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INDIAN PUBLIC FINANCE IN THE 1990s: CHALLENGES AND PROSPECTS

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Indian Public Finance in the 1990's: Challenges and Prospects

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Abstract.

This study updates and extends to the period 88/89-92/93 our earlier analysis of the public finances of India. The foreign exchange crisis of early 1991 forced the government to recognize the severity of the fiscal crisis it was facing and led to the implementation of a restrictive fiscal and monetary program.

As regards the magnitude of the fiscal correction that was undertaken, we conclude that it was insufficient. Further significant increases in the public debt-GDP ratio would be de-stabilizing and inflationary financing of public sector deficits is not an option. We calculate that a further permanent increase in the public sector *primary* surplus of about four and a half points of GDP is needed to achieve the modest objective of stabilizing the public debt-GDP ratio.

On the revenue side, this increase in the primary surplus is best achieved by expanding the direct and indirect tax bases and improving tax administration, collection and enforcement. On the expenditure side, reductions in the general government wage bill, in fertilizer subsidies, in some (but not all) food subsidies and in operating and capital subsidies to public sector enterprises are recommended. For efficiency reasons and to support the proposed expenditure cuts, the overwhelming majority of the public sector enterprises should be privatized and cut off from further government subsidies.

KEY WORDS: India, Fiscal Policy, Solvency, Inflation Tax

1. INTRODUCTION.

Despite the two-year old process of fiscal adjustment in India, the spectre of a government budgetary emergency or even of a government solvency crisis has not been eliminated. The fiscal correction of the last two years has been insufficient to correct for the profligacy of the 1980s. Though the overall public sector financial and primary deficits as ratios to GDP have declined modestly, both the debt-GDP ratio and the present discounted value of the public debt in Rupee terms continue to rise, albeit more slowly than previously, and a reversal of this pattern seems unlikely, without further measures to reduce public expenditure or raise government revenues.

At the beginning of 1991, a foreign exchange crisis had forced the government to recognize what was already obvious a year earlier: India was in a deep economic crisis. The crisis had as its proximate cause the large and increasing fiscal deficits of the public sector that had emerged over the last decade or so. These had contributed to large external current account deficits which were financed through official foreign borrowing. With the help of emergency short- and medium-term credits, and an adjustment programme containing the usual ingredients of a depreciation of the nominal exchange rate, an increase in interest rates and a fiscal consolidation to reduce the central government's deficit, India averted a default on its foreign debt.[1] The fiscal correction, which was the critical ingredient of the stabilization programme, consisted mainly in cuts in public sector capital expenditure.[2] There has been little action on the important task of changing the structure of taxation to increase the buoyancy of revenues. Direct taxes still play a relatively unimportant role in revenue mobilization.[3] Agricultural income continues to escape taxation and there is an over-reliance on indirect taxation whose structure is characterized by numerous rates and exemptions leading to major distortions[4]. To a large extent, these distortions are due to *overlapping* tax administrations - the Union government, twenty-five State governments and various local authorities - and numerous *exemptions* granted by each of the three levels of government.

The brunt of the fiscal adjustment has been borne by the central government. This reflects the political realities of India's federal political structure and

the political weakness of the incumbent Union government. The present minority administration at the Federal level has been unable (and unwilling) to tighten the fiscal screws on the states to the extent required in view of the magnitude of the overall fiscal adjustment that is needed.

In addition, the public sector enterprises (PSEs) continue to be a large net drain on the financial resources of the government[5]. There have been no serious efforts to privatize or close down any PSEs. Fear of potentially damaging opposition from the public sector labour unions accounts for this inertia. During 1991 and 1992, the government's privatization (more accurately, *corporatization*) efforts have been limited to the disinvestment of equity varying between 5 and 20 per cent in 31 selected PSEs. The total shares thus disinvested during 1991/92 comprised 8 per cent of the total government shareholding in these 31 PSEs, and equalled 0.5 percent of 1991/92 GDP or 2.6 per cent of 1991/92 Central Government expenditure.

The fiscal crisis had been anticipated in our earlier work (Buiter and Patel [1992]), which contained two main conclusions. First, a continuation of recent trends in fiscal behaviour would eventually threaten the solvency of the government.[6] Second, the option of using *seigniorage* or the *inflation tax* to bridge part of the budgetary gap was limited: small sustained increases in the share of seignorage in GDP will have a high cost in terms of additional long-run inflation, and even maximal use of the inflation tax would not be sufficient to close the solvency gap. The fiscal correction that has taken place has not succeeded in stabilising the debt-GDP ratio which has continued to increase but at a slower rate[7] Much remains to be done even to achieve the modest objective of stabilising the debt-GDP ratio, let alone reducing it. The primary deficit stands in 1992/93 at 5 percent of GDP. Although this represents a reduction of two and a half percentage points of GDP since its peak in 1990/91, any persistently positive value of the primary is inconsistent with ensuring solvency: the present discounted value of the debt (henceforth the discounted debt) rises if and only if the primary deficit is positive. India has to start generating primary surpluses to stop the discounted debt from rising; *a fortiori*, with the interest rate above the growth rate, primary surpluses are required to

stabilize the debt-GDP ratio. This implies that further fiscal retrenchment is required.

The mixed success of the policy measures, including fiscal consolidation, provides a sufficient motivation for revisiting the public finances of India. In an open economy, a fiscal crisis often manifests itself first through a foreign exchange crisis, that is, through a speculative run on the foreign exchange reserves. This can happen even if little or no public debt is held by foreigners. The modalities for a speculative attack on a country's foreign exchange reserves are of course multiplied when, as in the case of India, there is a large externally held component of the public debt. Since the foreign debt is denominated in hard foreign currencies (such as the US dollar) rather than in Rupees, speculators are concerned about sovereign risk, that is, about explicit government default or repudiation risk rather than about currency risk (devaluation risk). As a result of the underdeveloped state of India's domestic financial markets, domestic borrowing by the government amounts, directly or indirectly, to monetization or to taxation of the (largely government-owned) banking system, which is compelled to absorb public debt at rates below the rates that would be required for voluntary debt acquisition. Given these rather strict limits on the governments ability to finance deficits domestically, government deficits spill over into the external current account. Without Ricardian equivalence or debt neutrality, continuing large fiscal deficits threaten to become continuing large current account deficits and the risk of government default manifests itself as default risk on the externally held public debt.

