A SIMULATION ANALYSIS OF RESOURCE DEFICITS, BORROWINGS, AND DEBTS BYUSINGTHREE-GAP MODEL: A CASE OF PAKISTAN

By

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DEDICATION

I dedicatedmyresearch thesis in gratitude and affection to mybeloved

Mother and Sisters. May Allah give them long life and health.

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In the name of Allah, The Most Gracious, The Most Compassionate, first of all I would like to say thanks to ALLAH Almighty, Who bestowed on me the precious opportunities to lead a good life. The completion of M.Phil.-Economics gives me a lot of confidence and hope to move forward.

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GDP	Gross Domestic Product
GNP	Gross National Product
CPI	Consumer Price Index
IMF	International Monetary Fund
MOF	Ministry of Finance
FDI	Foreign Direct Investment
GFS	Government Finance Statistics
OLS	Ordinary Least Square
GOP	Government of Pakistan
SBP	State Bank of Pakistan
PBS	Pakistan Bureau of Statistics
WB	World Bank

ABSTRACT

This study analyzes Pakistan's external and internal debt situations on the basis of a three-gap model in order to make future projections of the indicators of deficits, borrowings and debts for the next 30 years and simulate the effects of various policy changes on these projected indicators. The study finds that deficits and debt situations have improved substantially during the past 10 years following large inflows of foreign exchange through formal channels after the event of 9/11. However, in the recent years the inflow of foreign exchange has mainly been used to raise the value of rupee against the US dollar. This drive has helped reduce inflation rate but at the cost of stagnant foreign exchange holdings and, hence, losing the opportunity of retiring some of the expensive short-term debt and avoiding the need for further borrowings. During the past 10 years, the borrowings levels have remained low but with increased year to year variation, the possible reasons being commodity price hike in the world market, oil price fluctuations, unprecedented increase in remittance, volatile capital movements due to changing law and order situation and changes of political regimes. The recent trend in borrowing and debts also indicate a tendency towards the substitution of external debt by internal debt, mainly caused by a sharp increase in unrequited transfers (mostly remittances).

The study finds that the current account external and budget deficits are expected to continue increasing in future, thereby resulting in increased need to borrow externally as well as internally. The volume of external debt as a percentage of the GDP is expected to rise at relatively faster rates, whereas internal debt as a percentage of the GDP is expected to remain stable around. The study concludes that the benefits of foreign exchange inflow following the 9/11 event are not going to last any longer and Pakistan will have to search for more permanent solutions to its continuing problem of managing the fiscal and balance of payments situations.

Further, on the basis of simulation analysis the study confirms the presence of debt-growth trade-off and concludes the key to bypass the trade-of is productivity as represented by capital-output ratio. Any policies that aim to improve productivity are likely to produce the desirable result, that is, reduction in debt burden without growth sacrifice or increase in growth rate without added burden of debt. Thus all such measures that improve economic efficiency, human capital, knowledge, overall governance structure, general law-and-order situation and political stability are likely to bring fruitful results. Since these policies also need investment of resources it is important to conduct benefit-cost analysis of alternative ways of improving productivity and their feasibility.

CHAPTER 1

INTRODUCTION

1.1   Introduction

Resource deficits are easy to highlight but difficult to manage. They can play a significant role in the economic management of any developing country. Pakistan is facing serious resource constraints to which there is no easy solution. Resource deficiency in Pakistan can be reflected in low GDP growth rate that is about 3% in the last five years on average, low foreign exchange reserves despite having significant support from IMF, circular debt which has crippled the power sector and chocked the economic activity flows, lack of Investment and high average deficit in the last five years [Government of Pakistan (2014)].

A report of Institute of Public Policy (2014)[1] proposes that government should aim atreviving economic growth gradually from the present underlying rate of around 4 percent per annum to 6.5 percent over the next five years. However, such a prescription has to be scrutinized carefully because the reviving of economic growth is not free of cost. External debt can be interpreted as a price of economic growth, which has its own consequences. The Debt-growth link shows that when debt grows up to a certain level, the GDP growth rate slows down and may even turn negative. The debt overhang theories suggest that if there is some likelihood in the future that the debt will be larger

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[1]See: Institute of Public Policy, The state of the economy: Challenges and Response, Beaconhouse National University, Lahore, 2014, Chapter 3.

than a country's repayment ability, expected debt servicing costs will further discourage domestic and foreign investment and thus harm economic growth [Patilo*et al,* (2002)].

Pakistan'sreliance on foreign sources to finance investments and balance of payments and budget deficits has made it vulnerable to the donor'sconditionality's. According to Kemal (2001), while bilateral donors affect the choice of projects undertaken, multilateral institutions directly influence government's economic policies. Among the policies they insist upon, which are not all in the best interests of the Pakistan, are withdrawal of subsidies, increase in utility prices, extension of sales taxes to more products, reduction of import duties, reduced size of the government machinery and privatization. According to Thirlwall (2006), most of the developing countries today do not have the option to reduce the level of net resource inflows without a major disruption of their economies.

The Government of Pakistan accepted the stabilization program with the IMF[2] in September 2013 that requires not only reduction in fiscal deficit, large buildup of foreign exchange reserves and energy price adjustment but also significant structural changes such as large scale privatization and widening the tax net. The government has raised $2 billion from entering into the international bond market and has received grant of $1.5 billion from Saudi Arabia [State Bank of Pakistan (2014)]. It is clear from the past experience that whenever capital inflows were large, they produce economic boom, as was the case on three occasions – in 1964-66, 1984—87, and 2003-06 but they could not be sustained because they were never supported by domestic resource mobilization.

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[2]The amounts being provided are sufficient for the country to service itsprevious loan from the IMF. For the timebeing, the IMF is not injecting new money into Pakistan.

Pakistan's public debt (domestic and external debt) has increased by 2.7 times from Rupees 5602 billion in 2008 to Rupees 15996 billion in June 2014. In terms of debt to GDP ratio, coming down from the peak of 87% in the year 2000-01, the burden of debt has fluctuated around the average of 63% during the past 10 years,which is still above the limit [3] .The domestic financial sector of Pakistan remained safe from the direct consequences of global financial crunch in the 2007-08. However, macroeconomic imbalances in Pakistan expanded due to rise in the oil and food prices in the world market. Since no effective measures were taken to address the situation, the economy faced the balance of payment crisis. A large amount of debt has been accumulated to finance the budget deficit[Pakistan Debt Policy Statement (2010-2011)].

The decade of 1990s is an exemplary decade for the rising debt burden. In 1990s Pakistan faced serious fiscal deficit, growing public debt with minimal economic growth and rising poverty. A number of studies devoted to the causes and consequences of rising debt burden in the second half of 1990s, when the debt crises was at its peak [Hasan (1999), Tahir (1998), Ahmad and Ahmed (1998), Pasha and Ghaus (1999), etc.]. The most serious implication of the debt crises of the 1990s was the slowdown of economic activity accompanied by consistent budget and balance of payment deficits, which narrowed the range of fiscal options available to economic managers, resulting in declined public expenditures on health, education and social welfare.

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[3] The Fiscal Responsibility Law places a 60 percent limit on the public debt-to-GDP ratio.

The current situation of debt burden is better on comparative basis ifwe considerdebt to GDP ratio of 1990s but waiting for the unavoidable circumstances is not a good idea. Ahmad (2011) has emphasized that debt situation in Pakistan is not poor as it was during the 1990s and Pakistan does not fall in the domain of unsustainable debt but if the debt crises of the same magnitude reoccurs, the burden of its economic and social cost would be more severe this time. Also the composition of external debt has changed so there is a need to study the dynamics of borrowings and debts.

The debt problem is an inter-temporal problem and it can be analyzed in the framework of gap-models that are based on standard national income equilibrium condition and focus on low saving, low productivity and unsustainable economic growth as the key economic factors that explain high debt burden [Bacha (1990), Ahmad (2001)]. Gap models put together the national income and product, fiscal, monetary, and balance of payment accounts to give the reflection of what is going on in the real economy and inform macroeconomic debate in developing world [Taylor (1994)]. The central idea of gap analysis is that development tends to create situations which are characterized by a plentiful supply of all but one or a few of the factors required for continued development [Bruton (1969)]. These models can tell about specific policy issues and are easy to apply in real empirical situation for determining key constraints, debt projections, foreign resource requirement for developing countries, etc.

With the above background in view, the present study focuses on analyzing Pakistan's external and internal debt situations on the basis of three gap model. There is less work

done on the development and application of three-gap models in case of Pakistan.Specially, there are few significant studies that have considered the external and internal debt as interrelated issues. The main objective of the study is to make future projections of various indicators of resource deficits, borrowings and debts and simulate the effects of various policy changes on these projected indicators. This exercise is expected to highlight the importance of various policy measures that are often prescribed such as tax increase, government consumption expenditure cuts for the expected future debt scenario. Another aim in conducting the simulation analysis is to analyze the trade-off between economic growth and debt and to see the implications of low saving rate and low productivity.

1.2   Objectives of the study

The specific objectives of the study are as given below.

- The first objective of the study is to observe and analyze the past trends in the indicators of resource deficits, borrowings, debts and other liabilities over the period of 35 years, that is, the fiscal years 1980 to 2014.

- The second objective is to forecast the time paths of various measures of foreign and domestic resource deficits over the next 30 years under the framework of a three gap model.

- The final objective is to provide the alternative policy-based solutions to the expected debt burden over the next 30 years and to evaluate the economic cost of these solutions in terms of growth sacrifice.

1.3 Scheme of the Study

The study is divided into six chapters. Chapter 2 provides a brief review of literature on Two-Gap and Three-Gap models of debt and their relevance to developing countries. Chapter 3 will present the mathematical structure of the three-gap model. The details on data and state of the economy in the context of debt situation in Pakistan will be provided in Chapter 4. In chapter 5 the debt projections and simulation analysis are conducted by using the debt simulation model. Finally, summary and conclusion is elucidated in chapter 6.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

There existsa large amount of research on gap models of debt. This chapter discusses some of the theoretical and empirical studies on gap models. The gap model suggests how different factors can act as a binding constraint on economic growth in developing world. The relevance of gap models to the developing countries started with the development of the two-gap models of debt. Substantial theoretical and empirical work has been done on the two-gap models and little work has been done on the three-gap models of debts especially for the case of Pakistan. The main focus of this chapter is reviewing the literature on the two-gap and three-gap models of debt.

2.2 Two-Gap Models of Debt

Two-gap models emerged in 1960s in order to identify the key constraint on economic growth in developing countries. These models are rooted in post Keynesian growth models for closed economies as designed by Harrod (1939) and Domer (1946) in order to identify the pre-conditions needed to enable the industrialized economy to reach steady state equilibrium of growth. In the Harrod model of growth, the relationship between saving (s) and growth (g) is given by incremental capital-output ratio (c), which is the reciprocal of productivity of capital (p) that is $g = s/c$ or $g = s\,p$. Likewise, the growth can be express as the product of the incremental output-import ratio (m) and the ratio of investment-good imports to income (i), that is, $g = i\,m$. If there is lack of substitutability

between domestic and foreign resources, growth will be constrained by whatever factor is most limiting- domestic saving and foreign exchange.

Growth requires investment goods where the domestic provision requires saving and the foreign provision requires foreign exchange. Therefore, the concept and basic argument of dual gap analysis is that foreign borrowing must fill the larger of two gaps if the target growth rate is to be achieved. In national income accounting, an excess of investment over domestic saving is equivalent to a surplus of imports over exports. The national income equation from the expenditure side can be worked out to arrive at the twin gap equation: investment – savings = imports – exports. In accounting terms, the amount of foreign borrowing required to supplement domestic savings is the same whether the need is just for more resources for capital formation or for imports. The distinctive contribution of dual gap analysis that if foreign exchange is the dominant constraint, as presume for developing countries, it points to the dual role of foreign borrowing in supplementing not only deficient domestic saving but also foreign exchange.

