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# Macroeconomic constraints on private sector investment in Pakistan

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## Abstract

The purpose of this paper is to assess the manner in which the Government's fiscal policies affect the willingness of the private sector to invest, especially in the all-important manufacturing sector. Using an optimal control analysis to examine alternative fiscal packages, it is shown that proper economic management can return the country to a high growth path while avoiding many of the imbalances that have characterized recent economic performance. This analysis suggests that deficit reduction must be the key element in any future policy package.

## 1. Introduction

The recent economic difficulties facing Pakistan -widening fiscal and current account deficits, growing foreign debt burden, and slowing growth rates- have led to a fundamental assessment of the country's adjustment and development strategy. Specifically the sentiment in economic and policy making circles has shifted against large-scale government intervention and toward greater reliance on the market in the allocation and use of resources (Kahn and Reinhart, 1990: 19).

Conventional wisdom is that the way to prosperity, as represented by a sustained higher rate of economic growth requires stable and conservative macroeconomic policies, liberalization of the goods and factor markets, greater flexibility in the financial system, and an enhanced role for the private system in economic activity.

Even if it can be assumed that an increase in private investment, other things being equal, has an unambiguous positive effect on output, it is still necessary to establish how private investment in Pakistan is determined -in particular, what variables systematically affect it- before one can evaluate the influence that government can exercise over private investment decision. The purpose of this paper is to undertake this examination, particularly as it pertains to private sector investment in manufacturing.

Ultimately our objective is to integrate the private investment decision into a macroeconomic forecasting model. In turn this model will be used to assess the manner in which the Pakistani economy might evolve under alternative policy packages. The philosophy underlying this approach stresses the importance of examining private sector investment in the context of the government's overall development and budgetary strategies.

## 2. Macro-imbalances

Although Pakistan's growth performance during the 1980s was healthy (averaging more than 6% per annum), and inflation, while fluctuating considerably was generally moderate (averaging 7% per annum), the increasing macroeconomic imbalances, growth of public sector deficits and indebtedness, and underlying structural weaknesses convinced the Government that without corrective action the economy's growth performance could not be sustained. Accordingly, in early Fiscal Year 1989 (FY89) the government embarked on a macroeconomic structural adjustment program which has been implemented more or less continuously up to the present time.

The Government realized that the economy's main weaknesses were: (i) low savings and investment rates, particularly in the public sector, (ii) structural rigidities and distortions in the incentive system, which reduced efficiency and depressed economic activity, and (iii) limited progress in education, health and nutrition. Among the most important issues to be addressed through the reform effort were the following:

*a. Fiscal Policy.* Pressure the fiscal accounts increased during the 1980s and the budget deficit reached an unsustainable 8.5% of GDP in Fiscal Year 1988 (FY88). One factor behind this deterioration was stagnant public revenues heavily dependent on trade taxes and inelastic domestic taxes. Despite the growing deficits, expenditures to build, and maintain and operate key development program/projects in the social sectors and infrastructure were inadequate. Non-development expenditures, in particular interest

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payments, defense, and subsidies (mainly food and agricultural input price subsidies) absorbed an increasing proportion of current outlays (about two-thirds by FY88).

*b. The External Accounts.* Despite healthy export performance, the external accounts were also under increasing pressure during this period and the current account deficit reached 4.3% of GNP in FY88, mainly due to declining remittances and a growing interest burden. Creditworthiness indicators deteriorated as excessive borrowing led to an increase in the debt service ratio from 20% of exports of goods and services in FY81 to 25%-30% during the mid-1980s.

*c. Social Indicators.* While the population was growing quickly at about 3.1% per annum, human resource development -mainly the responsibility of the provinces- was underfunded and implementation constraints reduced the effectiveness of government actions. Thus, social indicators continued to lag significantly behind those of comparable countries and the demands of the population for basic social services could not be met adequately.

*d. Private Sector Activity.* The private sector was confronted with pervasive regulatory controls in manufacturing and burdened by large public enterprises suffering from poor performance and inefficiency. It was also unable to fully exploit its growth potential due to an insufficient infrastructure and a poorly educated and trained workforce. The incentive system was distorted by high tariff and non-tariff barriers, a domestic tax system that taxes production rather than consumption and administered interest rates and prices. As a result, innovation was discouraged and the industrial sector remained narrow.

Perhaps the most ominous pattern concerns savings and investment. Both of these rates are low by international standards (averaging 14.1% and 18.9% of GNP, respectively) during the five years ended in June 1993. Usually countries capable of sustaining growth in the 5-7% range save and invest more than 20% of their GNP<sup>1</sup>.

While various reasons have been put forward to explain the country's lackluster savings performance (Aftab Khan, 1993a, 1993b), it is clear that the main imbalance between savings and investment in Pakistan arises in the public sector. The budget deficit, i.e. the gap between consolidated public revenues and expenditures is currently the most serious macro problem facing

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<sup>1</sup> For example, during the period 1980-91 China, Indonesia, South Korea, Malaysia, Mauritius, Oman, Singapore and Thailand (World Bank, 1993) all achieved average annual rates of growth of over 5.0 % per annum and savings rates over 20 % (usually over 30 %).

the economy. There was a persistent growth in the dimensions of the overall deficit in the 1970s and 1980s culminating in FY 87-88 when it reached Rs. 57.6 billion or 8.5% of Gross Domestic Product (GDP). This gap emerged because of inadequately restrained expenditure policies, weak revenues and poor performance of the state-owned enterprises. In particular, the tax system was marked by a narrow base, low elasticity with respect to overall economic growth.

In the summer of 1988 with the assistance from the International Monetary Fund (IMF), Pakistan embarked on an adjustment program designed to address macro-economic imbalances and ensure steady growth of the economy at a respectable rate within an environment of low inflation. In the fiscal field this macro-economic adjustment program envisaged a gradual reduction of the overall fiscal deficit to 4.8% of GDP through resource mobilization efforts aimed at increasing the tax revenue elasticity.

In order to understand the fiscal choices (constraints) for the coming years, the government will have to acknowledge the budgetary constraint set by the "sustainable deficit". This can be defined simply as the deficit level that can be financed without insupportable internal and external debt service ratios and without violating the government's macro-economic objectives such as low inflation, viable balance of payments and real economic growth.

On the basis of studies conducted by the Planning Commission as well as the International Monetary Fund it appears that a fiscal deficit in excess of 5% of GDP could have adverse macro-economic consequences including the danger of accelerated inflation. In any case government's ability to create additional debt for financing budgetary deficits over this level will be sharply constrained by the existing high level of indebtedness. Even worse, deficits more than 5% might cause the demand for government debt to sharply decline due to investor concerns over ability of the government to service its debt. In such a situation the government would also be forced to sharply increase its interest rates, risking driving out a considerable amount of private investment.

### 3. Factors affecting private investment

As noted above growing fiscal imbalances have increased concern about the possible crowding out of private investors from the country's financial markets. Potentially this is an extremely serious problem. However, there are a number of additional factors that may affect the investment decision. Unless these are systematically controlled for one might incorrectly conclude those

growing government deficits were solely responsible for the private sector's observed pattern of investment. Unfortunately, many of the published studies on private investment in Pakistan are not linked to a broader macroeconomic context capable of systematically examining these linkages.