When the financial markets no longer rule out the possibility of default, they become jittery and illiquid. Re-financing of maturing obligations is no longer automatic. The pattern of debt service (interest and repayment of principal), which is heavily influenced by the maturity structure of the debt, acquires an importance it does not have when solvency is not in question and voluntary roll-overs take place quasi-automatically. In the case of India, the foreign debt servicing ratio is high and rising over the next few years as a result of repayments of debt incurred in the last two years to bolster the foreign exchange reserves. This is the main reason for India's credit rating in

the international capital market continuing to be *speculative* grade rather than *investment* grade.[8]

Tables 1-5 present the basic Public Finance data. The time series of India's debt profile over the last two decades reveals two distinct phases. The 1970s are characterized by a modestly declining debt-GDP ratio (NTD), but there was a sharp reversal in behaviour of this ratio starting in 1980/81 (Table 1). The debt-GDP ratio has risen from about 30 percent in 1980/81 to 71 percent in 1992/93. The domestic debt figure (NTDD) includes the internal liabilities of the Union government, the states and the public enterprises. All cross-holdings of debt between the three components of the public sector have been netted out. The decomposition of NTDD according to the level of general government is given in Table 2. The Union government accounts for two-thirds of all Rupee denominated public sector liabilities. The foreign debt (TFD) figures in Table 3 includes public and publicly guaranteed long-term debt, use of IMF credit, and an estimate of public and publicly guaranteed short-term debt. Foreign exchange reserves, R, are subtracted from TFD to obtain net foreign debt (NTFD). A striking fact to emerge from Tables 2 and 3 is that over the period of fiscal consolidation it is the increase in foreign debt that has accounted for most of the increase in the total public debt-GDP ratio. The overall public sector deficit as a ratio to GDP rose from 4.3 percent in 1975/76 to 11.6 percent in 1990/91, and the primary deficit increased from 2.5 percent to 6.9 percent over the same period (Table 4). Interest payments have more than doubled as a percentage of GDP between 1980/81 and 1992/93 and are expected to continue to rise at least over the near future. Lower world interest rates has helped to contain the increase. Though the use of seignorage has declined recently it rose from 1 percent of GDP in 1980/81 to over 3 percent by 1989/90. Table 5 presents the evolution of the central ingredients in our solvency tests - the discounted debt, the discounted primary deficit and discounted seignorage.

The plan of the rest of the paper is as follows. In Section 2 after setting up a basic accounting framework for tracing the evolution of debt over time, the central issue of *(in)solvency* is comprehensively investigated. The accounting framework is the key input into making any judgement regarding the sustainability

of the overall public sector's fiscal-financial-monetary programme and of the magnitude of fiscal correction required to ensure solvency of the government. In Section 3 the magnitude of fiscal correction that is required to put Indian Public Finances on a firmer footing is calculated. Using the notion of a *primary gap* we calculate, under a variety of assumptions, the excess of the required fiscal correction over that implied by the present fiscal stance. A brief discussion of how the fiscal consolidation could be achieved follows the calculations. A demand equation for base money is estimated and deployed in Section 4 to investigate both the efficacy of running the printing presses as a means of closing the primary gap and the implied inflationary consequences that would follow from using this option. In Section 5 we formally investigate the time series behaviour of debt servicing ratios to flag possible liquidity problems built into the current *composition* of the debt. In Section 6 *transitory* increases in public expenditure that could make the required fiscal adjustment difficult to achieve are discussed; and in Section 7 the possible (institutional) constraints that stand in the way of further fiscal consolidation are put forward. Finally, Section 8 contains our concluding remarks.

2. EVALUATING SOLVENCY.

2.1. Basic accounting idendities, concepts and measures of fiscal sustainability.

We start from the basic single-period budget identity (sources and uses of funds) of the consolidated public sector and central bank, given in equation (2.1) below.

$$\begin{aligned} & C_t - T_t - E_t N_t^* - F_t + A_t \\ & - PRIV_t + i_t B_{t-1}^d + i_t^* E_t (B_{t-1}^* - R_{t-1}^*) \\ & \equiv \Delta B_t^d + E_t \Delta B_t^* + \Delta H_t - E_t \Delta R_t^* \end{aligned} \qquad \textbf{(2.1)}$$

C_t is the nominal value of government consumption spending in period t.

T_t is the nominal value of taxes net of transfers and subsidies in period t.

E_t is the nominal spot exchange rate (the domestic currency price of foreign exchange in period t).

N_t^* is the foreign currency value of foreign aid.

F_t is the nominal value of the gross cash flow from the public sector capital stock in period t.

A_t is the nominal value of gross domestic capital formation in the public sector in period t.

$PRIV_t$ is the nominal value of privatization proceeds in period t.

i_t is the nominal interest rate on domestic currency denominated public debt in period t.

B^d_{t-1} is the nominal face value of the net stock of domestic currency-denominated interest bearing liabilities of the consolidated public sector, including arrears, outstanding at the beginning of period t.

B^*_{t-1} is the foreign currency face value of the net stock of foreign currency-denominated interest-bearing liabilities of the consolidated public sector, including arrears but excluding official foreign exchange reserves, outstanding at the beginning of period t.

R^*_{t-1} is the foreign currency value of the stock of official international reserves (denominated in foreign currency) at the beginning of period t.

H_{t-1} is the nominal stock of non-interest bearing base money or high-powered money outstanding at the beginning of period t.

For any variable X we define $\Delta X_t \equiv X_t - X_{t-1}$.

We also define the following:

(2.2) $$H_t \equiv CU_t + RR_t$$

(2.3) $$P_t \Delta K_t \equiv A_t - DEP_t - \frac{P_t}{P^k_t} PRIV_t$$

(2.4) $$DEP_t \equiv P_t \delta_t K_{t-1}$$

(2.5) $$F_t \equiv P_t \rho_t K_{t-1}$$

CU_t is the nominal stock of domestic currency in the hands of the public at the end of period t.

RR_t is the nominal value of commercial bank reserves held with the central bank at the end of period t.

P_t is the domestic GDP deflator in period t.

K_t is the public sector capital stock at the end of period t valued at current reproduction cost, that is, measured in physical units, which are assumed to be real GDP units. The nominal reproduction cost of public sector capital stock is therefore assumed to be the GDP deflator, although a capital reproduction cost index distinct from the GDP deflator could be added without complications.

DEP_t is the nominal value of public sector capital consumption or depreciation in period t.

P^k_t is the domestic currency value of the price obtained for a unit of public sector capital privatized in period t.

δ_t is the proportional rate of physical depreciation of the public sector capital stock in period t.

ρ_t is the gross real cash (or financial) rate of return on public sector capital in period t. Note that this consists both of direct financial revenues (from tolls, user charges etc.) and through indirect effects of public sector capital on other sources of government revenue. An example is the possible positive effect of infrastructure investment by the government on real GDP and thus on the income tax base.

The *current* or *consumption account primary surplus* (that is, the non-interest, non-investment, non-privatization) surplus of the consolidated public sector, S^c_t is defined in equation (2.6).

$$S^c_t \equiv T_t + E_t N^*_t - C_t \tag{2.6}$$

The *conventionally defined primary (non-interest) financial surplus* of the consolidated public sector, S_t, is defined in equation (2.7). Unlike S^c_t it includes gross capital formation, A, as a debit item and gross capital income, f, and receipts from privatization, $PRIV$, as credits.

$$S_t \equiv S^c_t + F_t + PRIV_t - A_t \tag{2.7}$$

Public sector gross dissaving or the consumption account deficit of the public sector, D^c_t, is defined in equation (2.8).