The formal debate on the two gap models started with the work of Chenery and Bruno (1962) which recognized the foreign exchange as a constraint on economic growth. The study also found that the productivity of foreign aid in case of Israel ranged from 0.2 to 0.6 when domestic saving were the limit to growth and 0.4 to 1 when foreign exchange was the binding constraint. Later on Chenery and Strout (1966) used the two-gap model for the case of fifty less developed countries by using the data for the period 1957 to 1962. The study suggested two phases corresponding to lower and high development

level. In the first phase, the countries faced saving constraint for low development level which subsequently became foreign exchange constraint as the development occurred. By using the gap model, the study calculated the aid requirements for less developed countries for a given target rate of growth over the period 1962-1975.

The Two-Gap models give the justification for going for foreign assistance. By using the two gap model, Adelman and Chenery (1966) investigated the effect of foreign aid on Greece economic growth for the period 1950-1961. The study found that for the period up to 1957, savings were the binding constraint on growth and after that period, import-export gap became the binding constraint on growth. According to the results of the study, the productivity of additional unit of external assistance is 2.61 when saving and investment are not the limitation on growth while it is only 0.36 when saving constraint is binding. Whereas Mckinnon (1964) provided a general framework emphasizing how the trade possibilities and foreign capital transfers affect the growth process in developing economies. Following Chenery and Bruno (1962), Mckinn on argued that when foreign exchange constraint holds, foreign aid transfers will always have a proportionately greater effect on the feasible growth rate than if the saving constraint holds.

Cheneray and MacEvan (1966) can be considered as the first study that used the two gap model in case of Pakistan to projects the optimal patterns of growth and aid for the period 1963-85. Although Chenery and Strout (1966) also estimated the two-gap model for fifty developing countries and specifically found that the productivity of foreign aid is higher in case of Pakistan if foreign exchange has appeared as a binding constraint on economic

growth. Chenery and Mac Evan gave the detailed analysis and divided the whole period into three regimes; 1963-1975 (regime I), 1977-1981 (regime II) and 1982-1985 (regime III). The findings of the study show that the capacity constraint on total investment to be binding on growth in regime I and a foreign exchange constraint in regime II. Finally regime III was mentioned in the years when foreign aid was required to end.

The two gap models that were prominent during the decade of 1960s and 1970s disappear from the literature for some time period. In the 1980s, the debate on the two gap models shifted from just finding the key constraint on economic growth in developing countries to short-term projection of country's financing need. Bandera and Luckman (1985) simulate the functioning of Columbian economy and explore the policy options when foreign indebtedness acts as constraints on growth.

A number of empirical studies attempted to analyze the debt problem of Pakistan in the framework of two gap models. By using two gap models, these studies performed debt simulations and analyzed the effects of changes in certain parameters on external debt of Pakistan [Naqvi (1970), Chaudhary (1988), Burney (1988), Chaudhary and Ali (1996)].

Naqvi (1970) provided the theoretical underpinnings to understand the dynamic structure of government borrowing and public debt through a two-gap model. This study also updated the forecasts for resource deficits, the level of government borrowing and the size of public debt for the period 1965-85. Chaudhary (1988) used the two gap model to forecasts Pakistan's foreign dependency by the year 2010 and revealed that Pakistan could accumulate foreign loans up to 67% of its GNP if present trends of borrowing

continues. Further, the key finding of the study is that the trade policy has a more significant impact on the reduction of foreign loans than that of saving policy.

A study by Burney (1988) analyzed the foreign debt problem of Pakistan by exploring the determinants of debt to GDP ratio. The study concluded that the terms of borrowing and growth rate of GDP do not appear to significantly affect the variations in debt servicing ratios. Also the study predicts that unless the overall saving rate in the economy increases, the debt problem in Pakistan is likely to get more severe in the future. Chaudhary and Ali (1996) also used the two gap model developed by Bandera and Luckan (1988) to determine the nature of debt by estimating the concessions inherent in government loans.

The two gap models initially developed by Chenery and collaborators came under the attack on different front due to its limitations. Bruton (1969) criticize the idea of two gap model that aid can cover the saving gap and breaks the import bottleneck. Further, the study explained that the aid is gap producing instead of covering the gap by criticizing the key assumption of two-gap models that country is unable to transform its potential savings into exports. A country may transform a part of its domestic savings into capital if a country has its own capital goods sector. The study also criticized the fact that the two gap model do not incorporate investment in human capital for example the use of resources to improve education, health etc.

Joshi (1970) also criticized the key assumption of two-gap model and argued that the distinction between a saving constraint and foreign exchange constraint is of limited use from the perspective of pure trade theory. It is unrealistic to assume in two gap models that aid provides a one to one increment to the capital stock. The two-gap model allows no scope for substitution in production either between factors to relieve capital shortage and to reallocate factors between sectors. It is also unrealistic to assume a fixed capital output ratio in the two-gap model. Most importantly, the two gap model does not distinguish the contributions of the public and private sector to the overall resource deficits. It only considers the foreign debt problem whereas the domestic debt problem is also equally serious.

2.3   Three-Gap Models of Debt

Bacha (1990) tried to develop a macroeconomic framework of a three-gap model for a fiscally constraint highly indebted developing economy by considering the fiscal constraint as possible third gap besides saving and foreign exchange gaps. Solimano (1990) formalize his own three gap model for the Chilean economy framed in a disequilibrium setting to examine the macroeconomic constraints for sustained growth. Taylor (1994) sets out saving, foreign exchange, investment, and inflation gap restrictions on potential output growth and capacity utilization. The three-gap model suggests how fiscal factors with savings and foreign exchange factors can act as a binding constraint on economic growth in developing world. The idea is that growth rate possible under fiscal constraints and when they are relaxed can be understood as a "gap", which can represent macroeconomic disequilibrium (See, Taylor, 1991).

Fiscal constraints through public sector account introduce a gap between a potential and realized growth rates. The mechanism of fiscal gap as a constraint works through crowding in effect of public investment. Public investment supports private investment and hence accelerates the growth process. The growth will remain slow if fiscal gap acts as a binding constraint even if the other two constraints do not hold. Taylor (1993) has set up the three-gap framework which further used to calculations of global resource requirements for renewed output growth in the developing world. Taylor's versions of three-gap models have been applied on various developing countries and find evidence of crowding in the effect of public investment and how fiscal gap acts as binding constraint on growth. Sepehri and Lodhi (2005) point outthat an innovative feature of three-gap analysis is its explicit consideration for the interaction between capacity utilization and capacity growth rate. The idea is simple that developing economy can face fiscal, saving and foreign exchange constraints that may restrict it from fully utilizing its capacity.

All the criticisms of two-gap models carry over to three-gap models. In addition, three-gap models have been subject to a number of general criticisms regarding the assumptions of the models developed by Bacha (1990), Taylor (1993, and 1994) and Solimano (1990). The assumptions of three-gap model developed by Bacha (1990) are given as; no foreign capital inflows to the private sector, no market for government bonds, no capital flight, and no change in foreign reserves which can be criticized with respect to developing countries.

There is little work done on the development and application of Three-Gap models in case of Pakistan. Specially, there are only few significant studies that have considered the external and internal debt as interrelated issues. Ahmad (2000) used simulation with a three-gap dynamic model of macroeconomic equilibrium to analyze the public debt situation in Pakistan and assessed the alternative policy measures in controlling the size of the internal and external debt. The proposed policy package envisages 6% annual growth in real income. It recommends the replacement of public investment by private domestic investment. The package also recommends a gradual increase in taxes and a cut in public consumption expenditures. It is recommended that the growth rates of money supply and foreign exchange reserves be pegged to GDP, after increasing foreign exchange reserves to 4% of GDP. With the resulting stability in the price level and the exchange rate, a better budget position and the declining role of public sector, it is expected that real interest rates on domestic savings instruments will rise and the private sector will gain confidence. These factors along with improved growth performance, better capacity utilization and other measures are expected to raise the private saving rate and productivity. In an earlier study Ahmad (1997) predicted the net foreign and domestic borrowings and foreign and domestic debts in Pakistan over the period 1995-96 to 2019-20. The study predicted that the ratios of current account deficit and net domestic borrowing to the GDP would grow respectively by 2.6% and 4.1% per annum.

Three-Gap models have been around for some time employs to understand economic growth in Pakistan. Iqbal (1995) and Iqbal*et al*., (2000) have considered a three-gap model in their analysis of growth constraints. On the other hand, Ali and Haider (2014)

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have used an extended version of three-gap model consistent with Taylor (1993). In his most updated study, Iqbal et al., (2000) has used the three gap framework to analyze the contribution of adjustment policy reforms, that began in 1980s by the World Bank and IMF, and external shocks to macroeconomic performance of Pakistan by using the data from 1970 to 1993. In other study, Iqbal (1995) has used a three gap model developed by Solimano (1990) to examine the foreign exchange, fiscal, and savings constraints to Pakistan's economic growth over the period 1977-92.Iqbal (1996) has pointed out the six possible combinations of three gaps in an open economy as display in Figure 2.1.The situation of Pakistan's economy depict the case 1 where private saving is greater than private investment but imports are greater than exports and government expenditures are greater than total revenue.

Figure 2.1: Possible combination of three gaps in an open economy
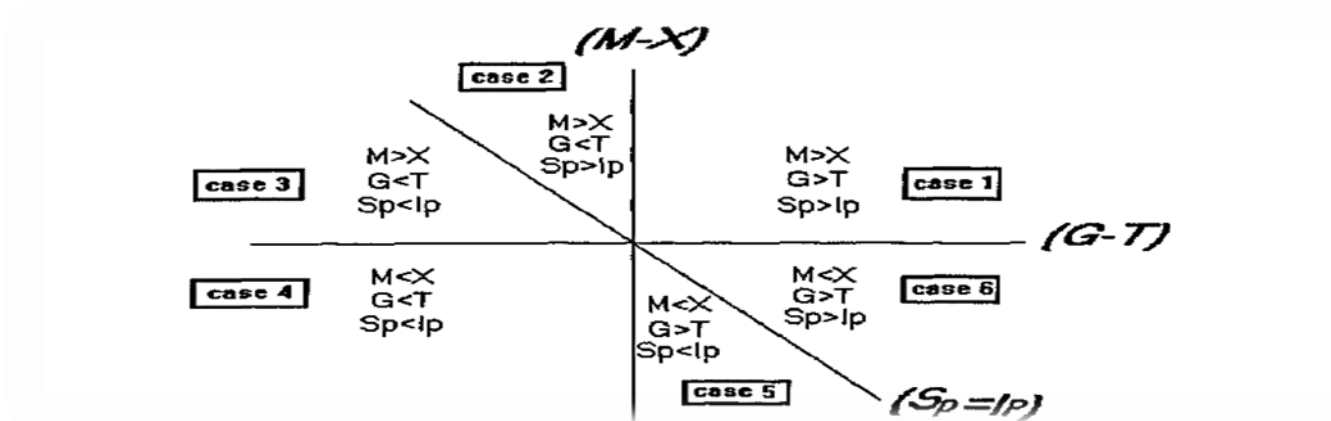
Source: Adopted from Iqbal (1996)

Chaudhary, et al (2000) has given its insight regarding the dependency of South Asian economies on foreign resources. The study identified future trends of foreign borrowings and its expected burden by using the three-gap model. The rescheduling of foreign debt of Pakistan in 1999-2000 is an indicator of poor capacity to repay the debt of Pakistan. Furthermore the significance of public debt issue can be seen in term of external gap and internal gap. External gap is larger than internal gap for Pakistan, India, Bangladesh, Sirilanka, Nepalese and Maldives. For Bhutan, the internal gap is larger than external gap. Overall, for South Asian countries the debt-servicing ratio, which is now 5 percent of their GDP, will increase to over 14 percent by the year 2014-15.