In recent years several studies (Chishti *et al.* 1992; Haque *et al.* 1994) have tried to bridge this important gap. Here it should be noted that the impact stimulus on private investment of government expenditures *per se* may not be that strong simply because about 75% of the total current expenditures of the federal government is in general accounted for by defense and debt servicing which have most likely no significant and positive impact on GDP (Chishti *et al.* 1992: 369).

Here it is important to note that budgetary deficits in themselves do not automatically imply macroeconomic problems. If the use of public resources is sufficiently productive, further income can be generated to cover the servicing costs of any debt incurred. Deficits can be more easily absorbed by countries with high rates of domestic savings and well-developed capital markets. Thus a relatively high deficit need not cause problems in an efficient high-saving economy, whereas in a low-saving economy like Pakistan (6% of GDP) with inefficient and less developed financial markets, even a small deficit might be destabilizing.

Starting from this position Khan and Iqbal (1991) examined the whole issue of crowding-out, i.e., whether the ever rising government expenditures displace an equal amount of spending from the private sector. As they note, macroeconomic effects of fiscal deficits can be examined in the light of three (FitzGerald, 1979; FitzGerald, 1980; Looney and Frederiksen, 1987) different theories, viz. conventional crowding-out, Keynesian crowding-out, and the monetary approach to the balance of payments (Khan and Iqbal, 1991):

- Conventional crowding-out takes place when the fiscal deficit is financed by selling government bonds which ultimately increase interest rates which then cause private investment to decline.
- The Keynesian crowding-out takes place when deficits are financed by reducing private consumption, that is, by increasing private savings.
- Under the monetary approach, the deficit is financed by money creation which leads to an excess supply of cash balances. Individuals reduce their surplus holdings by increased expenditures; under this approach adjustment is made entirely through increased imports. The full effect of the deficit is felt by the worsening external balance.

In their study Khan and Iqbal (1991) found no evidence of conventional as well as Keynesian crowding-out. On the other hand they show that deterioration of the fiscal deficit has been worsening the current account balance, a finding which is in line with the monetary approach to the balance of payments.

In addition, they find that increases in the fiscal deficit have reduced private savings and hence investment and growth in Pakistan. Besides the existence of financial repression (low or negative real interest rates) and the lack of financial development (few financial institutions and the availability of few financial instruments), the fiscal deficit appears to be an important factor in accounting for such low savings. In short, their findings suggest that government savings is a substitute for private savings.

In a related paper on factors affecting private investment Khan (1988) finds that (289-90):

- On the one hand, changes in output appear to have minor impact on private investment while on the other hand, the general market condition appears to have a strong influence on private capital formation.

- Private investment in Pakistan was constrained by the availability of funds. Thus, the monetary authority can influence private investment behavior by changing bank credit to this sector. Fiscal policy appears to have a relatively stronger effect on private investment.

- Public sector investment in providing infrastructure clearly augments private capital formation in Pakistan, thereby confirming its complementary role.

In contrast to Khan and Iqbal (1991), Burney and Yasmeen (1989) focused on the budgetary effects on interest rates. Their findings suggest that, in general, the overall government budget deficit in Pakistan does not have any significant impact on the nominal interest rates. However, when assumed that people can predict the future rate of inflation accurately the overall deficit is found to have a significant impact on the nominal interest rate. Although they do not directly examine the impact on private investment, it is noted that there may be an inverse relationship between investment and nominal interest rates. If this is in fact the case, their results suggest that an increase in the overall deficit is likely to crowd-out private investment expenditure in Pakistan.

In short, the studies noted above suggest that a Keynesian expenditure based model may provide a more accurate depiction of Pakistan's macro-economy than that derived from a monetarist approach. Within this framework, however, the works of Khan-Iqbal and Burney-Yasmeen caution

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that public investment may not, because of crowding-out effects, be particularly effective in spurring expanded private sector investment.

To gain a rough idea of the causal links between government expenditures (general government, defense and consumption), and private investment in manufacturing (both large scale and small scale), a series of Granger (1969, 1988) causality tests were performed. Because the literature suggests the manner in funding government expenditures may have a number of secondary effects on private investment, the link between each expenditure category, the deficit, and subsequent borrowing were also examined in detail.

The main findings (Looney, 1992: 90-8) of these causality tests are suggestive of the existence of crowding-out. Interestingly, public investment and infrastructural development appear to have the least stimulating (and in some cases, negative) effect on private sector investment. This is somewhat ironic, given that a major purpose of these allocations is to provide a stimulus to follow on private investment. Clearly this effect stems from the large demands placed on the domestic capital market by this type of expenditure.

At the other extreme is defense. Again a somewhat ironic pattern exists whereby expanded military expenditures provide a generally strong stimulus to private investment in large scale private manufacturing. While the analysis does not let us identify the cause of this stimulus (general Keynesian demand expansion and/or direct linkages to the country's military procurement program), the fact remains that the government has shown restraint in funding defense expenditures once domestic borrowing begins to accelerate.

General public consumption falls somewhere in between defense and investment in affecting the private sector's willingness (or ability) to commit capital to manufacturing. While the government does fund increased consumption through expanded domestic borrowing, the magnitudes involved do not appear to be nearly as great as in the case of investment. Thus government consumption is still able to provide a net positive stimulus to small scale private investors (who presumably are not as reliant on the domestic capital markets as is the case for their larger scale counterparts).

#### 4. Private investment and macro-economic policy

Drawing on the literature and the causality tests summarized above, a twenty-four equation policy model was developed (Table 1). Here, our main concern was capturing the main potential links between government expenditures, deficits and private investment. For some of these variables

such as growth the links are direct. For others such as private investment the links are more indirect, working through the impact of defense on the deficit, the impact of the deficit on savings and ultimately the impact of savings on private investment.

With regard to the more important individual equations<sup>2</sup> (Table 1):

- Aggregate demand (Eq. 1) is affected mainly by employment (a proxy for consumer expenditures), lagged military expenditures (the largest public sector expenditure item) and private investment. Public investment was insignificant when included in the equation<sup>3</sup>. Government investment was not statistically significant in affecting GDP.

- Potential supply (Eq. 2) was assumed to be a function of factor inputs -labor and capital. Again, a distinction was made between stocks of capital in public and private sectors.

- As noted earlier (Looney, 1992) the factors affecting private investment in large and small scale units vary considerably. Private investment in large scale industry is aided on the demand side by military expenditures. It also benefits from foreign borrowing and increased national savings. As noted in the causality findings, small scale investment is favorably influenced by public allocations to non-defense activities.

- Private investment in non-manufacturing activities is also strongly affected by the savings rate<sup>4</sup>.

## 5. Endogenous simulation

To provide a benchmark, the first set of simulations undertaken was essentially an extrapolation of key macro economic and investment variables to the year 2000. Here, using the estimated equations summarized in Table 1, two exogenous variables, i.e. employment, growing at 3% per annum and the import price index, increasing at 5% per annum generated values for the key aggregates up to the end of the century. Several patterns (Tables 2-3) stand out:

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<sup>2</sup> This model is an expanded version of one developed in Looney (1992). That model was used exclusively to simulate the period 1974-1991 under different assumptions concerning government investment and foreign public borrowing. There was no optimal control element incorporated into that analysis, nor were any forecasts made.

<sup>3</sup> This is consistent with the findings presented in Khan and Reinhart (1990), who found that private investment has a larger direct effect on growth than public investment.