The conventionally defined financial deficit or borrowing

$$D_t^c \equiv -S_t^c - (F_t - DEP_t) + i_t B_{t-1}^d + i_t^* E_t (B_{t-1}^* - R_{t-1}^*) \tag{2.8}$$

requirement of the public sector, D_t, is defined in equation (2.9).

$$\begin{aligned} D_t &\equiv D_t^c + A_t - DEP_t - PRIV_t \\ &\equiv -S_t + i_t B_{t-1}^d + i_{t-1}^* (B_{t-1}^* - R_{t-1}^*) \end{aligned} \tag{2.9}$$

From equations (2.1), and (2.3) to (2.5) we obtain equation (2.10).

The following definitions will also prove to be useful in subsequent

$$\begin{aligned} C_t - T_t \; -E_t N_t^* - \left(\frac{P_t^k - P_t}{P_t^k}\right) PRIV_t - (F_t - DEP_t) \\ + i_t B_{t-1}^d + i_t^* E_t (B_{t-1}^* - R_{t-1}^*) \\ \equiv -P_t \Delta K_t + \Delta B_t^d + E_t \Delta (B_t^* - R_t^*) + \Delta H_t \end{aligned} \tag{2.10}$$

analysis. Y_t is real GDP in period t.

$$\sigma_t \equiv \frac{\Delta H_t}{P_t Y_t} \tag{2.11}$$

σ_t is seignorage as fraction of GDP, that is the change in the nominal stock of base money divided by nominal GDP.

$$B_t \equiv B_t^d + E_t (B_t^* - R_t^*) \tag{2.12a}$$

B_t is the nominal face value (measured in domestic currency) of the total net stock of non-monetary financial public debt at the end of period t.

$$\bar{B}_t \equiv B_t - P_t K_t \tag{2.12b}$$

$\bar{B}_t$ is the nominal face value of the total net stock of non-monetary tangible liabilities of the government at the end of period t. It subtracts the public sector capital stock valued at current reproduction cost from the net stock of non-monetary financial liabilities.

It is sometimes useful to rewrite equation (2.10) in terms of behaviour over time of stocks and flows *per unit of GDP*, that is, to use real GDP as the

numeraire. This yields equation (2.13). Lower-case stocks and flows denote the corresponding upper-case quantities as a proportion of GDP[9]. π is the domestic rate of inflation, P^* the foreign GDP deflator, π^* the foreign rate of inflation, ϵ the proportional rate of depreciation of the nominal exchange rate, γ the proportional rate of depreciation of the real exchange rate, g the growth rate of real GDP, r the domestic real rate of interest and r^* the foreign real rate of interest.

$$
\begin{aligned}
& c_t - \tau_t - n_t^* - \left(\frac{P_t^k - P_t}{P_t^k}\right) priv_t - \left(\frac{\rho_t - \delta_t - g_t}{1+g_t}\right) k_{t-1} \\
& + \left(\frac{r_t - g_t}{1+g_t}\right) b_{t-1}^d + \left(\frac{r_t^*(1+\gamma_t) + \gamma_t - g_t}{1+g_t}\right) (b_{t-1}^* - \rho_{t-1}^*) \\
& \equiv -\Delta k_t + \Delta b_t^d + \Delta (b_t^* - \rho_t^*) + \sigma_t
\end{aligned}
\tag{2.13}
$$

$$\pi_t \equiv \frac{P_t}{P_{t-1}} - 1 \tag{2.14a}$$

$$\pi_t^* \equiv \frac{P_t^*}{P_{t-1}^*} - 1 \tag{2.14b}$$

$$g_t \equiv \frac{Y_t}{Y_{t-1}} - 1 \tag{2.14c}$$

$$\epsilon_t \equiv \frac{E_t}{E_{t-1}} - 1 \tag{2.14d}$$

$$\gamma_t \equiv \frac{(1+\epsilon_t)(1+\pi_t^*)}{1+\pi_t} - 1 \tag{2.14e}$$

(2.14f) $$r_t \equiv \frac{1+i_t}{1+\pi_t} - 1$$

(2.14g) $$r_t^* \equiv \frac{1+i_t^*}{1+\pi_t^*} - 1$$

A digression on the valuation of public sector capital.

Equation (2.13) brings out the important point that there are *three* distinct valuations of public sector capital that are relevant for the government's intertemporal budget constraint or solvency constraint. The first is the current reproduction cost of capital, P_t in nominal terms, that is the cost of gross domestic capital formation[10]. The second is the value realized though sale to the private sector, P_t^k in nominal terms. The third is the "continuation value" of a unit of public sector capital in the public sector, that is, what the unit of capital is worth if it were to remain in the public sector for at least one more period. Let this be denoted V_t . Note that, unlike P_t^k and P_t , V_t is not a price quoted in any actual market, but rather an implicit or shadow price. Consider the case where the government acts as if it were maximizing, in each period t, the expectation of the time-additive utility functional U_t given below:

$$U_t = \sum_{i=0}^{\infty} \beta^i u(C_{t+i}), \qquad 0<\beta<1 \; ; \; u'>0; \; u''<0; \; u'(0)=\infty$$

Now consider the following two alternative investment strategies. In the first a unit of public sector capital is retained in the public sector for the current period where it earns $(\rho_t-\delta_t)P_t$. Next period it can either be resold for P_{t+1}^k or be retained

for another period in the public sector, in which case its value will be V_{t+1} Rational intertemporal choice by the government means that the continuation value in the public sector of public sector capital is constrained by the "Euler

equation" given in (2.15). $\mathcal{E}_t$ is the expectation operator conditional on information at time t.

$$\frac{V_t}{P_t}u'(c_t) = \mathcal{E}_t\left\{[P_t(\rho_t-\delta_t) + \max\{P^k_{t+1}, V_{t+1}\}]\frac{1}{P_{t+1}}\beta u'(c_{t+1})\right\} \tag{2.15}$$

Equation (2.15) brings out that the determination of the continuation value in the public sector of public sector capital requires the tools of option pricing. Retaining the capital in the public sector for the current period means retaining the option of privatizing it the next period, should next period's privatization price exceed next period's continuation value in the public sector. Note that the "strike price" that determines whether or not the option to privatize is exercised next period, V_{t+1} , is itself uncertain at time t. The second strategy involves investing in securities with a nominal rate of return i_{t+1} . The Euler equation for this investment choice is

$$u'(c_t) = \mathcal{E}_t\left\{\frac{(1+i_{t+1})}{(1+\pi_{t+1})}\beta u'(c_{t+1})\right\} \tag{2.16}$$

If there is risk-neutrality (u' is constant) and if the nominal interest rate i_{t+1} is known at time t, then (2.15) and (2.16) imply (2.17).

$$V_t = \frac{(\rho_t-\delta_t)P_t}{1+i_{t+1}} + \frac{1}{1+i_{t+1}}\mathcal{E}_t\left\{\max\{\frac{P^k_{t+1}}{P_{t+1}}, \frac{V_{t+1}}{P_{t+1}}\}\right\}\left[\mathcal{E}_t\left\{\frac{1}{P_{t+1}}\right\}\right]^{-1} \tag{2.17}$$

If in addition the future general price level is non-stochastic, (2.17) reduces to the simple recursion relation given in (2.18) below.