2.4   Summary Table of Preliminary Literature

The summary of the preliminary literature review is given below in Table 2.1.

Table 2.1: Summary Table of Preliminary Literature

Author/ study	Focus of the Study	Model/Methodology	Results/Conclusions
Ahmad (2000)	Analyze the public debt situation in Pakistan Study the effects of various fiscal and monetary measures on the debt position.	Three-Gap Model	➢ The study anticipates that Pakistan internal debt will not improve and external debt position will further deteriorate in the future. ➢ Retiring external debt through privatization holds no ground.
Ali and Haider (2014)	Analysis of the constraints to economic growth in Pakistan by using Three-Gap approach.	Formulization and estimation of Three-Gap Model	➢ Estimation results along with counterfactual simulation show that both foreign exchange and fiscal gaps restrain economic growth in Pakistan. ➢ The fiscal gap appears to be more binding constraint than foreign exchange gap. ➢ Improving tax revenue could help provide the fiscal space require for long run economic growth.
Ahmad (1996)	Explore the effects of policies of attracting foreign investment in reducing the size of debt.	Conducted Simulations by using Three-Gap Model	➢ When foreign capital is sufficiently responsive to changes in its rate of return, foreign debt can be reduced by the policy of increasing rate of return on foreign capital at the expense of domestic debt. ➢ The burden of foreign debt can be reduced by selling public sector enterprises to foreign investors does not hold much ground
Chaudhary, et al (2000)	Analyze the dependency of South Asian economies on foreign resources.	Three-Gap Model	➢ An important finding of the study is that the external gap is larger than internal gap for Pakistan, India, Bangladesh, Srilanka, Nepalese and Maldives. For Bhutan, the internal gap is larger than external gap. Overall, for South Asian countries the debt-servicing ratio, which is now 5 percent of their GDP, will increase to over 14 percent by the year 2014-15.
Iqbal, et al (2000)	Assess the extent to which key adjustment policy	Three-Gap Framework	➢ The central finding of the study is that in broad terms, the adjustment programs resulted in a substantial improvement in

Table 2.1: Summary Table of Preliminary Literature

Author/ study	Focus of the Study	Model/Methodology	Results/Conclusions	
	variables and external shocks have influenced the macroeconomic performance of Pakistan's economy over the period 1970-1993.		macroeconomic performance of Pakistan's economy. ➤ The adverse effects associated with external shocks appearedto have been severe during the adjustment process.	
Chaudhary (1988)	Forecasts Pakistan's foreign dependency by the year 2010.	Two-Gap Model	➤ The key finding of the study is that the trade policy has a more significant impact on the reduction of foreign loans than that of saving policy.	
Burney (1988)	Analyzed the foreign debt problem for Pakistan by exploring the determinants of debt-GDP ratio.	Two-Gap Model	➤ The study concluded that the terms of borrowing and growth rate of GDP do not appear to significantly affect the variations in debt servicing ratios. Also the study predicts that unless the overall saving rate in the economy increases, the debt problem in Pakistan is likely to get more severe in the future.	
Chenery and MacEvan (1966)	Used two-gap model for the case of Pakistan to project the optimal pattern of growth and aid for the period 1963-1985.	Two-Gap Model	➤ The study divide the whole period into three regimes, 1963-1975 (regime 1), 1977-81 (regime II), and 1982-85 (regime III).Capacity constraint on total investment to be binding on growth in regime I and foreign exchange on regime II.	
Chenery and Strout (1966)	By using the data for the period 1957-62, applied two-gap model on fifty developing countries.	Two-Gap Model	➤ Productivity of foreign aid was much higher when foreign exchange was the limiting factor on economic growth of Pakistan.	
Chenery and Bruno (1962)	Recognized two binding constrained on growth i.e. saving and foreign exchangeconstraint.	Two-Gap Model	➤ Foreign exchange prove to be the binding constrained on economic growth of Israel. Productivity of foreign aid in Israel range from 0.4-1 when foreign exchange was the binding constraint, while it range from 0.2 to 0.6 when domestic saving were limit to growth	

CHAPTER 3

A THREE GAP DYNAMIC MODEL OF
RESOURCE DEFICITS, BORROWINGS, LIABILITIES AND DEBTS

3.1   Introduction

We consider a three gap model like the one proposed in Ahmad (2000) with certain

modifications in the treatment of interest and rental rates. In three-gap model, the internal

deficit consisted of two components, public and private sector deficits. The third deficit is

the external deficit. Furthermore, it follows from the national income accounting

identities that the internal and external deficits are mirror images of each other.

3.2   Variables And Notations

For the model to be presented below we use the following notations.

i = A subscript indicating time

a_i^{ED} = Amortization rate of external debt in dollars

BM_i = Base money

C_i^G = Government consumption expenditure

C_i^P = Private consumption expenditure

CBD_i = Current account budget deficit

CED_i = Current account external deficit

e_i = Rate of exchange rate depreciation

ED_i = External debt

ER_i = Nominal exchange rate

FDI_i = Private foreign direct investment

FDK_i = Stock of private foreign direct capital

FEI_i = Private foreign equity investment

FEK_i = Stock of private foreign equity capital

FER_i = Foreign exchange reserves

G_i^{FDK} = Growth rate of foreign direct capital in real terms

G_i^{FEK} = Growth rate of foreign equity capital in real terms

G_i^{FER} = Growth rate of foreign exchange reserves in real terms

G_i^{BM} = Growth rate of base money in nominal terms

G_i^{Y} = Growth rate of real

GDP

g_i = Marginal rate of government consumption expenditure

GEB_i = Gross external borrowing

I_i^{G} = Government investment expenditure

I_i^{P} = Private investment expenditure

ID_i = Internal debt

INT_i^{ED} = Interest payment on external debt

INT_i^{ID} = Interest payment on internal debt

k_i = Marginal capital-output ratio

M_i = Imports

NEB_i = Net external borrowing

NIB_i = Net internal borrowing

PBD_i = Primary budget deficit

PED_i = Primary external deficit

PPD_i = Primary private sector's deficit

r_i^{ED} = Rate of interest on external debt denominated in dollars

r_i^{ID} = Real rate of interest on internal debt

RNT_i^{FDK} = Rental on foreign direct capital

RNT_i^{FEK} = Rental on foreign equity capital

RNT_i^{FK} = Rental on total foreign capital

S_i^{G} = Government savings

S_i^{P} = Private savings

s_i = Marginal private saving rate (out of private disposable income)

T_i = Tax and non-tax government revenues

t_i = Marginal tax rate

U_i = Unrequited transfers

u_i = Marginal rate of unrequited transfers

X_i = Exports

Y_i = Gross domestic product (GDP)

δ_i = Depreciation rate of private foreign direct capital

γ_i = Government's share in investment expenditure

π_i = Domestic inflation rate

ρ_i^{FDK} = Real rental rate on private foreign direct capital

ρ_i^{FEK} = Real rental rate on private foreign equity capital

3.3   The Model

It is to be noted at the outset that all the quantities including parameters are allowed to change over time. Thus, even though in numerical simulations, we may fix the values of certain parameters over some period of time, here all the parameters are treated as variables. The model is constructed by starting with the primary deficits, which account for the excess of consumption spending over income and do not include interest and rental payments or receipts. The primary deficits are given by and can be inter-related as follows.

$$PBD_i = C_i^G + I_i^G - T = I_i^G - S_i^G, \tag{3.1}$$

$$PPD_i = C_i^P + I_i^P + T_i - Y_i - U_i = I_i^P - S_i^P, \tag{3.2}$$

$$PED = PBD_i + PPD_i = \left(C_i^G + C_i^P + I_i^G + I_i^P\right) - \left(Y_i + U_i\right) = M_i - X_i - U_i,$$ (3.3)

To trace the time paths of these resource deficits, we perform certain algebraic steps as detailed below. The primary public and private sector deficits can be traced as follow.

$$PBD_i = I_i^G - S_i^G = \frac{I_i^G}{I_i} \frac{I_i/P_i}{\varDelta(Y_{i+1}/P_{i+1})} \frac{\varDelta(Y_{i+1}/P_{i+1})}{Y_i/P_i} \frac{Y_i/P_i}{Y_{i-1}/P_{i-1}} \frac{P_i}{P_{i-1}} Y_{i-1}$$

$$- \frac{T_i - C_i^G}{Y_i} \frac{Y_i/P_i}{Y_{i-1}/P_{i-1}} \frac{P_i}{P_{i-1}} Y_{i-1}$$ (3.4)

$$= \gamma_i \kappa_i G_{i+1}^Y \left(1 + G_i^Y\right)\left(1 + \pi_i\right)Y_{i-1} - \left(t_i - g_i\right)\left(1 + G_i^Y\right)\left(1 + \pi_i\right)Y_{i-1}$$

$$PPD_i = I_i^P - S_i^P = \frac{I_i^P}{I_i} \frac{I_i/P_i}{\Delta(Y_{i+1}/P_{i+1})} \frac{\Delta(Y_{i+1}/P_{i+1})}{Y_i/P_i} \frac{Y_i/P_i}{Y_{i-1}/P_{i-1}} \frac{P_i}{P_{i-1}} Y_{i-1}$$

$$- \frac{S_i}{Y_i + U_i - T_i} \frac{Y_i + U_i - T_i}{Y_i} \frac{Y_i/P_i}{Y_{i-1}/P_{i-1}} \frac{P_i}{P_{i-1}} Y_{i-1}$$ (3.5)

$$= \left(1 - \gamma_i\right)\kappa_i G_{i+1}^Y \left(1 + G_i^Y\right)\left(1 + \pi_i\right)Y_{i-1} - s_i\left(1 + u_i - t_i\right)\left(1 + G_i^Y\right)\left(1 + \pi_i\right)Y_{i-1}$$

Further collecting the terms and using the relationship between the three primary resource deficits as given by equation (3), the following results are obtained.

$$PBD_i = \left(1 + \pi_i\right)\left(1 + G_i^Y\right)\left[\gamma_i \kappa_i G_{i+1}^Y - \left(t_i - g_i\right)\right]Y_{i-1},$$ (3.6)

$$PPD_i = \left(1 + \pi_i\right)\left(1 + G_i^Y\right)\left[\left(1 - \gamma_i\right)\kappa_i G_{i+1}^Y - s_i\left(1 + u_i - t_i\right)\right]Y_{i-1},$$ (3.7)

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$$PED_i = (1 + \pi_i)(1 + G_i^Y)\left[\kappa_i\, G_{i+1}^Y - (t_i - g_i) - s_i(1 + u_i - t_i)\right]Y_{i-1}, \qquad (3.8)$$

Before proceeding further, it is necessary to specify the assumptions regarding how inflation and exchange rate movements are incorporated in the stocks and interest/rental payments of debts and liabilities. Furthermore, it is also important to explicitly specify how various stock variables are linked with the corresponding flow variables.

Since the internal deficits are measured in local currency and there exists duality between internal and external deficits, we measured all the resource deficits in local currency. It follows that to obtain consistent aggregation, all the interest and rental payments, whether these are paid locally or overseas, are also to be measured in local currency.