<sup>4</sup> Again, consistent with the findings of Khan and Iqbal (1991).

Table 1

Pakistan: Private Investment and the Macroeconomy, Simulation Model  
(constant 1985 prices)

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**STRUCTURAL EQUATIONS**


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**(1) Gross Domestic Produce (GDP)**

$$\text{GDP} = -129.72 + 12.05 \text{ EMP} + 5.97 \text{ MILX}_{(t-1)} + 3.16 \text{ IPTP}$$

(-3.83) (5.99)\*\*\* (8.20)\*\*\* (4.98)\*\*\*

$r^2(\text{adj}) = 0.997$ ; DW = 2.19; F = 2715.6

**(2) Potential Supply (GDPS)**

$$\text{GDPS} = -88.27 + 8.21 \text{ EMP} + 2.05 \text{ PK} + 2.67 \text{ GK}$$

(-1.71) (1.96)\* (6.11)\*\*\* (2.27)\*\*

$r^2(\text{adj}) = 0.993$ ; DW = 2.86; F = 831.98

**(3) Total Government Investment (IGT)**

$$\text{IGT} = 6.82 + 0.47 \text{ IGT}_{(t-1)} + 1.04 \text{ INFR}$$

(3.72) (2.53)\*\* (4.14)\*\*\*

$r^2(\text{adj}) = 0.992$ ; DW = 2.11; F = 853.5

**(4) Defense Expenditures (MILX)**

$$\text{MILX} = -4.90 + 0.12 \text{ GDP}_{(t-1)} - 0.21 \text{ IGT}_{(t-1)} - 0.14 \text{ GDEF}_{(t-1)} - 0.20 \text{ GDEF}_{(t-2)}$$

(-4.21) (14.94)\*\*\* (-3.00)\*\*\* (-2.21)\*\* (-3.33)\*\*\*

$r^2(\text{adj}) = 0.987$ ; DW = 1.91; F = 329.97

**(5) Public Infrastructure Investment (INFR)**

$$\text{INFR} = 2.86 + 0.74 \text{ INFR}_{(t-1)} + 0.21 \text{ IPMT}$$

(2.53) (5.56)\*\*\* (1.92)\*

$r^2(\text{adj}) = 0.951$ ; Durbin's H = 0.35; F = 166.21

**(6) Non-Defense Expenditures (NILX)**

$$\text{NILX} = -16.27 + 0.56 \text{ NILX}_{(t-1)} + 2.90 \text{ INFR}$$

(-2.06) (3.08)\*\* (2.71)\*\*

$r^2(\text{adj}) = 0.953$ ; Durbin's H = -0.51; F = 192.72

**(7) Government Revenues (GR)**

$$\text{GR} = -20.77 + 0.21 \text{ GDP}_{(t-1)} + 0.27 \Delta \text{GDP}_{(t-1)}$$

(-9.27) (25.44)\*\*\* (2.27)\*\*

$r^2(\text{adj}) = 0.991$ ; DW = 1.85; F = 906.68

**(8) Government Domestic Borrowing (BORD)**

$$\text{BORD} = 12.99 + 0.73 \text{ GDEF}_{(t-1)} - 0.91 \text{ BORD}_{(t-1)}$$

(4.01) (5.10)\*\*\* (-2.91)\*\*

$r^2(\text{adj}) = 0.610$ ; DW = 2.37; F = 14.31

**(9) Net Domestic Credit to the Government (MSGCP)**

$$\text{MSGCP} = 46.94 + 1.93 \text{ GDEF}_{(t-1)} + 1.91 \text{ GDEF}_{(t-2)} - 2.07 \text{ BORD} + 7.38 \text{ MILX}$$

(2.77) (2.72)\*\* (2.59)\*\* (-2.01)\*\* (1.78)\*

$r^2(\text{adj}) = 0.805$ ; DW = 1.90; F = 18.51

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**Table 1 (contd.)**  
(constant 1985 prices)

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*STRUCTURAL EQUATIONS*

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*(10) Gross Domestic Product Deflator (GDPDF)*

$$\text{GDPDF} = 0.12 + 0.67 \text{GDPDF}_{(t-1)} + 0.002 \text{MSGC} + 0.07 \text{UVZ}$$

$$(5.52) \quad (8.99)^{***} \quad (5.47)^{***} \quad (2.06)^{**}$$

$r^2(\text{adj}) = 0.998$ ; Durbin's H = -1.52; F = 2988.55

*(11) Government Net Foreign Borrowing (BORF)*

$$\text{BORF} = 7.57 + 0.32 \text{BORF}_{(t-1)} + 0.48 \text{GDEF} - 0.17 \text{GNS}_{(t-1)}$$

$$(3.22) \quad (2.07)^{**} \quad (4.59)^{***} \quad (-3.74)^{***}$$

$r^2(\text{adj}) = 0.740$ ; Durbin's H = -1.49; F = 17.15

*(12) Gross National Savings (GNS)*

$$\text{GNS} = -32.7 + 0.29 \text{GDP}_{(t-1)} - 1.02 \text{GDEF} - 0.62 \text{GDEF}_{(t-1)}$$

$$(-5.06) \quad (10.23)^{***} \quad (-2.68)^{**} \quad (-1.97)^*$$

$r^2(\text{adj}) = 0.949$ ; DW = 2.22; F = 86.97

*(13) Private Investment in Small Scale Manufacturing (IPMS)*

$$\text{IPMS} = 0.01 + 0.87 \text{IPMS}_{(t-1)} - 0.008 \text{BORD}_{(t-1)} + 0.007 \text{NILX}$$

$$(0.27) \quad (8.34)^{***} \quad (-3.25)^{***} \quad (3.85)^{***}$$

$r^2(\text{adj}) = 0.995$ ; Durbin's H = -0.51; F = 885.1

*(14) Private Investment in Large-Scale Manufacturing (IPML)*

$$\text{IPML} = -4.54 + 0.77 \text{IPML}_{(t-1)} - 0.08 \text{BORD}_{(t-1)} + 0.19 \text{MILX}_{(t-1)} + 0.15 \text{BORF}_{(t-1)}$$

$$(-3.71) \quad (6.31)^{***} \quad (-2.80)^{**} \quad (2.81)^{**} \quad (3.14)^{***}$$

+ 0.02 GNS  
(1.82)\*  
 $r^2(\text{adj}) = 0.991$ ; Durbin's H = -1.24; F = 368.5

*(15) Private Investment in Non-Manufacturing (IPNM)*

$$\text{IPNM} = 2.47 + 0.07 \text{GDP}_{(t-1)} - 0.34 \text{MILX} + 0.08 \text{GNS}$$

$$(3.12) \quad (7.13)^{***} \quad (-3.04)^{***} \quad (3.20)^{***}$$

$r^2(\text{adj}) = 0.987$ ; DW = 1.75; F = 414.98

*IDENTITIES*

*(16) Government Expenditures (GE)*

$$\text{GE} = \text{MILX} + \text{NILX}$$

*(17) Government Deficit (GDEF)*

$$\text{GDEF} = \text{GE} - \text{GR}$$

*(18) Change in Gross Domestic Product ( $\Delta\text{GDP}$ )*

$$\Delta\text{GDP} = \text{GDP} - \text{GDP}_{(t-1)}$$


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**Table 1 (contd.)**  
(constant 1985 prices)