The continuation value of a unit of public sector capital in the public sector during period t is the discounted value of period t's net cash flow plus

$$V_t = \frac{(\rho_t-\delta_t)P_t}{1+i_{t+1}} + \frac{1}{1+i_{t+1}}\mathcal{E}_t\{\max\{P^k_{t+1}, V_{t+1}\}\} \tag{2.18}$$

the expected present discounted value of the larger of next period's privatization value and next period's continuation value. In a perfect world without adjustment costs, it would be the case that $V_t = P_t = P^k_t$. There is no

reason to believe that this happy state of affairs in ever approximated in practice. A government that takes P_t^k and P_t as given (that is, independent of its investment and privatization decisions) can relax its intertemporal budget constraint by increasing fixed capital formation in the public sector if $V_t > P_t$ [11]. It can relax its intertemporal budget constraint by privatizing existing public sector capital if $P_t^k > V_t$. It can relax its intertemporal budget constraint by engaging in fixed capital formation and immediately selling the new capital goods if $P_t^k > P_t$.[12] In general, however, we would expect the government to recognize the dependence of P_t on its own investment decisions and the dependence of P_t^k on the scale of its privatization programme. Many other government actions outside the immediate areas of government investment, privatization or socialization can also be expected to influence P_t, P_t^k and V_t. The government can be expected to recognize the fact that it is a large agent with respect to many of the economic processes it is involved with. It may be tempted to use its monopoly and monopsony power.

Simple debt dynamics.

Equation (2.13) can be rewritten as an equation of motion for the ratio to GDP of the net non-monetary tangible liabilities of the government, $\overline{b}$. Noting that $\overline{b} \equiv b^d+b^*-\rho^*-k$, we have

$$\overline{b}_t \equiv \left(\frac{1+r_t}{1+g_t}\right)\overline{b}_{t-1} - \tilde{s}_t^c \tag{2.19}$$

$\tilde{s}_t^c$ is the *augmented* current or consumption account primary surplus as a fraction of GDP, defined in equation (2.20).

The augmented current or consumption account primary surplus, $\tilde{s}^c$, a dds four items to the ordinary, non-augmented current or consumption account primary surplus, s^c.[13] The first is the profits from privatization, measured by the excess of the price at which the public sector capital is sold to the private

$$\tilde{s}_t^c \equiv s_t^c + \left(\frac{P_t^k - P_t}{P_t^k}\right) priv_t + \left(\frac{\rho_t - \delta_t - r_t}{1+g_t}\right) k_{t-1} + \left(\frac{r_t - [r_t^*(1+\gamma_t)+\gamma_t]}{1+g_t}\right)(b_{t-1}^* - \rho_{t-1}^*) + \sigma_t \tag{2.20}$$

sector, P^k , over the current reproduction cost of public sector capital, P , , times the number of units sold , $priv/P^k$. The second and third items correct for any errors involved in imputing to all tangible assets and liabilities a real rate of return equal to the domestic real rate of interest. The term $\left(\frac{\rho_t - \delta_t - r_t}{1+g_t}\right)k_{t-1}$ shows that a country's net debt will increase more slowly if the net real financial rate of return on the public sector capital stock $\rho-\delta$ exceeds the real interest rate, r . The term $\left(\frac{r_t - [r_t^*(1+\gamma_t)+\gamma_t]}{1+g_t}\right)(b_{t-1}^* - \rho_{t-1}^*)$ shows that a country's net debt will increase more slowly if it has borrowed abroad, $b_{t-1}^* - \rho_{t-1}^* > 0$, and the domestic real interest rate, r, exceeds the world real rate of interest, r^* , plus the proportional rate of depreciation of the real exchange rate, γ. Finally, seigniorage (as a fraction of GDP), σ, is added to the conventional primary surplus.

The (non-augmented) *current or consumption account primary surplus* as a fraction of GDP, s_t^c, is defined in equation (2.21).

$$s^c \equiv \tau + n^* - c \tag{2.21}$$

Alternatively, we may wish to consider the behavior over time of $b \equiv b^d + b^* - \rho^*$,the net non-monetary *financial* liabilities of the government, as a fraction of GDP. This is given by equation (2.22).

$\tilde{s}$ is the *augmented* (conventional) primary surplus of the government, as a fraction of GDP, defined in equation (2.23).

$$b_t \equiv \left(\frac{1+r_t}{1+g_t}\right) b_{t-1} - \tilde{s}_t \tag{2.22}$$

$$\tilde{s}_t \equiv s_t + \left(\frac{r_t - [r_t^*(1+\gamma_t)+\gamma_t]}{1+g_t}\right)(b_{t-1}^* - \rho_{t-1}^*) + \sigma_t \tag{2.23}$$

The augmented primary surplus measure adds to the ordinary, non-augmented primary surplus, s, defined in equation (2.24), a correction for any deviation from uncovered real interest parity, that is any discrepancy between the domestic real interest rate and the world rate of interest plus the proportional rate ofdepreciation of the real exchange rate. Seigniorage is also added to the non-augmented primary surplus.

$$s \equiv s^c + f + priv - a \tag{2.24}$$

Both equation (2.19) and equation (2.22) have a measure of the primary (non-interest) surplus as the forcing variable in the debt process. Alternative representations of the equations of motion for the net non-monetary tangible liabilities, $\bar{b}$, and for the net non-monetary financial liabilities, b , using the conventionally measured financial deficits (inclusive of nominal interest payments) as the forcing variable are given below in equations (2.25) to (2.30). While of less intrinsic interest, we provide them both for sake of completeness and because real-world policy rules are often specified in terms of the desired behavior of the conventionally measured public sector financial deficits. A recent example are the so-called fiscal convergence criteria embodied in the Protocols of the Treaty of Maastricht, signed in late 1991 and recently ratified. These required the gross debt of the general government (roughly the same as b) not to exceed 60 percent of GDP and the general government financial deficit (roughly the same as $\tilde{d}$ below) not to exceed 3 percent of GDP (see Buiter, Corsetti and Roubini [1993]).

$$\bar{b}_t \equiv \frac{1}{(1+\pi_t)(1+g_t)} \bar{b}_{t-1} + \tilde{d}_t^c \tag{2.25}$$

$$\partial_t^c \equiv d_t^c + \frac{\epsilon_t}{(1+\pi_t)(1+g_t)}(b_{t-1}^* - \rho_{t-1}^*) - \frac{\pi_t}{(1+\pi_t)(1+g_t)}k_{t-1} - \frac{(P_t^k - P_t)}{P_t^k}priv_t - \sigma_t \tag{2.26}$$

$$d_t^c \equiv c_t - \tau_t - n_t^* - (f_t - dep_t) + \frac{i_t}{(1+\pi_t)(1+g_t)}b_{t-1}^d + \frac{i_t^*(1+\epsilon_t)}{(1+\pi_t)(1+g_t)}(b_{t-1}^* - \rho_{t-1}^*) \tag{2.27}$$

$$b_t \equiv \frac{1}{(1+\pi_t)(1+g_t)}b_{t-1} + \partial_t \tag{2.28}$$

$$\partial_t \equiv d_t + \frac{\epsilon_t}{(1+\pi_t)(1+g_t)}(b_{t-1}^* - \rho_{t-1}^*) - \sigma_t \tag{2.29}$$

$$d_t \equiv c_t - \tau_t - n_t^* + a_t - f_t - priv_t + \frac{i_t}{(1+\pi_t)(1+g_t)}b_{t-1}^d + \frac{i_t^*(1+\epsilon_t)}{(1+\pi_t)(1+g_t)}(b_{t-1}^* - \rho_{t-1}^*) \tag{2.30}$$

Note that d^c is the conventionally defined current or consumption account financial deficit of the government as a fraction of GDP and that d is the conventionally defined financial deficit of the government as a fraction of GDP. The corrections and adjustments involved in going from d^c to ∂^c (the augmented current or consumption account financial deficit as a fraction of GDP) and from d to ∂ (the augmented financial deficit as a fraction of GDP), given in equations (2.26) and (2.29) respectively, are self-explanatory. We will not consider equations (2.19), (2.25) and (2.28) further in this paper. For reasons of space we focus on the behavior over time of b, the ratio to GDP of the net non-monetary financial debt of the government.