It is assumed that interest rate on internal debt and the rental rate on foreign equity capital are subject to full Fisher effects,[4] which means that both the rates adjust one to one with the current inflation rate. On the other hand, foreign direct capital, being stocked in physical terms, is fully indexed for inflation and, therefore, the rental rate on foreign direct capital does not incorporate inflationary factor. Finally, assuming that the purchasing power parity holds, the exchange rate depreciation factor is equal to the ratio of domestic inflation factor to foreign inflation factor. This means that external debt is also indexed for domestic inflation. It also follows that the interest rate on external debt do not include inflationary factor.

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[4] According to the Fisher effect, under perfect foresight and with flexible prices and in the absence of any shocks, nominal interest rate fully adjusts to the expected inflation to yield a constant real rate of interest. Likewise, if the foreign inflation rate is constant, the nominal exchange rate will also adjust with changes in the domestic inflation to yield a constant real exchange rate (see Tanzi*et al.* (1988)).

Under these specific assumptions the time paths of certain flow variables are given by:

$$FDI_i = \frac{P_i}{P_{i-1}} \frac{FDI_i/P_i}{FDK_{i-1}/P_{i-1}} FDK_{i-1} + \left(1 + \pi_i\right)\left(G_i^{FDK} + \delta_i\right)FDK_{i-1} \tag{3.9}$$

$$FDK_i = \left(1 - \delta_i\right)\frac{FDK_{i-1}}{P_{i-1}} P_i + FDI_i = \frac{P_i}{P_{i-1}}\left(1 - \delta_i\right)FDK_{i-1} + \frac{P_i}{P_{i-1}} \frac{FDI_i/P_i}{FDK_{i-1}/P_{i-1}} FDK_{i-1}$$

$$\tag{3.10}$$

$$= \left(1 + \pi_i\right)\left[\left(1 - \delta_i\right) + \left(G_i^{FDK} + \delta_i\right)\right]FDK_{i-1} = \left(1 + \pi_i\right)\left(1 + G_i^{FDK}\right)FDK_{i-1}$$

$$FEI_i = \frac{P_i}{P_{i-1}} \frac{FEI_i/P_i}{FEK_{i-1}/P_{i-1}} FEK_{i-1} = \left(1 + \pi_i\right)G_i^{FEK} FEK_{i-1} \tag{3.11}$$

$$FEK_i = \frac{FEK_{i-1}}{P_{i-1}} P_i + FEI_i = \frac{P_i}{P_{i-1}} FEK_{i-1} + \frac{P_i}{P_{i-1}} \frac{FEI_i/P_i}{FEK_{i-1}/P_{i-1}} FEK_{i-1}$$

$$\tag{3.12}$$

$$= \left(1 + \pi_i\right)\left(1 + G_i^{FEK}\right)FEK_{i-1}$$

$$\Delta FER_i = \frac{P_i}{P_{i-1}} \frac{\Delta FER_i/P_i}{FER_{i-1}/P_{i-1}} FER_{i-1} = \left(1 + \pi_i\right)G_i^{FER} FER_{i-1} \tag{3.13}$$

$$FER_i = \frac{FER_{i-1}}{P_{i-1}} P_i + \Delta FER_i = \frac{P_i}{P_{i-1}} FER_{i-1} + \frac{P_i}{P_{i-1}} \frac{\Delta FER_i/P_i}{FER_{i-1}/P_{i-1}} FER_{i-1}$$

$$\tag{3.14}$$

$$= \left(1 + \pi_i\right)FER_{i-1} + \left(1 + \pi_i\right)G_i^{FER} FER_{i-1} = \left(1 + \pi_i\right)\left(1 + G_i^{FER}\right)FER_{i-1}$$

$$BM_i = BM_{i-1} + \frac{BM_i - BM_{i-1}}{BM_{i-1}} BM_{i-1} = \left(1 + G_i^{BM}\right) BM_{i-1} \tag{3.15}$$

Similarly, we can work out the time paths of the interest and rental payments, etc. on debts and other liabilities as follows.

$$INT_i^{ED} = r_i^{ED} \frac{ED_{i-1}}{ER_{i-1}} ER_i = \left(1 + e_i\right) r_i^{ED} ED_{i-1} \tag{3.16}$$

$$AMT_i^{ED} = a_i^{ED} \frac{ED_{i-1}}{ER_{i-1}} ER_i = \left(1 + e_i\right) a_i^{ED} ED_{i-1} \tag{3.17}$$

$$INT_i^{ID} = \left(1 + r_i^{ID}\right) \frac{ID_{i-1}}{P_{i-1}} P_i - ID_{i-1} = \left[\left(1 + \pi_i\right)\left(1 + r_i^{ID}\right) - 1\right] ID_{i-1} \tag{3.18}$$

$$RNT_i^{FDK} = \rho_i^{FDK} \frac{FDK_{i-1}}{P_{i-1}} P_i = \left(1 + \pi_i\right) \rho_i^{FDK} FDK_{i-1} \tag{3.19}$$

$$RNT_i^{FEK} = \left(1 + \rho_i^{FEK}\right) \frac{FEK_{i-1}}{P_{i-1}} P_i - FEK_{i-1} = \left[\left(1 + \pi_i\right)\left(1 + \rho_i^{FEK}\right) - 1\right] FEK_{i-1} \tag{3.20}$$

It is now simple to determine that time paths of current account external and budget deficits, which are given as under.

$$CED_i = PED_i + INT_i^{ED} + RNT_i^{FDK} + RNT_i^{FEK} \tag{3.21}$$

$$CBD_i = PBD_i + INT_i^{ED} + INT_i^{ID} \tag{3.22}$$

External borrowing is needed to partially finance current account deficit, to the extent that the latter is not offset by private direct or equity investment, and to build up the foreign exchange reserves (see Cohen, 1988). Gross external borrowing is sum of the net external borrowing and amortization payments (partial retirement of the existing external debt). That is;

$$NEB_i = CED_i - \left(FDI_i + FEI_i\right) + \Delta FER_i \tag{3.23}$$

$$GEB_i = NEB_i + AMT_i^{ED} \tag{3.24}$$

Next we consider net internal borrowing which, along with monetary borrowing and external borrowing (net of the increase in foreign exchange reserves), is needed to finance the budget deficit. Therefore,

$$NIB_i = CBD_i - \left(NEB_i - \Delta FER_i\right) - \Delta BM_i \tag{3.25}$$

Once the time paths of net external and net internal borrowings have been determined, it becomes quite straight forward to trace the time paths of the external and internal debts, which are given as under.

$$ED_i = \frac{ED_{i-1}}{ER_{i-1}} ER_i + NEB_i = \left(1 + e_i\right) ED_{i-1} + NEB_i \qquad (3.26)$$

$$ID_i = ID_{i-1} + NIB_i \qquad (3.27)$$

The above is the complete description of the dynamic model of resource deficits, borrowings, other liabilities and debts. In order to estimate the actual values of various variables of interest over any specific forecasting horizon, we need to know the initial values of certain variables and the values of the parameters involved. This task is left to the next two chapters.

CHAPTER 4

DATA AND DESCRIPTIVE ANALYSIS

4.1   Data

In order to make future forecasts of resource deficits, borrowings, liabilities and debts by using the model developed in chapter 3, a large amount of past data are needed. Most of the data are directly available from official data sources and we have mainly relied on three sources, which are *Pakistan Economic Survey*, Ministry of Finance; *Fifty years of Pakistan*, Pakistan Bureau of Statistics and *Annual Report*, The State bank of Pakistan. Certain data are not directly available and are, therefore, derived from the other related variables' data using standard definitions and accounting identities. Where needed, proxy data are derived as within-sample forecasts on the basis of regression analysis.

There are several definitions of external debt and we consider for analysis the public and publically guaranteed external debt. The reason is that this component of debt truly represents the burden on public at large. The other forms of liabilities like private loans from abroad are the private liabilities. Similarly, the stock of foreign capital is not the result of borrowing; it accumulates on account of voluntary investment of foreign agents in Pakistan. Obviously both these and other similar categories cannot be classified as foreign debt. In domestic debt we take the sum of three broad categories of debt, namely permanent debt (long-term debt through long-term bonds and prize bonds), floating debt (short-term debt through treasury bills) and unfunded debt (National Saving Schemes). In any case all the data on debt related variables like the debt stocks, borrowings and debt servicing are obtained from *Annual Report*, The State bank of Pakistan.

The data on national income accounts, particularly the public and private consumption and the public and private investment, are taken from various issues of *Pakistan Economic Survey*, Ministry of Finance and *Fifty years of Pakistan*, Pakistan Bureau of Statistics. The data on public finance statistics like tax and non-tax revenues of federal and provincial governments and profits/surpluses of the public sector enterprises are also taken from the same two sources. Similarly, the data on GDP deflator and exchange rate of Pak rupees vis-à-vis the US dollar are also derived from the same sources.

All the data related to balance of payments such as exports, imports, unrequited transfers, interest and rental incomes/payments direct and equity capital flows and changes in foreign exchange reserves are taken from *Annual Report*, The State bank of Pakistan. The data on money are also taken from the same source.

Quite a few other variables like public and private savings, stocks of foreign direct and equity capital and the rental payments on the two stocks of capital are not directly available. The data on these variables are constructed using certain approximations. The stocks of direct and equity capitals are obtained by accumulating the net foreign direct and equity investment inflows beginning from the earliest year for which the data could be traced (1950s) and employing 5% depreciation rate on the direct capital. The data on rental payments on the two forms of foreign capital are not separately given. The rental payments are derived by first estimating the rental rates on the basis of the following regression equation.

$$RNT_i^{FK} = \rho^{FDK} FDK_{i-1} + \rho^{FEK} FEK_{i-1} + U_i \qquad (4.1)$$

where, $RNT_i^{FK} = RNT_i^{FDK} + RNT_i^{FEK}$ is the rental payment on total foreign capital, while

ρ^{FDK} and ρ^{FEK} are the rental rates on foreign direct and equity capitals to be estimated as parameters. The euqtion is initially estimated by OLS. However, the random error term is found to have the first and second order autocorrelation. Based on further diagnostics and performance indications, the first order autoregressive and the second order moving average processes are imposed on the errors and the resulting estimates indicate no further trace of autocorrelation.

Once the two rental rates have been estimated the series of rental payments on direct and equity foreign capital are derived as follows.

$$\left(RNT_i^{FDK} \right)^* = \left(\rho^{FDK} \right)^* FDK_{i-1} \qquad (4.2)$$

$$\left(RNT_i^{FEK} \right)^* = \left(\rho^{FEK} \right)^* FEK_{i-1} \qquad (4.3)$$

Only a small number of values were found to be missing in the entire data. These are approximated by using the trend of given data in the adjacent years.

4.2   Descriptive Statistics

In this section, we present the past trends in the key variables that related to resource deficits, borrowings and debts. All the presentations are in the form of line charts that indicate the trend and fluctuations in data for the period of past 35 years, that is, the fiscal year, 1980 to 2014. As can be seen from the dynamic model of debt presented in Chapter 3, the process of debt accumulation can be understand by starting from the very basic concepts of expenditure-income gaps in the public and private sectors that can also be translated into investment saving gaps.

Figures 4.1, 4.2 and 4.3 show the time paths of investment, savings and primary resource deficits in the public and private sectors. Figure 4.1 shows that the primary budget deficit has improved significantly during the decades of 2000s and 2010s to the extent that it has turned into surplus in the recent years. This improvement has taken place mainly due to declining rate of investment expenditure in the public sector and to some extent due to improved savings, the latter caused by declining public consumption expenditure. Thus the public sector's primary budget position has improved at the cost of reduced spending in the public sector.

Figure 4.2 indicates that the private sector's primary deficit shows significant deterioration in the recent years, averaging around zero percent of GDP in the recent years after remaining negative (in surplus position) during the decades of 1980s, 1990s and early 2000s. This deterioration can be attributed to declining private savings except for the surge during the second half of the decade of 2000s.