(19) *Investment in Manufacturing (IPMT)*

$$IPMT = IPML + IPMS$$

(20) *Total Private Investment (IPTP)*

$$IPTP = IPMT + IPNM$$

(21) *Nominal Domestic Credit to the Government (MSGC)*

$$MSGC = MSGCP * GDPDF$$

(22) *Change in Military Expenditures ( $\Delta MILX$ )*

$$\Delta MILX = MILX - MILX_{(t-1)}$$

(23) *Private Capital Stock (PK)*

$$PK = IPTP + IPTP_{(t-1)} + IPTP_{(t-2)}$$

(24) *Government Capital Stock (GK)*

$$GK = INFR + INFR_{(t-1)} + INFR_{(t-2)}$$

**EXOGENOUS VARIABLES**

(25) *Employment (EMP)*

(26) *Import Unit Price Index (UVZ)*

*Notes:* Estimates are for the period 1974-1991. Two stage least squares estimations. See Sorites Group (1993) for a description of the computational method used.  $r^2(\text{adj})$ : adjusted coefficient of determination; F: F statistic; DW: Durbin-Watson Statistic, Durbin's H: Durbin's H statistic; (t-1): variable lagged one year; (t-2): variable lagged two years. \*: significant at the 10% level; \*\*: significant at the 5% level; \*\*\*: significant at the 1% level. Equation estimates over different time periods implied that the estimated coefficients were stable.

- Potential output grows fairly rapidly, averaging 7.4% over the 1992-96 period and 7.6% in the interval 1996-2000.

- It is likely that this pattern of growth could not be sustainable. As noted earlier, for a sustainable growth path, the government will most likely be forced to constrain its deficits in the range of 5% of GDP. In this simulation the fiscal deficits grow more rapidly than GDP, increasing their share to 6.9% by the end of the century (up from 5.1 in 1992).

- Expanding deficits and the associated external borrowing requirement result in double digit inflation, accelerating from around 13% per annum in the 1992-96 period to slightly more than 20% for 1996-2000.

- Given the government's current debt situation, rates of growth in public foreign borrowing of more than 10% in the 1992-2000 (accelerating to more than 16.3% for 1996-2000) are most likely unattainable.

- Another problem with this particular growth path is that it implies a fairly sharp fall in Gross National Savings (from 14.1% of GDP in 1992 to

**Table 2**  
**Macroeconomic Simulation I: Endogenous Base Forecast, 1992-2000**  
 (billions of 1985 rupees)

Year	GDP		Defense Expenditures			Non-Defense Expenditures		
	Value	%Growth	Value	%Growth	%GDP	Value	%Growth	%GDP
1992	730.1	7.6	53.5	9.0	7.3	114.9	6.4	15.7
1994	835.2	7.0	63.8	9.2	7.6	138.7	9.9	16.6
1996	972.0	7.9	71.1	5.6	7.3	168.6	10.3	17.3
1998	1127.9	7.7	80.7	6.5	7.2	204.0	10.0	18.1
2000	1306.4	7.6	90.7	6.0	6.9	245.6	9.7	18.8
92/96		7.4		7.4			10.1	
96/2000		7.7		6.3			9.9	
90/2000		7.6		7.2			9.2	

  

Year	GDP Deflator		Gross National Savings			Fiscal Deficits		
	Value	%Growth	Value	%Growth	%GDP	Value	%Growth	%GDP
1992	170.9	11.2	102.8	7.5	14.1	37.0	13.7	5.1
1994	215.8	12.4	125.6	10.5	15.0	46.1	11.6	5.5
1996	278.9	13.7	136.1	4.1	14.0	55.9	10.1	5.8
1998	386.2	14.9	148.5	4.5	13.2	72.5	13.9	6.4
2000	585.0	26.0	163.9	5.1	12.5	90.1	11.5	6.9
92/96-		13.0		7.3			10.9	
96,2000		20.3		4.8			12.7	
92/2000		15.6		6.3			11.8	

  

Year	Foreign Borrowing		Govt. Expenditures			Govt. Revenues		
	Value	%Growth	Value	%Growth	%GDP	Value	%Growth	%GDP
1992	13.5	3.5	168.4	7.2	23.1	131.4	6.6	18.0
1994	12.4	-4.2	202.5	9.7	24.2	156.5	9.1	18.7
1996	18.2	21.2	239.7	8.8	24.7	183.8	8.4	18.9
1998	25.2	17.7	284.7	9.0	25.2	212.2	7.4	18.8
2000	33.3	15.0	336.3	8.7	25.7	246.2	7.7	18.8
92/96		7.8		•			8.8	
96,2000		16.3					7.6	
92/2000		10.2					7.6	

Notes: Simulation based on Equations in Table 1. Growth rates are the annual average rates over each interval, i.e., for 1992 the growth rate is from 1990 to 1992; for 1994 it 1992-1994.

Assumptions: Employment grows at 3.0% per annum; Import price index increases at 5% per annum.

**Table 3**  
**Investment Simulation I: Endogenous Base Forecast, 1992-2000**  
 (billions of 1985 rupees)

	Private Capital Stock		Private Investment			Public Infrastructure		
	Value	%Growth	Value	%Growth	%GDP	Value	%Growth	%GDP
1992	178.8	3.4	62.6	5.7	8.6	24.8	8.2	3.4
1994	207.6	7.8	75.5	9.8	9.0	29.0	8.1	3.5
1996	246.7	9.0	89.9	9.1	9.2	34.1	8.4	3.5
1998	292.2	8.8	105.9	8.5	9.4	40.0	8.3	3.5
2000	345.9	8.8	125.5	8.9	9.6	46.9	8.3	3.6
92/96		8.4		9.5			8.3	
96/2000		8.8		8.7			8.3	
90/2000		7.5		8.4			8.3	

  

Year	Public Capital Stock		Private Investment Manuf.			Private Investment Non-Manuf.		
	Value	%Growth	Value	%Growth	%GDP	Value	%Growth	%GDP
1992	68.7	3.0	26.4	10.3	3.4	36.2	5.5	5.0
1994	79.8	7.8	33.9	13.3	4.1	41.6	7.2	5.0
1996	94.6	8.9	42.2	11.6	4.3	47.8	7.2	4.9
1998	110.9	8.3	51.6	10.6	4.6	54.2	6.5	4.8
2000	129.2	7.9	63.2	10.7	4.8	62.3	7.2	4.8
92/96		8.3		12.4			7.2	
96/2000		8.1		10.6			6.8	
92/2000		7.2		11.3			6.7	

  

Year	Private Capital Manuf.		PI Large Scale Manuf.			PI Small-Scale Manuf.		
	Value	%Growth	Value	%Growth	%PI	Value	%Growth	%PI
1992	71.9	6.1	23.1	10.3	36.9	3.3	10.6	5.3
1994	90.7	12.3	30.1	14.2	39.8	3.9	8.7	5.1
1996	113.4	11.8	37.6	11.8	41.8	4.6	8.6	5.1
1998	138.1	10.3	46.1	10.7	43.6	5.5	9.3	5.2
2000	167.2	10.1	56.6	10.8	45.1	6.6	9.5	5.3
92/96		12.1		13.0			8.7	
96/2000		10.2		10.8			9.4	
92/2000		10.1		11.5			9.3	

*Notes:* Simulation based on Equations in Table 1. Growth rates are the annual average rates over each interval, i.e., for 1992 the growth rate is from 1990 to 1992; for 1994 it 1992-1994.