Solvency

Solving (2.22) recursively forward in time for N ≥ 1 periods we get:

$$b_{t-1} \equiv \sum_{k=0}^{N-1} \prod_{j=0}^{k} \left(\frac{1+g_{t+j}}{1+r_{t+j}} \right) s_{t+k} + \prod_{j=0}^{N-1} \left(\frac{1+g_{t+j}}{1+r_{t+j}} \right) b_{t-1+N} \tag{2.31}$$

In the limit as $N \to \infty$, equation (2.31) implies equation (2.32) provided we impose the boundary condition given in (2.33).

$$b_{t-1} \leq \lim_{N \to \infty} \sum_{k=0}^{N-1} \prod_{j=0}^{k} \left(\frac{1+g_{t+j}}{1+r_{t+j}} \right) s_{t+k} \tag{2.32}$$

$$\lim_{N \to \infty} \prod_{j=0}^{N-1} \left(\frac{1+g_{t+j}}{1+r_{t+j}} \right) b_{t-1+N} \leq 0 \tag{2.33}$$

Equation (2.33) is the familiar "no Ponzi finance" terminal boundary condition constraining the growth of the public debt in the long run. It states that, in the long run, the growth rate of the debt-GDP ratio must be less than the excess of the long-run domestic real interest rate over the long-run growth rate of real GDP. Equivalently, the long-run growth rate of the face value of the debt, measured in domestic currency, should be less than the long-run domestic nominal rate of interest or the long-run growth rate of the real value of the debt should not exceed the long-run domestic real interest rate. These three equivalent ways of expressing the solvency constraint are in turn equivalent to the condition that the long-run growth rate of the debt measured in foreign currency should be less than the long-run foreign rate of interest, if and only if uncovered interest parity (UIP) holds ex-post, that is, if $(1 + i^{*}_{t+j})(1 + \epsilon_{t+j}) = 1 + i_{t+j}$. If UIP does not hold, the choice between the solvency constraint based on the internal rate of interest and the solvency constraint based on the external rate of interest will depend on whether the domestic or the foreign rate of interest is a better measure of the opportunity cost of funds to the government. We have no strong views on this issue, and consider both versions in what follows[14].

The no-Ponzi game condition makes sense only when the long-run nominal interest rate exceeds the long-run growth rate of nominal GDP [15]. We assume this to be the case in what follows.

When the solvency condition given in (2.33) holds, the current face value of the debt is no greater than the present discounted value of all future augmented primary surpluses, as shown in (2.34) or the equivalent expression in (2.32).

$$B_{t-1} \leq \lim_{N\to\infty} \sum_{k=0}^{N-1} \prod_{j=0}^{k} \left(\frac{1}{1+i_{t+j}}\right) \tilde{S}_{t+k} \tag{2.34}$$

where $\tilde{S} \equiv \$PY$ is the nominal value of the augmented primary surplus (measured in domestic currency).

The solvency constraint suggests that the behavior of what we shall call the discounted public debt, denoted $PDV(B_t)$, that is the present value of the public debt discounted to a fixed initial date, t_0 say, can serve as a useful indicator of potential fiscal-financial trouble. The formal definition of the discounted debt is given in (2.35) below

$$PDV(B_t) \equiv \prod_{j=0}^{t-t_0} \left(\frac{1}{1+i_{t+j}}\right) B_t \tag{2.35}$$

If the discounted debt has been rising significantly and looks like continuing to do so in the foreseeable future, then a far-reaching fiscal correction over several years may be the only credible response that could change the perception of impending insolvency. Empirically, a testable implication of the solvency constraint is that the unconditional expectation of the discounted public debt should be zero (or non-positive). In the absence of a structural political-economic model to explain the evolution of debt and deficits, we are restricted to describing the time series properties of the debt stock in terms of ad-hoc, reduced form data generating processes (DGPs). The tests that are conducted seek to answer two questions. The first asks whether the DGP describing the discounted public debt is stable in the sense of parameter constancy, that is, whether there are structural breaks in the process. The second asks,

conditional on an invariant structure having been identified, whether the discounted debt process is covariance stationary or not.

Note that finding non-stationarity need not be taken as prima facie evidence that the government will default; it only means that if present policies continue then bankruptcy of the Exchequer will occur. If the DGP is covariance stationary, its unconditional mean will be zero if the univariate representation of the stochastic process governing it is strictly indeterministic. If the process has a deterministic component, its unconditional mean may of course be non-zero even if the process is stationary.

2.2. Econometric methodology and results of the solvency tests.

Given the key implications of stationarity, or a lack of it, in this paper we employ *two methods* to test for stationarity. Assuming that the process describing $PDV(B_t)$ can be represented by a multivariate ARIMA process:

$$(1-\rho(L))((1-L)^d Y_t - \alpha_0) = (1-\theta(L))\epsilon_t \tag{2.36}$$

where $\rho(L)$ is a p^{th}-order polynomial, $\theta(L)$ is a q^{th}-order polynomial, Y_t is a random vector the first element of which, α_0 is a vector of constants, and ε_t is a vector white noise process. $(1-L)^d Y_t$ is a covariance stationary series, i.e., the series Y is integrated of order d. It is assumed that both $(1-\rho(L))$ and $1-\theta(L)$ have their roots outside the unit circle; under this assumption (2.36) has the AR representation

$$\eta(L)((1-L)^d Y_t - \alpha_0) = \epsilon_t \tag{2.37}$$

where

$$\eta(L) = \sum_{i=0}^{\infty} \eta_i L_i = (1-\theta(L))^{-1}(1-\rho(L)). \tag{2.38}$$

We implement the univariate special case of (2.37)

$$PDV(B_t) = \alpha_0 + \alpha_1 t + \beta(L)PDV(B_{t-1}) + u_t \tag{2.39}$$

where $\{u_t\}_0^{\infty}$ is an infinite sequence of weakly stationary random variables, to test whether the discounted Indian public debt was covariance stationary or not.

Eventual insolvency will occur if at least one of the following conditions hold:

(1) The roots of $1-\beta(L)$ do not all lie outside the unit circle.

(2) $\alpha_1 > 0$, that is, there is a positive deterministic time trend[16].