In Figure 4.3 the time paths of the primary resource deficits are shown, which indicate that the improvement in the primary budget deficit has almost been offset by deterioration in the primary private sector's deficit, leaving the overall primary deficit, which also equals the primary external deficit, fluctuate with no long-run definite direction. The three figures also show that all the primary resource deficits reached very impressive positions during the fiscal years 2003 to 2004, following the large scale inflows of unrequited transfers (mostly in the form of remittances) and other capital flows through formal channels after the event of 9/11.

Figure 4.1: Public Sector's Investment and Savings Gap (Percentages of GDP)
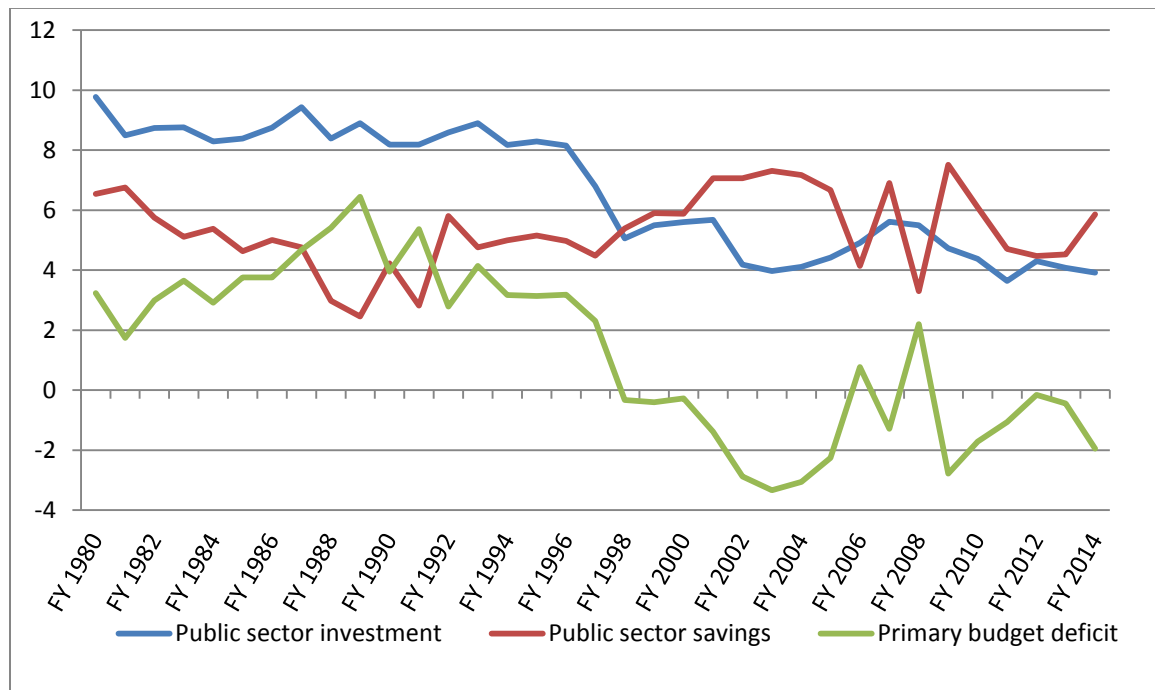
Figure 4.2: Private Sector's Investment and Savings Gap (Percentages of GDP)
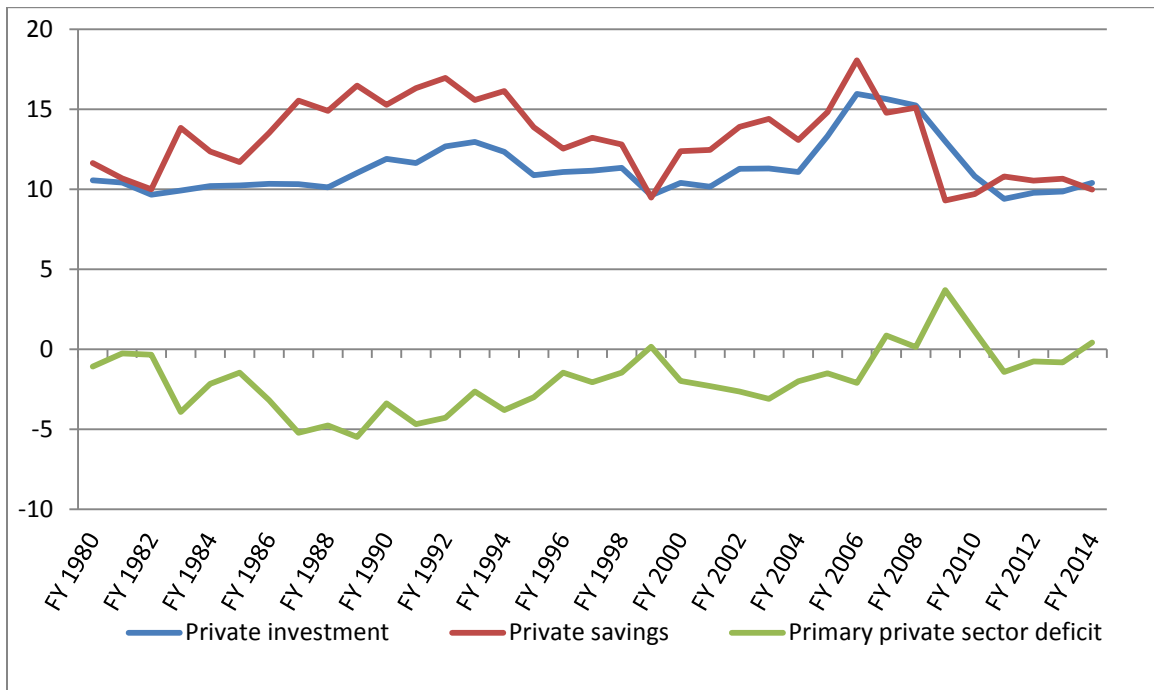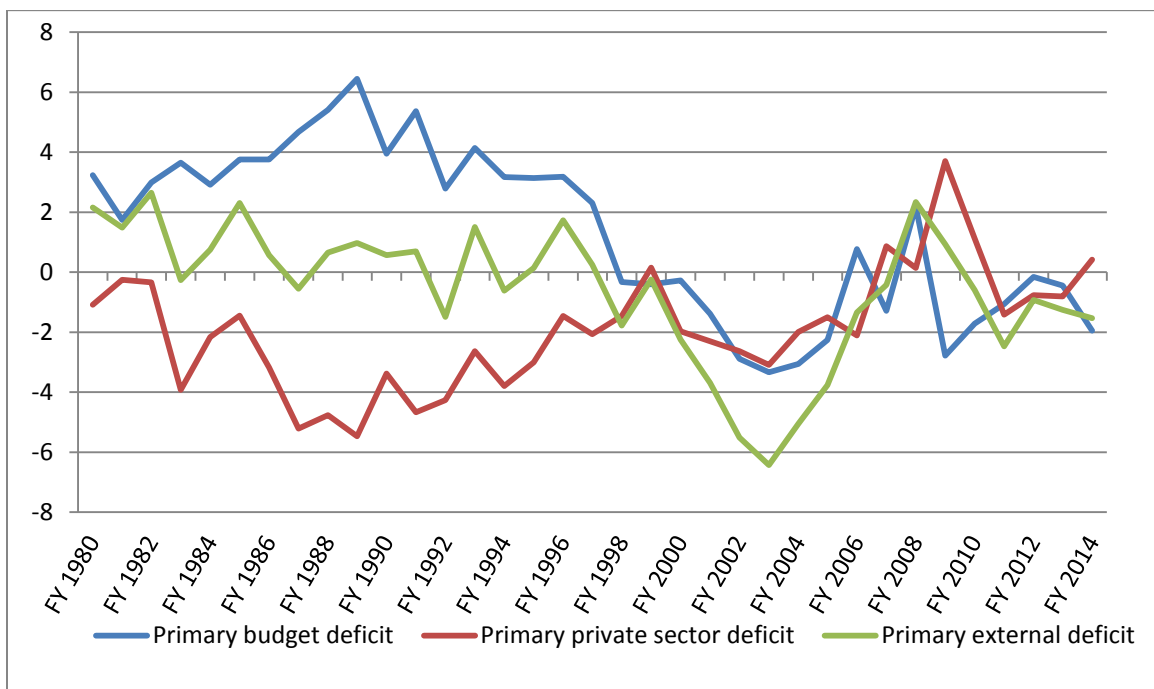

Figure 4.3: Primary Resource Deficits (Percentages of GDP)

We now discuss the data on certain important flows of foreign exchange that play crucial role in the determination of balance of payments and, hence, the need to borrow. These are the net inflows of unrequited transfers, foreign direct and equity investments and changes in foreign exchange reserves. Figure 4.4 presents the trends. Unrequited transfers to Pakistan are the most important component of foreign exchange flow after trade flows. This source makes much more significant contribution to foreign exchange earnings as compared to foreign direct or equity investment. This has been especially the case during the past twelve years following the 9/11 event.

We can also see from the figure 4.4 that accumulation of foreign exchange reserves moves somewhat pro-cyclically with the inflow of unrequited transfers until early 2000s but this association broke down during the past 10 years or so. Particularly during the recent years, the inflow of foreign exchange has been used to maintain the value of rupee against the US dollar and in the most recent period to even appreciate the exchange rate despite experiencing higher inflation rate in Pakistan as compared to the USA. This drive has helped reduce inflation rate but at the cost of stagnant foreign exchange holdings and, hence, losing the opportunity of retiring some of the expensive short-term debt and avoiding the need for further borrowings.

Figure 4.5 traces the time paths of various indicators of debt servicing and rental payments on foreign capital. The figure shows that interest payments on internal debt account for the greatest burden on the national exchequer, followed by amortization of foreign debt and interest payments on foreign debt. It may be noted here that amortization

of foreign debt becomes a burden when the country is in severe financial stress and cannot find room to meet its debt retirement obligations. Pakistan faced this kind of situation in the 1990s when its foreign exchange reserves depleted to very low level. However, in the present day situation amortization of foreign debt should be seen as an indication of Pakistan's ability to earn enough foreign exchange to retire the debt. For example, following the 9/11 event Pakistan was able to retire foreign debt to the tune of more than 7% of the GDP during the fiscal year 2002.

The time paths of the current account deficits that include interest and rental payments (but not the amortization payments, which are part of the capital account balance) along with primary deficits are shown in Figure 4.6. It can be seen that the two deficits have move over the years very closely with the correlation coefficient as high as equal to 0.75 despite measuring the two variables as ratios to the GDP, thus removing most of the secular trend, and having a moderate sample of 35 observations. It appears therefore that current account external deficit is mainly driven by the current account budget deficit. The two deficits showed significant improvements, the external debt turning into surplus, almost immediately after the 9/11 event. This was followed by rising deficits till the fiscal year 2008. The trend again turned in the favorable direction with the two deficits showing significant improvements during the recent years.