*Assumptions:* Employment grows at 3.0% per annum; Import price index increases at 5% per annum.

12.5% in 2000. As noted earlier, the country will need to increase its savings efforts to avoid many of the problems associated with its growing debt burden.

- Private investment in manufacturing expands quite rapidly under this scenario, averaging more than 10% per annum. The rate for large scale units is even higher at 11.5%.

This scenario illustrates the main problem facing the Pakistani government: unless the public sector is able to reduce its deficit, high rates of sustained growth will not be possible. Public expenditure and/or revenue responses will have to be modified from past patterns if the economy hopes to experience an acceptable rate of growth during the 1990s. The real question is how to alter the public sector's fiscal accounts with minimum disruption to the private sector.

## 6. Optimal Control Simulations

In order to examine a spectrum of fiscal alternatives open to the government, a series of optimal control simulations was performed. These simulations were based on:

- a set of behavioral equations (Table 1) that represents a system that is to be controlled
- a set of constraints on the policy variables of the system -government expenditures, the fiscal deficit, foreign borrowing, gross national savings, inflation.
- a set of boundary conditions on the variables -employment and the import price index, and
- a performance index which is to be maximized. In this case the objective was to maximize the terminal private capital stock.

The essential idea of optimal control is to derive the optimal policy to overcome specified constraints (i.e. government expenditure level, the fiscal deficit, and foreign borrowing) in order to steer the economy to a specified set of targets, i.e. the maximum stock of private capital in the terminal year, 2000. In the simulations that follow, constraints are placed on government expenditures (changing them from endogenous variables in Table 1 to exogenous policy variables) one at a time until a final set of performance targets is met. In their order of introduction, the constraints include:

- public foreign borrowing limited to a range of greater than zero but less than 5% increase over the 1992-2000 period. This figure corresponds to the average over the 1980-90 period of 5.3%, but considerably below the

28.5% for 1986-90.

- infrastructure constrained in the range greater than zero, but equal or less than 10% per annum average growth rate. Infrastructure had expanded at an average annual rate of 7.1% over the 1980s, but had decelerated to 4.3% over the 1986-90 period. If beneficial to the economy, the model constraint lets infrastructure expand at rates somewhat over its historical growth path.

- non-defense expenditures were confined to an expansion of greater or equal to 2.0% and less than or equal to 7%. The upper constraint is somewhat below the 10.1% average of the 1980s. Clearly, many of the country's current fiscal problems stem from the fact that non-defense expenditures grew at rates considerably above that of government revenues (7.7%) during the 1980s.

It should be noted that the foreign borrowing was constrained in all of the simulations, whereas infrastructure and non-defense expenditures were introduced in subsequent scenarios.

The side conditions (outcome constraints) that ultimately had to be met were

- fiscal deficits constrained to less than 5% of GDP
- inflation: less than 5% average rate
- gross national savings greater than 14.0% of GDP (1990 value)

Two conditions deemed desirable, but not formally introduced as policy objectives were that:

- By the year 2000, defense expenditures should fall below 6% (they averaged slightly more than 7% during the 1980s, which is high by international standards).

- Given the government's goal of privatization, there should be a contraction of the share of GDP accounted for by government expenditures. The government sector expanded from around 17% of GDP in 1980 to more than 23% in 1990. Lowering this share to around 18-19% of GDP would be consistent with the government's liberalization policies.

Given these two sets of constraints, the model optimized the terminal stock of private capital. That is, after government expenditures were controlled to meet deficit, borrowing, inflation and savings conditions, how rapidly would the private sector be able to accumulate capital? As a basis of comparison, several alternative goals were specified: (a) the public stock of capital and (b) GDP as the variables to be maximized. Here interest was in determining whether expanding private investment came into conflict with the country's other major policy objectives.

Finally, as a basis of examining the role of defense expenditures in affecting private investment (directly through Eqs. 14 and 15 of Table 1 and indirectly through the fiscal deficit equation), several alternative strategies were examined:

- High defense budgetary strategy, where defense expenditures were constrained to a range of greater or equal to 5% and less than or equal to 7% average over the 1992-2000 period.

- Moderate defense budgetary strategy, where defense expenditures were constrained to a range of greater or equal to 3% and less than or equal to 5% average over the 1992-2000 period.

- Low defense budgetary strategy, where defense expenditures were constrained to a range of greater or equal to 1% and less than or equal to 3% average over the 1992-2000 period.

In all, 21 simulations were performed under alternative budgetary assumptions.<sup>5</sup> Several general patterns can be easily identified: First, the outcomes obtained by simply adopting the three defense budgetary strategies (without constraining other government expenditures) in an environment of constrained foreign borrowing:

- The low defense budgetary strategy (constraining budgetary allocations increases to a range of 1-3% average rate of increase) does not solve the country's fiscal deficit problems. In fact, deficits increase as a share of GDP to 6.1 (down from 7.1% in 1998) % by the year 2000.

- In large part this growth path stems from the fact that non-defense expenditures increase at rates greater than real GDP. In turn the revenue base expands slowly (4.7% average over the 1990-2000 period) compared with overall public expenditures (5.6). Private investment in manufacturing would gradually decline, reaching an average growth rate of 9.6 over the 1996–2000 period. Investment in small scale manufacturing would be less affected.

- As a result of the growing deficit, the country's saving rate and rate of inflation assume values outside the acceptable range of policy outcomes.

- Although defense expenditures decline to 4.4% of GDP by the year 2000, total government expenditures increase to almost 23% of GDP (up from 21.8% in 1992).

- Expanding defense expenditures into the moderate (3-5% growth) and high (5-7%) would result in an acceleration in both GDP and private investment in manufacturing. Specifically, the average growth in GDP over

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<sup>5</sup> The detailed tables containing these results are available from the author upon request.

the 1990-2000 period would increase from 5.8% in the low defense strategy to 6.1% in the moderate and 6.4% in the high defense strategy. The corresponding figures for private investment are more dramatic (5.7%, 7.0% and 8.2%).

- The relatively dramatic increase in private investment is due to the fact that expanded defense expenditures do not have a major impact of the fiscal deficit in this environment. For the low defense scenario, the deficit expands at an average rate of 8.9% per annum over the 1990-2000 period. This increases to only 9.1% with the moderate scenario and up to 9.5% with the high defense budgetary strategy. The corresponding crowding-out of private investment is less than the direct stimulus provided by the allocations to defense.

- In sum, however, all three defense scenarios violate the inflation, savings and deficit constraints. For this reason, the government would have to resort to increased austerity in other sections of the budget (assuming the historical pattern of revenues).

- In the next series of forecasts, the annual growth rate of infrastructure investment was constrained in the range of 0-10%, while the fiscal deficit was set at a minimum of 34.3 billion (1985) rupees (the actual deficit in 1991) and a maximum of 200 billion rupees. The most interesting features of this environment are that:

- Because of potential crowding-out of private investment, optimization of the terminal stock of private capital entails holding the fiscal deficit to its minimum figure (34.3 billion rupees). Of significance is the fact that does not change over the three budgetary scenarios.