(3) $\alpha_0 > 0$, that is even though the $PDV(B_t)$ process is stationary, its unconditional expectation is positive[17].

To allow for a wide class of error structures the Phillips-Perron $Z(\beta)$, $Z(t_\beta)$ and $Z(\Phi_3)$ test statistics can be used to test for the null hypothesis that $\beta=1$ and $\alpha 1=0$ within a maintained hypothesis that permits a non-zero drift α_0.

On the basis of Monte Carlo investigations, it has been found that standard unit root tests (for example, Dickey-Fuller and Phillips-Perron) are not very powerful against relevant alternatives such as trend stationarity (linear or non-linear), fractionally integrated processes and even level stationarity.[18] This is important since the manner in which classical statistical hypothesis testing is conducted results in the null hypothesis being accepted unless there is strong evidence against it. The null in case of the standard unit root tests is one of non-stationarity, i.e., the presence of a unit root. Although it is possible that the vast majority of aggregate economic time series do have a unit root, it is, in view of our earlier comments, probably preferable to formulate our statistical procedure in such a way as to have stationarity as the null. This is especially relevant given the relatively small sample size available to us using annual data for India. Recent work by Kwiatkowski, Phillips and Schmidt [1991], henceforth KPS, is useful here. Using a parameterization which provides a reasonable representation of both stationary and nonstationary variables, KPS have derived a test which has stationarity as the null hypothesis. The series under consideration, Y, is assumed to have the following decomposition:

$$(2.40) \qquad Y_t = \xi t + \Gamma_t + \varepsilon_t \qquad \text{where}$$

$$\Gamma_t = \Gamma_{t-1} + u_t \qquad ; \qquad u_t \sim i.i.d.(0, \sigma_u^2)$$

Y_t is modeled as the sum of a deterministic trend, a random walk and a stationary error, ε_t; the initial value of Γ_t is treated as fixed and serves the role of an intercept. The null hypothesis of trend stationarity can be stated in two equivalent ways:

(a) $\sigma_u^2 = 0$, or, (b) $\sigma_r^2 = 0$.

The disturbances ε_t being stationary, Y_t is also trend-stationary under the null hypothesis and the test statistic is thus based on the estimated residuals. The distribution of the test statistic is derived under assumptions about the regression residuals, e_t, that allow for many weakly dependent and heterogeneously distributed time series, including a wide class of data generating mechanisms such as finite order ARMA models, under very general conditions (see Phillips and Perron [1988]). The statistic for testing trend stationarity is derived from the residuals of a regression of Y_t on intercept and trend and takes the form:

$$\hat{\eta}_t = T^{-2}\sum_{t=1}^{T}\frac{S_t^2}{s^2(k)} \tag{2.41}$$

where

$$s^2(k) = T^{-1}\sum_{t=1}^{T} e_t^2 + 2T^{-1}\sum_{s=1}^{k}(1 - \frac{s}{(k+1)}))\sum_{t=s+k}^{T} e_t e_{t-s}$$

S is the partial sum process of the regression residuals, e_t, and 1-(s/(k+1)) is an optional Bartlett spectral window to allow for residual correlations. To test for *level* stationarity instead of *trend* stationarity, ξ in (2.40) is set equal to zero and the residuals are from a regression of Y on only the intercept. This statistic is denoted by $\hat{\eta}_\mu$. Kwiatkowski, Phillips and Schmidt provide critical values for tests of both level and trend stationarity.

Since we perform tests both under the null hypothesis of a unit root and under the null hypothesis of (trend) stationarity, there are **four** possible outcomes:

(i) If the null of (trend) stationarity is accepted and the null of a unit root is rejected we can conclude that a series is (trend) stationary;

(ii) If the null of (trend) stationarity is rejected and that of a unit root cannot be rejected then the series is non-stationary;

(iii) If both the nulls are accepted then we cannot be sure whether or not there is stationarity;

(iv) If both nulls are rejected then we cannot reach any conclusion.

It is obvious that if condition (iii) or (iv) prevails, we won't know how to interpret the stationarity properties of the time series under consideration, but that (i) and (ii) are conclusive.

The first three of the five test statistics given in Table 6A are derived in Phillips and Perron [1988] for the null that β=1 and α_1=0. $Z(\beta)$ makes use of the standardized and centered least squares estimates of β. $Z(t_\beta)$ makes use of the t-statistic on β, t_β (for β=1), and $Z(\Phi_3)$ is the regression F-test of Dickey and Fuller [1981]. These three statistics possess for a very wide class of error processes the same limiting distributions as the statistics developed by Dickey and Fuller for the case of i.i.d. errors. The critical values of the three statistics are therefore the same and can be found in Fuller [1976] and Dickey and Fuller [1981].

Most of the evidence for both the null of unit root and the null of stationarity points to nonstationarity of the discounted debt series. The exceptions are (i) the $Z(\Phi_3)$ test on B_1 (debt in Rupees discounted at the government's Long Bond Yield); (ii) the $\hat{\eta}_\mu$ and $\hat{\eta}_\tau$ tests for B_2 (debt in Rupees discounted at the Advance rate); and (iii) the $\hat{\eta}_\tau$ test for B^*_1. The rejection of the null hypothesis of a unit root could occur because the discounted debt series B_1 could be integrated of order 2 or higher, that is, it could be more nonstationary than can be captured by a single unit root. This possibility is in fact borne out when the Phillips-Perron tests are conducted on the differenced series ΔB_1 (Table 6B). Similarly, for ΔB^*_1 the null of trend stationarity is rejected. The empirical results for the discounted debt series establish that out of the four possible outcomes listed above, (ii), the conclusion that the discounted debt series is nonstationary, is the relevant one.

It should be noted that the discounted debt rises if and only if the augmented primary surplus is negative. The conventional solvency constraint implies that equation (2.34) holds: the current face value of the debt cannot exceed the present discounted value of future primary surpluses and seignorage.

It follows that stationarity of the present discounted value of the augmented primary surplus, is necessary but not sufficient[19] for solvency. Thus if $PDV(\tilde{S}_t)$ is non-stationary, then $PDV(B_t)$ certainly will be nonstationary and

insolvency will result. For $\hat{\eta}_{\mu}$ and $\hat{\eta}_{\tau}$, the test statistics which have, respectively, level and trend stationarity as the null, it is found that the null was rejected for both the tests (Table 7). The $Z(\beta)$, $Z(t_{\beta})$ and $Z(\Phi_3)$ statistics fail to reject the presence of a unit root in the discounted sum of seignorage and primary surplus series at the 95 percent level.

While, in theory, unbounded debt-GDP ratios are not inconsistent with government solvency and sustainable fiscal policy, *de facto* debt-GDP ratios will of course have to remain bounded. If all feasible taxes are distortionary and/or tax collection and administration costs are increasing and strictly convex in the tax rate, only bounded debt-GDP ratios are feasible. For Indian data the $Z(\beta)$ and $Z(t_{\beta})$ statistics fail to reject the presence of a unit root in debt-GDP ratio, but the $Z(\Phi_3)$ statistic rejects the null at the 95 percent level (Table 7). For the $\hat{\eta}_{\mu}$ and $\hat{\eta}_{\tau}$ tests which have, respectively, level and trend stationarity as the null it is found that the null was rejected for both tests.