Figure 4.4: Foreign Exchange Flows (Percentages of GDP)

- 4 Unrequited transfers
- 4 Foreign direct investment
- 4 Foreign equity investment
- 4 Change in foreign exchange reserves
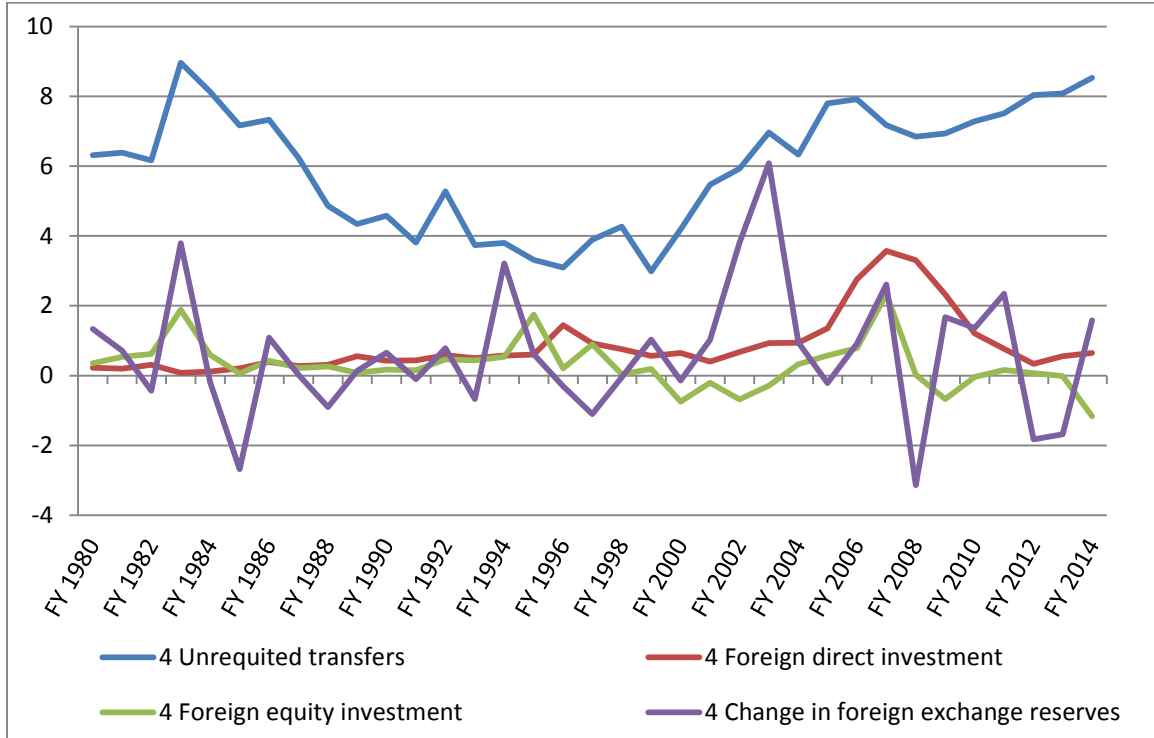
Figure 4.5: Servicing of Debt and Foreign Liabilities (Percentages of GDP)

- Interest payments on external debt
- Amortization payments on external debt
- Interest payments on internal debt
- Rental payments on foreign capital
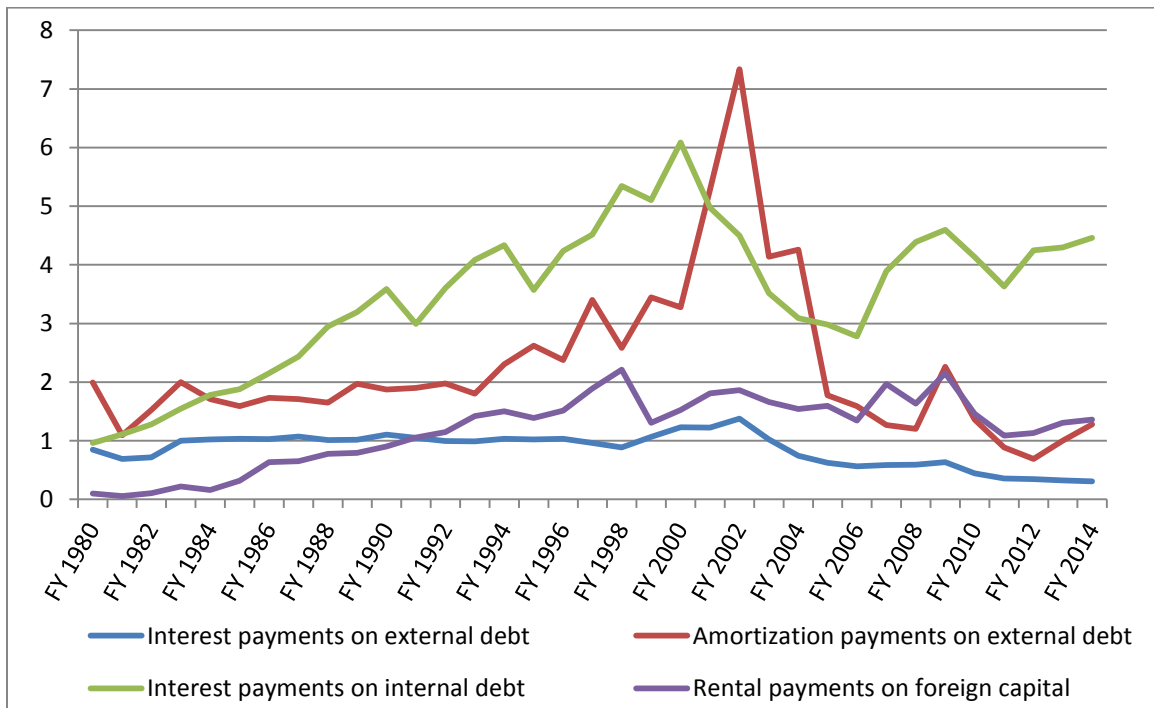
Figure 4.6: Current Account Deficits (Percentages of GDP)
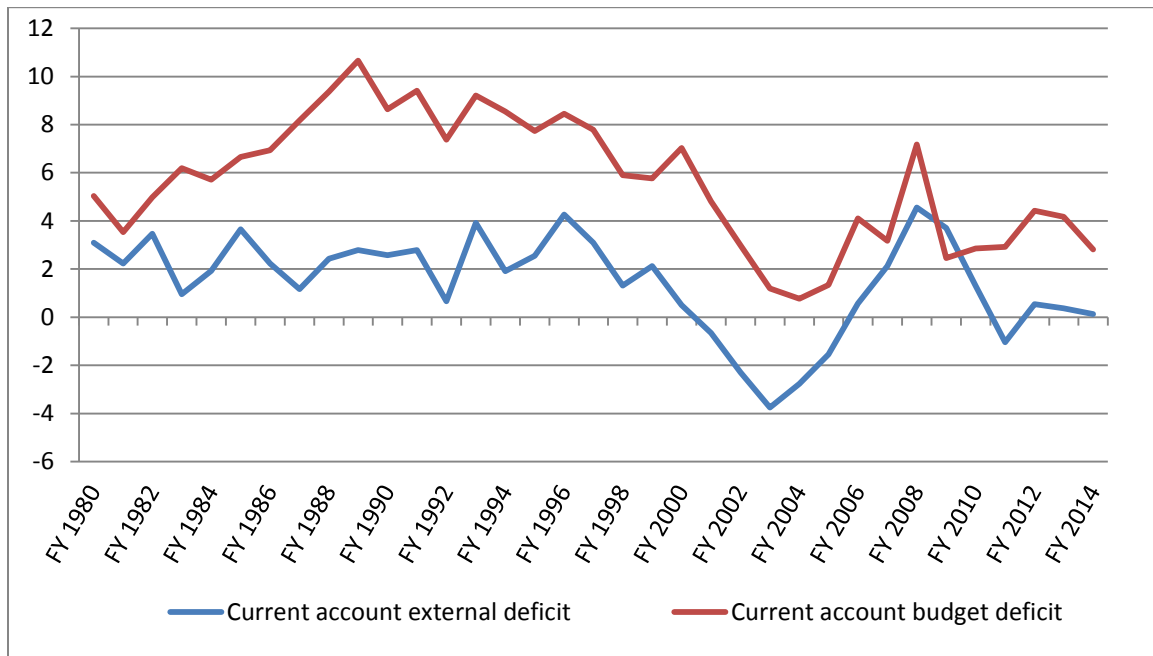
Figure 4.7 shows the time paths of external and internal borrowings. The general trend of borrowing shows similar patterns as the current account deficits shows because borrowings are mainly arranged to meet the deficits. Discrepancy may, however, arise because internal deficit may partially be finance by money creation, external deficits may partially be finance by foreign investment and external borrowings can change due to built-up or depletion of foreign exchange reserves. In any case we can see that the long run level of borrowing remained almost throughout starting from the fiscal year 1980 till the fiscal year 2001. From the year 2002 onwards the borrowing pattern became more volatile, starting with significant improvement with the influx of foreign exchange through official channels following the 9/11 event. During the past 10 years or so the borrowings levels have remained low on average but with more year to year variation.

Several factors that contributed to this volatile pattern of borrowings include commodity price hike in the world market, oil price fluctuations, unprecedented increase in remittance, volatile capital movements due to changing law and order situation (especially related to terrorists' acts) and changes of political regimes in Pakistan. The increase in remittances means less reliance on external borrowing and, hence, increased dependence on internal borrowing to meet the government's current budget deficit, which has not change much in qualitative or even quantitative terms.

Figure 4.7: External and Internal Borrowings (Percentages of GDP)
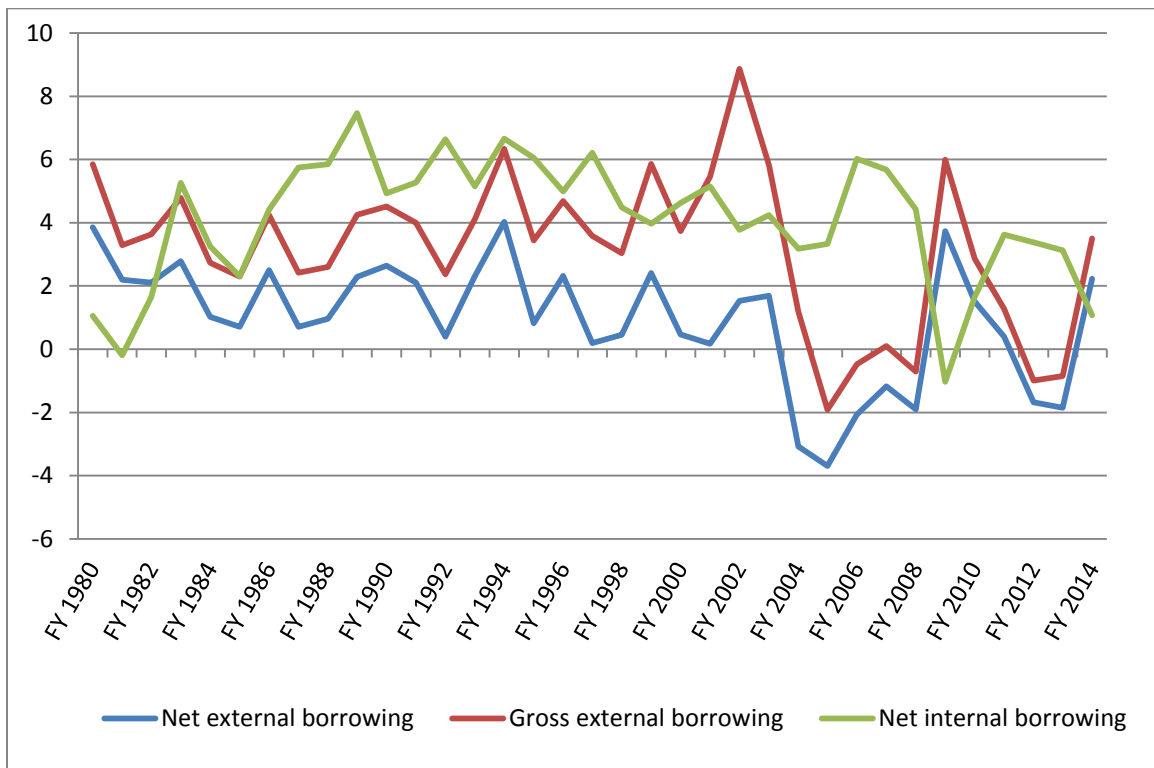
Finally, the time paths of external and internal debts are shown in Figure 4.8. We can see that both the debt indicators peaked around the turn of the century, just two years after Pakistan was faced with financial crises and was close to default on its debt servicing

obligations after the detonation of atomic devices of may 1998. The situation quickly turned around due to the influx of foreign exchange after the 9/11 as has been explained earlier. A significant improvement in external debt position in the recent years owes much to the unprecedented increase in the inflow of remittances. Since, as mentioned earlier, the government's current account balance has not changed much, the decrease in the accumulation of external debt obviously translates into increased accumulation of internal debt.