- Compared to GDP growth rates of 5.8%, 6.1%, and 6.4% in the unconstrained infrastructure scenarios, the corresponding rates are 6.3%, 6.8% and 6.9% with the 0-10% limits placed on the growth in infrastructure investment. The corresponding figures for the growth of private investment in manufacturing are 8.4%, 9.5% and 10.7% p.a. (compared with 5.7%, 7.0% and 8.2% p.a. in the first set of simulations).

- While the rate of inflation is still outside the tolerable range of 5%, the fiscal deficits of all three scenarios decline to sustainable shares of GDP. Savings performance also improves with this aggregate increasing to 16.6% of GDP in the low defense budgetary strategy to 17.3% in the moderate defense scenario and 18.2% in the high defense budget.

- To determine if inflation could be reduced without seriously compromising private investment, the next set of simulations examined the scope for policies with this aim in mind. Again assuming that public revenues

will follow their historical patterns, reducing the fiscal deficit through expenditure austerity is the most logical option. Politically, deficit reduction at a rate of more than 5% per annum is not feasible. Hence the lower bound on the deficit was set at a maximum decline of 5% per annum average over the 1992-2000 period.

- The most significant finding of this set of simulations is that in order to maximize the stock of private capital, the model selects the lowest deficit allowable. That is in all three defense strategies, the deficit is reduced at 5% per annum throughout the 1990s. As a result, the deficits for each simulation fall well below the 5% minimum reduction target.

- With controlled deficit reduction the potential supply of GDP increases at rates of 6.6%, 6.8% and 7.1%, respectively under the low, medium and high defense budgetary strategies. The corresponding figures without deficit reduction were 6.3%, 6.8% and 6.9%.

- For private investment in manufacturing, the corresponding figures were 9.1%, 10.2% and 11.0% (compared with 8.4%, 9.5% and 10.7% without deficit reduction).

- With deficit reduction inflation falls within the acceptable policy target range of 4.3% (average rate for 1990-2000) for the low defense strategy, but increases to 5.2% for the medium and high defense strategies. It should be noted, however, that in the 1996-2000 period, inflation is reduced to an average of 1.7% per annum with the moderate budgetary and 1.3% for the high defense strategy.

Summing up, controlling defense expenditures at rates of increase averaging 7% or less together with a limitation on infrastructure investment of 10% would be all that was necessary for GDP to grow at rates more than 6.5% and private investment at rates more than 8.4%. This result occurs despite the fact that a fairly strong constraint was placed on the public sector's foreign borrowing.

In the simulations summarized above, non-defense expenditures were endogenous (determined by Eq. 5 of Table 1). Changing this variable to a policy instrument (constrained in an annual average range of between 2% and 10% per annum) resulted in several marginal changes from the previous set of findings:

- As in the previous set of simulations, maximizing the terminal stock of private capital, implies a minimization (within the ranges specified) of the fiscal deficit -this pattern applied to each of the three defense budgetary strategies.

- The country's saving performance improves under each budgetary

strategy with savings reaching 18.1%, 18.9% and 19.6% of GDP in the year 2000 under the low, medium and high defense strategies. The corresponding rates before imposing the constraint on non-defense expenditures were: 18.4%, 19.2% and 14.4%.

- In this scenario, inflation averages 4.3%, 5.1% and 6.3% over the 1900-2000 period under the low, medium and high defense strategies. For the high defense case, this is a deterioration from the 5.2% rate obtained prior to converting non-defense expenditures into a policy variable. Again it should be noted that under all of these scenarios inflation decelerated well below 5% in the 1996-2000 period.

- The rates of GDP growth (1990-2000) are 5.1%, 7.0% and 7.1% for the low, moderate and high defense budgetary strategies, respectively. The corresponding rates without the non-defense expenditure constraint were 6.6%, 6.8% and 7.1%. This finding suggests that at low rates of growth in defense expenditures aggregate demand becomes a problem great enough to offset the depressing effects of increased federal deficits. As we move into higher rates of defense expenditures, this demand effect becomes less important and the deficit takes on a larger importance in affecting the macro-economy. In this environment, constraining non-defense expenditures accelerates the growth of GDP.

- The corresponding rates of growth in private investment in manufacturing were 9.1%, 10.1% and 10.7% for the low, medium and high defense budgetary strategies. These rates compare to the 9.1%, 10.2% and 11.0% rates experienced before non-defense expenditures became a policy variable.

- By the year 2000 the share of defense expenditures falls to 4.1%, 4.7% and 5.9% in the low, medium, and high budgetary scenarios. Again this is down from the plus 7% rates experienced in the 1980s. Also, by the year 2000 the share of government expenditures in GDP declined to 18.6%, 19.5% and 19.7%. These figures are down from the 23% plus rates in the late 1980s.

In short, some marginal improvements can be made in GDP growth and private investment in manufacturing through placing some loose constraints on non-defense expenditures. Longer run gains in the form of higher savings rates would be the main advantage of this particular strategy. The fact remains that several fiscal options capable of reviving growth and private sector capital formation are available to the authorities. Given their parameters, these policy packages are not of the question politically. Austerity and macroeconomic balance does not have to be at the expense of growth

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and real capital formation. In short, a moderate budgetary strategy program along the line outlined above (Tables 4 and 5) should enable the country to meet its main policy objectives without resorting to severe austerity or abandoning its economic liberalization/privatization programs.

As an alternative, the government might consider a shock therapy type program with an immediate drop in the deficit. Using the same assumptions for expenditures as in the moderate budgetary strategy with controlled (5%) deficit reduction, this simulation constrains the deficit at 25 billion (1985) rupees throughout the period up to 2000. The results (Tables 6 and 7) differ from the controlled deficit reduction case in several regards:

- While the average rate of increase in GDP (1990-2000) is the same in both scenarios, inflation is somewhat lower in the shock therapy case (4.4% down from 5.1%).

- Total private investment is the same in both scenarios (8.5%). In the shock therapy case however, private investment in large-scale manufacturing grows at a higher rate (10.7%) than in the controlled deficit case (9.7%).

Similar simulations were undertaken with the terminal stock of GDP as the objective function. As might be expected, the moderate budgetary strategy results in a higher rate of growth in GDP (8.0% average for the period 1990-2000 *versus* 7.0% for the terminal stock of private capital). Also the rate of private investment in manufacturing (10.1% is marginally lower than that obtained by optimizing the terminal capital stock (10.4%). Other differences include:

- the saving rate would be higher maximizing the terminal stock of private capital (18.4% in the year 2000 *versus* 16.5%).

- inflation would be marginally lower maximizing GDP (3.7% *versus* 4.2%).

- the share of government expenditures in GDP is somewhat lower in the GDP simulation (17.1% for 2000 *versus* 18.4%).

In short, the results of the maximization of the terminal productive capacity of the economy (GDP) produced results closely approximating those obtained from optimizing the terminal stock of private capital. Choosing one objective as superior to the other would be largely a matter on how one valued savings, inflation and the share of government expenditures in GDP. For all practical purposes, however, both objectives would yield the same growth in private investment. Of the scenarios considered here, those using shock therapy could be considered the optimal for policy purposes. If the shock therapy approach is deemed politically risky, the moderate budgetary strategy of controlled deficit reduction would also yield acceptable results.