3. THE FISCAL ADJUSTMENT NEEDED TO ENSURE SOLVENCY.

Given the time series behaviour of the Indian public debt, both discounted and as a ratio to GDP, it is clear that there is a compelling need for fiscal adjustment to maintain long-run solvency. Note that the size of the public debt can be a concern even if solvency is not in question. Later in this paper we consider a possible link between public debt and long-run inflation. Even if solvency is guaranteed and public debt and deficits are never monetized, fear of *financial crowding out* may lead a government to try and limit its recourse to borrowing. Holding constant the path of exhaustive public spending, the substitution of borrowing for current tax financing implies that taxes are postponed, thus redistributing life-time resources from the young to the old and toward current generations and away from future generations yet to be born. Absent debt neutrality or Ricardian equivalence, such intergenerational redistribution will reduce the national saving rate.

Solvency only relates to the *feasibility* rather than to the *optimality* of budgetary policies. But the issue of feasibility assumes center stage when the extrapolation of current patterns of revenues and expenditures implies a major

problem. We now calculate (i) the magnitude of fiscal correction that is required to attain a target debt-GDP ratio; and (ii) the implied fiscal `gap' due to the present fiscal stance.

3.1. Primary gaps.

Given the initial value of the total non-monetary government debt-GDP ratio at the beginning of period t, b_{t-1}, the target value of the debt-GDP ratio $N \geq 1$ period later, b_{t-1+N}, the projected future one-period real interest rates during the next N periods, r_{t+j}, $j = 0,\ldots,N-1$, and the projected growth rates of real GDP during the next N periods, g_{t+j}, $j = 0,\ldots,N-1$, the constant augmented primary surplus to GDP ratio, $\tilde{s}_R^N(t)$, that will achieve the target is given by:

$$\tilde{s}_R^N(t) \equiv \left[\sum_{k=0}^{N-1}\prod_{j=0}^{k}\left(\frac{1+g_{t+j}}{1+r_{t+j}}\right)\right]^{-1}\left[b_{t-1} - \prod_{j=0}^{N-1}\left(\frac{1+g_{t+j}}{1+r_{t+j}}\right)b_{t-1+N}\right] \tag{3.1}$$

We shall refer to $\tilde{s}_R^N(t)$ as the *required* N-period (augmented) primary surplus-GDP ratio. With a constant N-period real interest rate r_t^N and a constant N-period growth rate of real GDP g_t^N , the required N-period primary surplus-GDP ratio simplifies to[20]:

$$\tilde{s}_R^N(t) \equiv \frac{(r_t^N - g_t^N)}{(1+g_t^N)\left[1-\left(\frac{1+g_t^N}{1+r_t^N}\right)^N\right]}\left[b_{t-1} - \left(\frac{1+g_t^N}{1+r_t^N}\right)^N b_{t-1+N}\right] \tag{3.2}$$

If the target debt-GDP ratio is the same as the initial debt-GDP ratio, the required N-period primary surplus-GDP ratio simplifies to

$$\tilde{s}_R^N(t) \equiv \left[\sum_{k=0}^{N-1}\prod_{j=0}^{k}\left(\frac{1+g_{t+j}}{1+r_{t+j}}\right)\right]^{-1}\left[1 - \prod_{j=0}^{N-1}\left(\frac{1+g_{t+j}}{1+r_{t+j}}\right)\right]b_{t-1} \tag{3.3}$$

With a constant real interest rate and a constant growth rate of real GDP, the required N-period primary surplus-GDP ratio for this case becomes[21]

$$(3.4) \qquad \tilde{s}_R^N(t) \equiv \frac{(r_t^N - s_t^N)}{1+g_t^N} b_{t-1}$$

We also define the *actual* N-period (augmented) primary surplus-GDP ratio, $\tilde{s}_R^A(t)$, to be that constant augmented primary surplus-GDP ratio whose present discounted value over the next N periods is the same as the present discounted value of the actually planned or expected augmented primary surplus-GDP ratio over the next N periods, that is

$$(3.5) \qquad \tilde{s}_A^N(t) \equiv \left[\sum_{k=0}^{N-1}\prod_{j=0}^{k}\left(\frac{1+g_{t+j}}{1+r_{t+j}}\right)\right]^{-1}\sum_{k=0}^{N-1}\prod_{j=0}^{k}\left(\frac{1+g_{t+j}}{1+r_{t+j}}\right)\tilde{s}_{t+k}$$

When the real interest rate and the real growth rate are constant, equation (3.5) simplifies to

$$(3.6) \qquad \tilde{s}_A^N(t) \equiv \frac{(r_t^N - g_t^N)}{(1+g_t^N)\left[1-\left(\frac{1+g_t^N}{1+r_t^N}\right)^N\right]}\sum_{k=0}^{N-1}\left(\frac{1+g_t^N}{1+r_t^N}\right)^{k+1}\tilde{s}_{t+k}$$

The N-period primary gap in period t, $GAP^N(t)$ is defined as the excess of the required N-period (augmented) primary surplus-GDP ratio, $\tilde{s}^N_R$, over the actual N-period (augmented) primary surplus-GDP ratio, $\tilde{s}^N_A$:

$$(3.7) \qquad GAP^N(t) \equiv \tilde{s}_R^N(t) - \tilde{s}_A^N(t)$$

For the special case when N=1 and the initial debt-GDP ratio is the same as the target debt-GDP ratio at the end of period t, the primary gap calculation simplifies to:

$$(3.8) \qquad GAP^1(t) \equiv \tilde{s}_R^1(t) - \tilde{s}_A^1(t) = \left(\frac{r_t - g_t}{1+g_t}\right)b_{t-1} - \tilde{s}_t$$

$GAP^1(t)$ is the excess of the augmented primary surplus-GDP ratio that stabilizes this period's debt-GDP ratio over the actual current augmented primary surplus-GDP ratio.[22]

The one-period primary gap, or any other short-run primary gap measure risks giving a potentially misleading estimate of the amount of fiscal adjustment that is required for three reasons. The first has to do with the treatment of public sector fixed capital formation and privatization proceeds. If current capital formation, a_t , is large, the current primary surplus may be small. If the additions to the public sector capital stock generated by the current a_t raise, directly or indirectly, future public sector revenues (f_{t+i} , $i > 0$), the current primary surplus will, *cet. par.* understate the permanent primary surplus. The (horrendous) conventional practice of counting privatization proceeds as negative current expenditures (!) rather than as financing equivalent to government borrowing can also, unless care is taken, lead to misleading inferences concerning the underlying budgetary position.

The second reason is that the actual current primary surplus may be affected by transitory increases or reductions in public sector revenues and non-interest expenditures. The third second reason is that the current real interest rate and growth rate of real GDP may be unrepresentative of their respective long-run expected average values. This suggests a need for a longer-run perspective.