Figure 4.8: External and Internal Debts (Percentages of GDP)
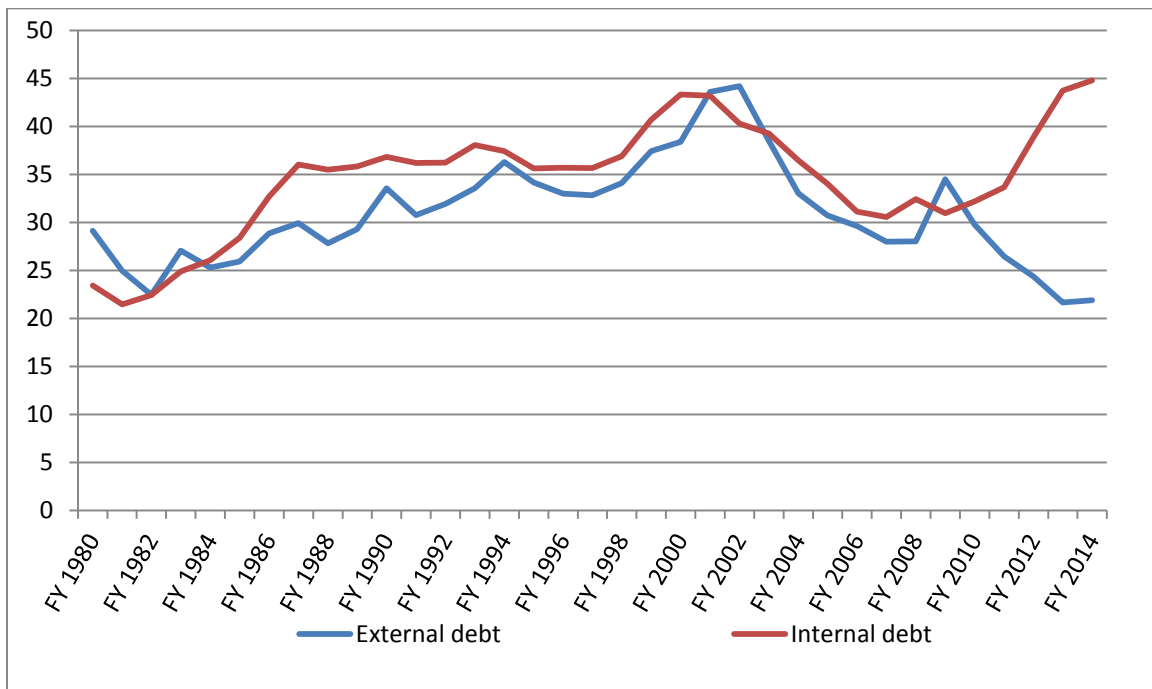
To summarize the above discussion, it appears that Pakistan has been able to keep its external and internal debt positions within manageable limits. However, the recent trend in borrowing and debts indicate a tendency towards the substitution of external debt by internal debt, mainly caused by a sharp increase in unrequited transfers (mostly

remittances) which have reached to about 8.5% of the GDP in the fiscal year 2014, about two third of the private savings and more than half of the total tax collection in Pakistan. Thus, although Pakistan appears to have landed in a good position to manage its deficits and debt, the improved position appears to be the result of good luck rather than a good economic policy.

CHAPTER 5

DEBT FORECASTS AND SIMULATIONS

5.1   Parameter Estimates

For debt forecasts and simulations we set the forecasting horizon equal to the next 30 years, that is, the fiscal years 2015 to 2044. At the first instance this forecasting horizon may seem to be too long, but there are two reasons to stick to it. First, as we have observed in chapter 4, debt accumulation process is a long term phenomenon. When circumstances change in any particular year, the repercussions are observed for the next several years to come. Second and more important, due to non-linearity in the dynamic paths, one cannot be sure that the trend observed in the next, say, five or 10 years will continue for the subsequent years as well. It is crucial to stretch the forecasting horizon to a longer period to better understand the consequences of policy changes for the time paths of resource deficits, borrowings and debts.

To make the debt forecasts on the basis of past trends and future expectations we first need to estimate all the parameters involved in our model of resource deficits, borrowings, liabilities and debts as presented in Chapter 3. The model includes a large number of parameters (which we have treated potentially as variables in the model construction). All these parameters are estimated using ratios, compound growth rates, etc. as required over the latest few years depending on stability of the data. The rental rates on the foreign direct and equity capital are estimated on the basis of the regression equation (4.1) in Chapter 4 used for estimating the rental payments on foreign direct and equity capital. All the parameter estimates are presented in Table 5.1.

Although parameters of the model are allowed to change from year to year, but for the baseline forecasts and simulations all the parameters are assumed to remain constant throughout the forecasting horizon. The table clearly indicates some of the reasons for resource deficits and accumulation of debt in Pakistan. For example the primary budget deficit arises because of the low tax rate that cannot meet the need for the government's consumption and investment expenditures. The implications of the values of other parameters are also quite straightforward and need not be mentioned here to avoid unnecessary mechanical discussion.

These parameter estimates are used for two purposes. In sections 5.2 the parameter estimates are used to make debt projections for the next 30 years assuming that all the estimated values remain constant throughout the forecasting horizon. In section 5.3 we introduce small changes in some important parameters, one at a time, in order to simulate what could be the possible consequences of certain policy-driven injections or exogenous shocks in the system. Since we will present a number of scenarios, to save the space the predicted values of the variables are averaged for the six consecutive non-overlapping windows of five years each. The results of forecasts and simulations will be presented in various tables.

Table 5.1:   Parameter Estimates

Parameter	Notation	Estimate
Amortization rate of external debt in dollars	a_i^{ED}	0.04
Rate of exchange rate depreciation	e_i	0.09
Growth rate of foreign direct capital in real terms	G_i^{FDK}	0.05
Growth rate of foreign equity capital in real terms	G_i^{FEK}	0.05
Growth rate of foreign exchange reserves in real terms	G_i^{FER}	0.05
Growth rate of base money in nominal terms	G_i^{BM}	0.09
Growth rate of real GDP	G_i^{Y}	0.05
Average rate of government consumption expenditure	g_i	0.10
Average capital-output ratio	k_i	3.60
Rate of interest on external debt denominated in dollars	r_i^{ED}	0.04
Real rate of interest on internal debt	r_i^{ID}	0.05
Average private saving rate (out of private disposable income)	s_i	0.12
Average rate of government revenue	t_i	0.14
Average rate of unrequited transfers	u_i	0.07
Depreciation rate of private foreign direct capital	δ_i	0.05
Government's share in investment expenditure	γ_i	0.30
Domestic inflation rate	π_i	0.09
Real rental rate on private foreign direct capital	ρ_i^{FDK}	0.07
Real rental rate on private foreign equity capital	ρ_i^{FEK}	0.06

5.2   Baseline Forecasts

The baseline projection refer to the forecasted values of various indicators of deficits, borrowings and debts based on the parameter estimates presented in Table 5.1. The forecasts in terms of percentages to the GDP along with the past data are presented in Table 5.2. The table shows that the current account external and budget deficits are expected to continue increasing in future, thereby resulting in increased need to borrow externally as well as internally. However, the expected rates of increase in the deficits and borrowings are small.

The volumes of external debt as a percentage of the GDP is expected to rise at relatively faster rates reaching a little more than 42% of the GDP in the period 2040-44. On the other hand, the volume of internal debt as a percentage of the GDP is expected to remain stable around 47% of the GDP. If we compare these forecasts with the past studies such as Ahmad and Ahmed (1998) and Ahmad (2000), we do not find much difference in the projected debt indicators. This means that the benefits of large scale foreign exchange inflow following the 9/11 event are not going to last any longer and Pakistan will have to search for more permanent solutions to its continuing problem of managing the fiscal and balance of payments situations. Although there is a lot that Pakistan can do in terms of improvements in its managerial capacity and governance structure, here we shall restrict to a few simple economic policies represented by parameters of the system. This exercise is carried out in the following section.

Table 5.2: Baseline Projection (Percentages of the GDP)

Year	Current account external deficit	Current account budget deficit	Net external borrowing	Gross external borrowing	Net internal borrowing	External debt	Internal debt
FY 1980-84	2.34	5.09	2.39	4.06	2.21	25.79	23.66
FY 1985-89	2.46	8.36	1.43	3.16	5.16	28.38	33.70
FY 1990-94	2.37	8.64	2.29	4.27	5.73	33.23	36.97
FY 1995-99	2.67	7.13	1.24	4.12	5.14	34.32	36.93
FY 2000-04	-1.79	3.36	0.15	5.01	4.19	39.55	40.53
FY 2005-09	1.88	3.65	-1.02	0.60	3.69	30.18	31.83
FY 2010-14	0.27	3.44	0.12	1.16	2.57	24.84	38.67
FY 2015-19	2.83	8.57	1.79	2.69	6.30	24.26	47.88
FY 2020-24	3.00	7.88	1.94	2.98	5.60	28.10	46.91
FY 2025-29	3.17	7.96	2.08	3.27	5.66	31.84	46.57
FY 2030-34	3.33	8.11	2.21	3.54	5.77	35.47	46.74
FY 2035-39	3.49	8.31	2.35	3.81	5.92	39.00	47.36
FY 2040-44	3.64	8.56	2.47	4.07	6.10	42.42	48.35

5.3   Debt Simulations

We now introduce a number of parametric changes and analyze their effects on the debt projections for Pakistan over the next 30 years. Table 5.3 shows the effect of increasing the average tax rate by one percentage point. The table shows that even this small change in tax revenue has sizable effects on the deficits, borrowings and debt positions provided the change is sustained over a long period of time. Although improvements in all the seven indicators considered are visible, the reductions in external deficit, borrowing and debt are by far greater than the ones observed in internal deficit, borrowing and debt. The reason is that with the increased tax revenue government needs to borrow less but at the same time increased tax burden on private sector leaves less room for internal borrowing by government. In any case, the external debt to GDP ratio is expected to decline to about 19% by the period 2040-44 as compared to about 42% in the baseline case.

Table 5.3:   Simulated Projections After One Percentage Point Increase in Tax Rate

Year	Current account external deficit	Current account budget deficit	Net external borrowing	Gross external borrowing	Net internal borrowing	External debt	Internal debt
FY 2015-19	1.88	7.77	0.85	1.68	6.45	21.63	48.53
FY 2020-24	1.89	6.67	0.83	1.64	5.51	21.18	46.97
FY 2025-29	1.89	6.51	0.80	1.60	5.49	20.73	46.02
FY 2030-34	1.90	6.43	0.78	1.56	5.52	20.26	45.58
FY 2035-39	1.90	6.40	0.76	1.52	5.59	19.79	45.56
FY 2040-44	1.91	6.41	0.74	1.48	5.69	19.31	45.90

Table 5.4 shows the effects of one percentage point reduction in government consumption expenditure. The effects of this policy change on external deficit, borrowing and debt are almost similar to the effect of tax increase. But the effects on internal deficit, borrowing and debt are adverse as opposed to the case of tax increase. The reason is that according to out model a cut in government consumption expenditure does not affect the private sector directly. The small adverse effect is realized because the expected reduction in net external borrowing exceeds the reduction in current account deficit and as a result government needs to borrow less internally. However, this small difference in the behavior of resource deficits between tax increase and government expenditure cut is not much crucial and could be attributed to the way model is constructed. However, the main result so far is the tax increase or government expenditure cut both result in improved expected position of external borrowing and, hence, external debt.