**Table 4**  
**Macroeconomic Simulation II: Optimization of the Terminal Stock of Private Capital: Moderate Defense Budgetary Strategy, With Loosely Constrained Infrastructure Investment/Non Defense Expenditures, and the Option of Controlled Deficit Reduction**  
 (billions of 1985 rupees)

Year	GDP		Defense Expenditures			Non-Defense Expenditures		
	Value	Growth	Value	Growth	%GDP	Value	Growth	%GDP
1992	735.0	7.9	46.9	2.1	6.4	111.6	5.0	15.2
1994	833.3	6.5	51.9	5.2	6.2	121.3	4.3	14.6
1996	940.0	6.2	57.1	4.9	6.1	134.4	5.3	14.3
1998	1073.4	6.9	62.9	5.0	5.9	148.7	5.2	13.9
2000	1235.9	7.3	58.5	-3.6	4.7	182.3	10.7	14.8
92/96		6.3		5.0				
96/2000		7.1		0.6				
92/2000		7.0		2.7				

  

Year	GDP Deflator		Gross National Savings			Fiscal Deficits		
	Value	Growth	Value	Growth	%GDP	Value	Growth	%GDP
1992	170.9	11.8	113.1	12.8	15.4	27.0	-2.8	3.7
1994	191.2	5.8	131.6	7.9	15.8	29.4	4.3	3.5
1996	211.3	5.1	161.9	10.9	17.2	26.5	-5.1	2.8
1998	223.1	2.8	195.0	9.7	17.2	24.1	-4.6	2.2
2000	224.3	0.3	233.1	9.3	18.9	22.9	-2.5	1.9
92/96		5.4		9.4			-0.5	
96/2000		1.5		9.5			-3.6	
92/2000		5.1		10.1			-2.2	

  

Year	Foreign Borrowing		Govt. Expenditures			Govt. Revenues		
	Value	Growth	Value	Growth	%GDP	Value	Growth	%GDP
1992	13.8	4.7	158.5	4.2	21.5	131.4	5.6	17.9
1994	15.2	4.9	173.1	4.5	20.8	143.7	4.6	17.2
1996	16.7	4.8	191.5	5.2	20.4	165.0	7.2	17.6
1998	18.4	5.0	211.6	5.1	19.7	187.5	6.6	17.5
2000	17.1	-3.6	240.8	6.7	19.5	217.9	7.8	17.6
92/96		4.9		4.8			5.9	
96/2000		0.6		5.9			7.2	
92/2000		3.1		5.1			6.3	

*Assumptions:* Employment grows at 3.0% per annum; Import price index increases at 5% per annum; Defense expenditures are constrained in a range of 3-5% increase per annum; the growth in foreign borrowing is constrained in the range of 0-5% increase per annum; infrastructure is constrained to grow in the range of 0-10% per annum, with non-defense expenditures in the range of 2-7%, and the fiscal deficit allowed to decrease at a maximum of 5% per annum.

**Table 5**

Investment Simulation II: Optimization of the Terminal Stock of Private Capital: Moderate Defense Budgetary Strategy, With Loosely Constrained Infrastructure Investment/Non Defense Expenditures, and the Option of Controlled Deficit Reduction  
(billions of 1985 rupees)

	Private Capital Stock		Private Investment			Public Infrastructure		
	Value	Growth	Value	Growth	%GDP	Value	Growth	%GDP
1992	182.2	4.4	66.1	8.6	9.0	24.0	6.4	3.3
1994	212.0	7.9	75.7	7.0	9.1	26.5	5.1	3.2
1996	245.9	7.7	89.0	8.4	9.5	29.2	5.0	3.1
1998	290.4	8.7	104.8	8.5	9.8	32.0	4.7	3.0
2000	347.8	9.4	126.6	9.9	10.2	35.5	5.3	2.9
92/96		7.8		7.7		5.0		
96/2000		9.1		9.2		5.0		
92/2000		7.6		8.5		5.3		

  

Year	Public Capital Stock		Private Investment Manuf.			Private Invest.Non-Manuf.		
	Value	Growth	Value	Growth	%GDP	Value	Growth	%GDP
1992	67.9	2.4	26.7	10.9	3.6	39.4	10.8	5.4
1994	75.7	5.6	32.4	10.2	3.9	43.3	4.8	5.2
1996	83.0	4.7	39.7	10.7	4.0	49.3	6.7	5.2
1998	91.9	5.2	48.6	10.6	4.5	56.3	6.9	5.2
2000	101.3	5.0	57.2	8.5	4.6	69.3	10.9	5.6
92/96		5.1		10.4		5.8		
96/2000		5.1		9.6		8.9		
92/2000		4.6		10.2		8.0		

  

Year	Private Capital Manuf.		PI Large Scale Manuf.			PI Small-Scale Manuf.		
	Value	Growth	Value	Growth	%PI	Value	Growth	%PI
1992	72.1	6.2	23.4	11.0	35.4	3.3	10.6	5.0
1994	88.3	10.7	28.7	10.7	37.9	3.7	5.9	4.9
1996	108.0	10.6	35.5	11.2	40.0	4.2	6.5	4.7
1998	132.2	10.6	43.7	10.9	41.7	4.8	6.9	4.6
2000	159.4	9.8	51.5	8.6	40.7	5.8	9.9	4.5
92/96		10.6		11.0		6.2		
96/2000		10.2		9.7		8.4		
92/2000		9.6		9.7		7.9		

*Assumptions:* Employment grows at 3.0% per annum; Import price index increases at 5% per annum; defense expenditures are constrained in a range of 3-5% increase per annum; the growth in foreign borrowing is constrained in the range of 0-5% increase per annum; infrastructure is constrained to grow in the range of 0-10% per annum, with non-defense expenditures in the range of 2-7%, and the fiscal deficit allowed to decrease at a maximum of 5% per annum.

**Table 6**

Macroeconomic Simulation III: Optimization of the Terminal Stock of Private Capital: Moderate Defense Budgetary Strategy, With Loosely Constrained Infrastructure Investment/Non Defense Expenditures, With Shock Therapy Deficit Reduction, 1992-2000  
(billions of 1985 rupees)

Year	GDP		Defense Expenditures			Non-Defense Expenditures		
	Value	%Growth	Value	%Growth	%GDP	Value	%Growth	%GDP
1992	735.2	7.2	47.0	2.2	6.4	109.5	3.9	14.9
1994	836.7	6.7	51.9	5.1	6.2	117.8	3.7	14.1
1996	948.5	6.5	57.2	5.0	6.0	134.2	6.7	14.1
1998	1082.9	6.9	61.7	3.9	5.7	152.8	6.7	14.1
2000	1238.1	6.9	59.5	-1.8	4.8	178.1	8.0	14.4
92/96		6.6		5.0				5.2
96/2000		6.9		1.0				7.3
92/2000		7.0		2.8				5.9

  

Year	GDP Deflator		Gross National Savings			Fiscal Deficits		
	Value	%Growth	Value	%Growth	%GDP	Value	%Growth	%GDP
1992	170.9	11.8	115.2	13.8	15.7	25.0	-6.5	3.4
1994	190.0	5.4	140.4	10.4	16.8	25.0	0.0	3.0
1996	197.4	1.9	166.7	9.0	17.6	25.0	0.0	2.6
1998	203.3	1.5	195.2	8.2	18.0	25.7	1.4	2.4
2000	205.3	0.5	227.7	8.0	18.4	25.0	-1.4	2.0
92/96		3.7		9.7			0.0	
96/2000		1.0		8.1			0.0	
92/2000		4.2		9.9			-1.3	