Table 5.4: Simulated Projections After One Percentage Point Decrease in the Rate of Government Consumption Expenditure

Year	Current account external deficit	Current account budget deficit	Net external borrowing	Gross external borrowing	Net internal borrowing	External debt	Internal debt
FY 2015-19	1.75	7.79	0.72	1.54	6.60	21.28	48.89
FY 2020-24	1.74	6.74	0.67	1.46	5.73	20.24	47.94
FY 2025-29	1.72	6.65	0.63	1.37	5.80	19.21	47.62
FY 2030-34	1.70	6.62	0.59	1.29	5.91	18.19	47.83
FY 2035-39	1.69	6.65	0.55	1.21	6.06	17.17	48.47
FY 2040-44	1.67	6.74	0.50	1.13	6.24	16.16	49.49

The above two parametric changes directly represent fiscal policy. We now consider such parametric changes that can be affected by other policy tools (such as monetary policy) and, hence, can be considered indirectly as policy changes. The first such parameter to be analyzed is the private saving rate and Table 5.6 presents the result. The table shows that the increase in private savings has substantially large favorable effects on external deficit, borrowing and debt such that the external debt is reduced to less than half of the baseline projected value by the end of the forecasting horizon. But this relief in the external balance comes at the cost of worsening internal balance. The increase in savings improves the overall internal balance of the economy and, hence, the external borrowing decreases. However, since the government's primary budget position is not altered, government has to increase its borrowing from the private sector. Therefore, the government's internal borrowing and internal debt become larger.

Table 5.5: **Simulated Projections After One Percentage Point Increase the Private Saving Rate**

Year	Current account external deficit	Current account budget deficit	Net external borrowing	Gross external borrowing	Net internal borrowing	External debt	Internal debt
FY 2015-19	1.83	8.73	0.79	1.62	7.47	21.48	50.69
FY 2020-24	1.82	8.47	0.76	1.56	7.37	20.79	54.48
FY 2025-29	1.82	9.00	0.73	1.51	8.05	20.10	59.01
FY 2030-34	1.82	9.61	0.70	1.45	8.79	19.40	64.19
FY 2035-39	1.81	10.30	0.67	1.39	9.58	18.70	69.92
FY 2040-44	1.81	11.05	0.64	1.34	10.42	18.00	76.15

As is well known from the traditional growth models that underlie our debt simulation model as well, saving and productivity have symmetric roles to play in affecting the rate of economic growth for given external sources or in affecting the external balance for the given economic growth rate. This is reflected by the debt simulation results in Table 5.6 when capital-output ratio is improved from 3.6 to 3.5. Caution has to be applied while comparing the absolute values between Table 5.5 and Table 5.6 because the two parametric changes are not directly comparable, one as the ratio between savings and GDP and the other as the ratio between investment and output change. In any case we can see that improvements in productivity can lessen the burden of external borrowing and debt, which are to be partially replaced by internal borrowing and debt in order to meet the fiscal deficit.

Table 5.6: **Simulated Projections After Decrease in Marginal Capital Output Ratio from 3.6 to 3.5**

Year	Current account external deficit	Current account budget deficit	Net external borrowing	Gross external borrowing	Net internal borrowing	External debt	Internal debt
FY 2015-19	2.35	8.48	1.31	2.17	6.69	22.91	48.83
FY 2020-24	2.43	7.91	1.37	2.30	6.20	24.56	49.47
FY 2025-29	2.51	8.12	1.43	2.42	6.47	26.16	50.78
FY 2030-34	2.60	8.40	1.48	2.53	6.79	27.69	52.65
FY 2035-39	2.68	8.74	1.54	2.64	7.16	29.18	55.00
FY 2040-44	2.75	9.14	1.59	2.75	7.57	30.60	57.77

We now analyze the repercussions of increasing the economic growth target. The effects of one percentage point increase in the GDP growth rate. Table 5.7 shows that setting even such a moderate growth target would require dramatic worsening of the external balance to the extent that external debt increases close to three times the baseline projected value. With such an increase in external borrowing and debt, the burden of internal borrowing and debt is substantially improved to such an extent that internal borrowing is converted to internal lending and internal debt becomes negative midway through the forecasting horizon.

Table 5.7: **Simulated Projections After One Percentage Point Increase the Growth Rate of GDP**

Year	Current account external deficit	Current account budget deficit	Net external borrowing	Gross external borrowing	Net internal borrowing	External debt	Internal debt
FY 2015-19	6.65	9.09	5.64	6.79	2.99	34.23	39.05
FY 2020-24	7.38	7.18	6.40	8.29	0.47	53.73	23.63
FY 2025-29	8.06	6.04	7.10	9.69	-1.25	71.91	9.20
FY 2030-34	8.69	4.96	7.75	11.00	-2.90	88.85	-4.42
FY 2035-39	9.28	3.93	8.36	12.21	-4.48	104.63	-17.37
FY 2040-44	9.83	2.92	8.93	13.35	-6.00	119.33	-29.76

This result brings out sharply the underlying dilemma facing the developing countries like Pakistan that resort to borrowing in their attempts to grow faster than their the rate

compatible with their given governance structure and other conditions unfavorable for growth. The same phenomenon also explains how the debt situation in Pakistan has somehow remained under control even several years after the 9/11 event. The benefit of the foreign exchange inflow did not last longer more than a few years. From the year 2007-08 onwards Pakistan experienced an average annual GDP growth rate of about 3.6%, which has been the key factor for the debt situation in Pakistan to remain under manageable limits.

CHAPTER 6

SUMMARY AND CONCLUSION

The present study has been an attempt to analyze Pakistan's external and internal debt situations on the basis of a modified version of the three-gap model proposed in Ahmad (2000). The objective has been to make future projections of various indicators of resource deficits, borrowings and debts and simulate the effects of various policy changes on these projected indicators. In particular, the study has simulated the possible effects of tax increase, government consumption expenditure cut, increase in savings and productivity (measured by capital-output ratio) and the increase in target growth rate of GDP on the external and internal resource deficits, borrowings and debts. For better understanding of the debt situation the study has also analyzed the past trends in a number of important indicators of deficits, borrowings and debts over the period of 35 years 1980 to 2014. For debt forecasts and simulations the forecasting horizon is set equal to 30 years from 2015 to 2044.

The study finds that the primary budget deficit in Pakistan has improved significantly during the decades of 2000s and 2010s mainly due to declining rate of investment expenditure in the public sector and declining public consumption expenditure. However, this improvement has almost been offset by deterioration in the primary private sector's deficit, leaving the overall primary deficit fluctuate with no long-run definite direction. As expected, the overall primary deficit position improved substantially during the fiscal years 2003 to 2004 following the large scale inflows of unrequited transfers and other

capital flows through formal channels after the event of 9/11. Unrequited transfers to Pakistan have been the most important component of foreign exchange flow after trade flows. It is noted that during the recent years the inflow of foreign exchange has mainly been used to maintain the value of rupee against the US dollar and in the most recent period to even appreciate the exchange rate despite experiencing higher inflation rate in Pakistan as compared to the USA. This drive has helped reduce inflation rate but at the cost of stagnant foreign exchange holdings and, hence, losing the opportunity of retiring some of the expensive short-term debt and avoiding the need for further borrowings.

Interest payments on internal debt have accounted for the greatest burden on the national exchequer, followed by amortization of foreign debt and interest payments on foreign debt. Since presently Pakistan is not facing a severe financial stress, amortization of foreign debt should be seen as an indication of Pakistan's ability to earn enough foreign exchange to retire the debt. It is further noted that the current account deficits have moved over the years very closely, indicating that the current account external deficit has mainly been driven by the current account budget deficit. The two deficits showed significant improvements almost immediately after the 9/11 event. This was followed by rising deficits till the fiscal year 2008. The trend again turned in the favorable direction during the recent years. Almost the same pattern has been observed for the external and internal borrowings. During the past 10 years the borrowings levels have remained low but with increased year to year variation, the possible reasons being commodity price hike in the world market, oil price fluctuations, unprecedented increase in remittance,

volatile capital movements due to changing law and order situation (especially related to terrorists' acts) and changes of political regimes in Pakistan.

The study also observed that the external and internal debts as percentages to the GDP reached the highest levels around the turn of the century, just two years after Pakistan was faced with financial crises and was close to default on its debt servicing obligations. The situation quickly turned around due to the influx of foreign exchange after the 9/11. A significant improvement in external debt position in the recent years owes much to the unprecedented increase in the inflow of remittances.

From the past analysis the study concludes that Pakistan has been able to keep its external and internal debt positions within manageable limits. However, the recent trend in borrowing and debts indicate a tendency towards the substitution of external debt by internal debt, mainly caused by a sharp increase in unrequited transfers (mostly remittances). Thus, although Pakistan appears to have landed in a good position to manage its deficits and debt, the improved position appears to be the result of good luck rather than a good economic policy.

On the basis of past trends, the study finds that the current account external and budget deficits are expected to continue increasing in future, thereby resulting in increased need to borrow externally as well as internally. The volume of external debt as a percentage of the GDP is expected to rise at relatively faster rates, whereas internal debt as a percentage of the GDP is expected to remain stable around. While comparing these results with

previous literature, the study concludes that the benefits of large scale foreign exchange inflow following the 9/11 event are not going to last any longer and Pakistan will have to search for more permanent solutions to its continuing problem of managing the fiscal and balance of payments situations.

Further, on the basis of simulations to trace the effects of various parametric changes, the study draws a number of conclusions. First, even small increase in tax to GDP ratio or cut in government consumption spending can result in substantial favorable effects on the deficits, borrowings and debt positions provided that these policy changes are maintained over a long period of time. Second, increase in private savings has substantially large favorable effects on external deficit, borrowing and debt but this relief in the external balance comes at the cost of worsening internal balance. Third, improvement in productivity, as measured by capital-output ratio, reduces the burden of external borrowing and debt, which are to be partially replaced by internal borrowing and debt in order to meet the given fiscal deficit. Fourth, setting an ambitious growth target would require dramatic worsening of the external balance. Even one percentage point increase in the target annual GDP growth rate is expected to raise the external debt to GDP ratio to almost three times the baseline projected value. With such an increase in external borrowing and debt, the burden of internal borrowing and debt is substantially improved.

On the basis of these findings the study draws its major conclusion that debt-growth trade-off presents the developing countries like Pakistan a difficult dilemma. If Pakistan resorts to borrowing in its attempt to grow faster than the rate compatible with its given

governance structure and other conditions unfavorable for growth, it must pay the cost in terms of rising debt burden. This is exactly in line with the present-versus future trade-off. However, in the context of growth debt nexus there are ways to bypass the trade-off. The key to bypass the trade-of is productivity, which is given within the model in terms of capital-output ratio. Thus any policies that aim to improve productivity are likely to produce the desirable result, that is, reduction in debt burden without growth sacrifice or increase in growth rate without added burden of debt. Thus all such measures that improve economic efficiency, human capital, knowledge, overall governance structure, general law-and-order situation and political stability are likely to bring fruitful results. However, all these policies also need investment of resources and it is the task of economists to conduct benefit-cost analysis of alternative ways of improving productivity and their feasibility for a country like Pakistan.

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