  

Year	Foreign Borrowing		Govt. Expenditures			Govt. Revenues		
	Value	%Growth	Value	%Growth	%GDP	Value	%Growth	%GDP
1992	13.8	4.7	156.4	3.5	21.3	131.4	5.6	17.9
1994	15.2	4.9	169.7	4.2	20.3	144.7	4.9	17.3
1996	16.7	4.8	191.4	6.2	20.2	166.4	7.2	17.5
1998	18.4	5.0	214.5	5.9	19.8	188.8	6.5	17.4
2000	17.1	-3.6	237.6	5.2	19.2	212.6	6.1	17.2
92/96		4.9		5.2			6.1	
96/2000		0.6		5.6			6.3	
92/2000		3.1		5.0			6.1	

*Assumptions:* Employment grows at 3.0% per annum; Import price index increases at 5% per annum; defense expenditures are constrained in a range of 3-5% increase per annum; the growth in foreign borrowing is constrained in the range of 0-5% increase per annum; infrastructure is constrained to grow in the range of 0-10% per annum, with non-defense expenditures in the range of 2-7%, and the fiscal deficit allowed to decrease at a maximum of 5% per annum.

**Table 7**

**Investment Simulation III: Optimization of the Terminal Stock of Private Capital: Moderate Defense Budgetary Strategy, With Loosely Constrained Infrastructure Investment/Non Defense Expenditures, and With Shock Therapy Deficit Reduction**  
(billions of 1985 rupees)

	Private Capital Stock		Private Investment			Public Infrastructure		
	Value	%Growth	Value	%Growth	%GDP	Value	%Growth	%GDP
1992	182.3	4.4	66.2	8.7	9.0	24.0	6.4	3.3
1994	213.6	8.2	76.8	7.7	9.2	26.5	5.1	3.2
1996	250.3	8.3	90.7	8.7	9.6	29.2	5.0	3.1
1998	295.0	8.6	106.8	8.5	9.9	32.2	5.0	3.0
2000	348.9	8.8	126.2	8.7	10.2	35.5	5.0	2.9
92/96		8.3		8.2		5.0		
96/2000		8.7		8.6		5.0		
92/2000		7.6		8.5		5.3		

Year	Public Capital Stock		Private Investment Manuf.			Private Investment Non-Manuf.		
	Value	%Growth	Value	%Growth	%GDP	Value	%Growth	%GDP
1992	67.9	2.4	26.7	10.9	3.6	39.4	10.8	4.7
1994	75.7	5.6	32.9	11.0	3.9	43.9	5.6	5.2
1996	83.0	4.7	40.8	11.4	4.3	50.0	6.7	5.3
1998	91.9	5.2	49.6	10.3	4.6	57.2	7.0	5.3
2000	101.3	5.0	58.2	8.3	4.7	68.1	9.1	5.5
92/96	1	5.1		11.2		6.1		
96/2000		5.1		9.3		8.0		
92/2000		4.6		10.4		7.8		

Year	Private Capital Manuf.		PI Large Scale Manuf.			PI Small-Scale Manuf.		
	Value	%Growth	Value	%Growth	%GDP	Value	%Growth	%GDP
1992	72.2	6.3	23.5	11.2	35.5	3.3	10.6	4.9
1994	89.1	11.1	29.3	11.7	38.1	3.7	5.9	4.8
1996	110.5	11.4	36.6	11.8	40.3	4.2	6.5	4.7
1998	135.4	10.7	44.7	10.5	41.8	4.9	8.0	4.6
2000	161.9	9.3	52.4	8.3	41.5	5.8	8.8	4.6
92/96		11.2		11.7		6.2		
96/2000		10.0		9.4		8.4		
92/2000		9.7		10.7		7.9		

*Assumptions:* Employment grows at 3.0% per annum; Import price index increases at 5% per annum; defense expenditures are constrained in a range of 3-5% increase per annum; the growth in foreign borrowing is constrained in the range of 0-5% increase per annum; infrastructure is constrained to grow in the range of 0-10% per annum, with non-defense expenditures in the range of 2-7%, and the fiscal deficit allowed to decrease at a maximum of 5% per annum.

## 7. Conclusions

Using an earlier version (Looney, 1992) of the macroeconomic model developed above it was found that increased government investment tended to crowd out private investment in manufacturing. Historically, and with no other adjustments in government fiscal policy, it was found that over the 1974-91 period a modest increase in government investment (2.5%) crowded out enough private investment to reduce GDP in 1991 by slightly over 13%.

It was also found that the government could counter this contraction in private investment and GDP by increasing its borrowing in external capital markets. However, external borrowing proved to be a very costly solution. For example, beginning in the mid-1980s a 2.5% increase in government investment would have to be matched by an increase in public foreign borrowing of more than 10%, simply to preserve levels of investment and GDP that would have occurred in the absence of increased government investment. Given the country's deficient infrastructure the future looked bleak indeed.

However, using an optimal control analysis and expanding the policy options available to the government, it appears that with proper economic management the country can return to a high growth path while avoiding many of the imbalances that have characterized the country's recent economic performance.

The simulations summarized above suggest that a critical element of any future policy package must place a high priority on deficit reduction. This strategy would entail either an immediate sharp reduction in the deficit or a decline in the deficit by 5% per annum up to the year 2000. This strategy would provide a good chance of maintaining fairly high rates of growth throughout the 1990s.

For example, in an environment of controlled deficit reduction, limiting the expansion of defense expenditures to rates of increase averaging 7% or less, together with a limitation on the growth of infrastructure investment of 10% p.a. would enable the economy to expand at rates of more than 6.5% per annum and private investment at rates more than 8.4%. These rates of growth could occur in environment of relatively constrained foreign borrowing, i.e., rates of borrowing averaging less than 5% throughout the rest of the 1990s.

The rate of growth of private investment in manufacturing under these assumptions is likely to be below the rates obtained in the 1980s. However, with limitations on non-defense expenditures, rates of growth in the 10%

range are not out of the question. In addition, a program should enable the government to meet all of the country's main economic objectives -an inflation rate less than 5%, increased savings rate (from around 15% of GDP in the early 1990s up to nearly 19% by the end of the century), and a declining share of GDP accounted for by government expenditures. In essence, this program would create a macroeconomic environment conducive to obtaining the greatest benefits from the current privatization program.

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## Özet

### Pakistan'da özel yatırımların makroekonomik kısıtları

Bu yazının amacı, Pakistan'da maliye politikalarının özel kesim yatırım eğilimlerini ve çok önemli olduğu herkesçe kabul edilen imalat sanayiindeki özel yatırım kararlarını nasıl etkilediğini araştırmaktır. Alternatif maliye politikası paketlerinin etkilerini incelemek üzere geliştirilen bir optimal kontrol analizi yardımıyla basiretli bir ekonomik yönetimin Pakistan ekonomisini son yıllarda sık sık karşılaştığı dengesizliklerden koruyabileceği ve ekonomiyi daha hızlı bir büyüme çizgisine oturtabileceği gösterilmiştir. Analiz, gelecekteki herhangi bir politika paketinde yer alması gereken ve kilit önem taşıyan ögenin kamu açıklarının daraltılması olduğunu düşündürmektedir.