3.2. The permanent primary gap.

Using the government intertemporal budget constraint given in equation (2.32), we can define the required permanent (augmented) primary surplus-GDP ratio, $\tilde{s}_R^{\infty}(t)$, as follows:

$$\tilde{s}_R^{\infty}(t) \equiv \lim_{N\to\infty}\left[\sum_{k=0}^{N-1}\prod_{j=0}^{k}\left(\frac{1+g_{t+j}}{1+r_{t+j}}\right)\right]^{-1} b_{t-1} \tag{3.9}$$

When the real interest rate and the growth rate of real GDP are constant forever, equation (3.9) becomes

$$\tilde{s}_R^{\infty} = \left(\frac{r_t^{\infty}-g_t^{\infty}}{1+g_t^{\infty}}\right) b_{t-1} \tag{3.10}$$

The required permanent (augmented) primary surplus-GDP ratio is the constant (augmented) primary surplus-GDP ratio that, if maintained indefinitely, would ensure government solvency. It is also the constant primary surplus-GDP ratio that will ensure that ultimately the debt-GDP ratio does not exceed any finite upper limit.

The permanent primary gap, $GAP_{\infty}(t)$, first proposed in Buiter [1983, 1985 and 1990a] and more recently by Blanchard [1990], measures the magnitude of the permanent correction required to be made to the actual current and future planned augmented primary surplus-GDP ratios in order to ensure government solvency. It is given by the excess of the required permanent primary surplus-GDP ratio over the actual permanent primary surplus-GDP ratio:

$$\begin{aligned} GAP^{\infty}(t) &\equiv \tilde{s}_R^{\infty}(t) - \tilde{s}_A^{\infty}(t) \\ &\equiv \lim_{N\to\infty}\left[\sum_{k=0}^{N-1}\prod_{j=0}^{k}\left(\frac{1+g_{t+j}}{1+r_{t+j}}\right)\right]^{-1}\left[b_{t-1} - \sum_{k=0}^{N-1}\prod_{j=0}^{k}\left(\frac{1+g_{t+j}}{1+r_{t+j}}\right)\tilde{s}_{t+k}\right] \end{aligned} \tag{3.11}$$

When the real interest rate and the growth rate of real GDP are constant, (3.11) becomes

$$GAP^{\infty}(t) = \left(\frac{r_t^{\infty}-g_t^{\infty}}{1+g_t^{\infty}}\right)\left[b_{t-1} - \lim_{N\to\infty}\sum_{k=0}^{N-1}\left(\frac{1+g_t^{\infty}}{1+r_t^{\infty}}\right)^{k+1}\tilde{s}_{t+k}\right] \tag{3.12}$$

The calculation of the permanent primary gap requires forecasts of the long-run real interest rate and the long-run real growth rate and of the future primary surpluses that would materialize under current spending and revenue raising plans. The lazy man's or (myopic) alternative, measured by $MGAP^{\infty}(t)$, substitutes the current augmented primary surplus-GDP ratio, $\tilde{s}_t$, for the actual permanent augmented primary surplus-GDP ratio, that is

$$
\begin{aligned}
MGAP^{\infty}(t) &\equiv \tilde{s}_R^{\infty}(t) - \tilde{s}_t \\
&\equiv \lim_{N\to\infty}\left[\sum_{k=0}^{N-1}\prod_{j=0}^{k}\left(\frac{1+g_{t+j}}{1+r_{t+j}}\right)\right]^{-1} b_{t-1} - \tilde{s}_t \\
&= \left(\frac{r_t^{\infty}-g_t^{\infty}}{1+g_t^{\infty}}\right)b_{t-1} - \tilde{s}_t
\end{aligned}
\qquad (3.13)
$$

if interest rates and growth rates are constant

$MGAP^{\infty}(t)$ is therefore the same as the one-period gap, except for the substitution of the long real interest r_t^{∞} rate for the current real interest rate r_t and the substitution of the long-run growth rate of real GDP g_t^{∞} for the current growth rate of real GDP, g_t.

The fiscal adjustment that is needed merely to stabilize the debt-GDP ratio for the Indian public sector will be substantial despite the consolidation of the past two years. Table 8 provides estimates for $\tilde{s}_R^{\infty}(t)$ and the *implied* myopic permanent primary gap for various assumptions regarding long-run real interest rate, r, and long-run growth rate of real GDP, g. Seignorage is assumed to remain at the 1992/93 level of 1.2 percent of GDP. Using the 1992/93 augmented primary surplus as ratio to GDP of -3.4, and assuming an optimistic scenario where the real interest rate exceeds the real growth rate by only one percentage point (that is by one hundred basis points), the required permanent primary surplus is -0.52 percent of GDP and the implied myopic permanent primary gap is 3.98 percent of GDP. At present the real interest rate is about 6 percent and GDP growth is about 4 percent; if these values of r and g are good indicators of long-run magnitudes, then the required primary surplus is 0.16 percent of GDP and the corresponding debt to GDP stabilizing myopic permanent primary gap will be substantially higher at 4.66 percent of GDP. If the excess of the long-run rate of interest over the long-run growth rate of GDP rises to 3 percent per year, then the required permanent primary surplus is 0.85 percent of GDP and the myopic permanent primary gap rises to 5.35 percent of GDP. It is important to recognise that the primary surpluses calculated above are the *minimum* needed for solvency.

Other considerations, such as the desire to avoid financial *crowding-out* may require larger permanent primary surpluses.

At the start of a stabilization programme when a government is trying to establish or regain credibility, it may wish to use a sequence of declining debt-GDP ratios as a signal of its resolve to maintain solvency. If *interest payments* are already high (as they are in the case of India) partly because lenders have to be compensated for the perceived sovereign risk, then a declining debt-GDP ratio may have a favourable impact on the sovereign risk component of the interest rate that the government pays to finance future deficits or roll-over past debt.

Higher interest rates on domestically held public debt are likely in the future since, as part of the reform programme, the Indian government has made a start towards reducing `forced' lending to itself by domestic financial institutions at implicitly subsidised rates. While this is a desirable policy from the point of view of allocative efficiency, the government's intention to start borrowing at market-determined interest rates will create budgetary problems unless higher explicit taxes or spending cuts make up for the reduction in implicit taxes on the holders of the domestic public debt.

If the intention is to reduce the debt-GDP ratio from its current level of about 71 percent by, say, five percentage points of GDP over the next five years, then the five-year required primary surplus is, of course, rather higher (by about 1 percent of GDP in the examples calculated in Table 9) than the 5 year primary surplus required merely for stabilising the debt-GDP ratio (which is the same as the required permanent primary surplus shown in row 6 of Table 8). Even if r exceeds g by only one percentage point the permanent primary gap is 4.96 percent of GDP (Table 9).

3.3 Closing the primary gap.

The key question now is what categories of government expenditure and tax and non-tax revenue are obvious candidates to help close the primary gaps calculated above. On the tax revenue side a broadening of the indirect tax base and better (that is, more forceful) administration of direct taxes to ensure more

compliance offer scope for increasing revenues.[1,23] Direct tax revenues as a percent of GDP are at the same level as 1950/51 (2.7 percent), and indirect tax revenues have remained stagnant at about 14 percent of GDP since 1985/86. Presently, not only does the large and growing services sector go untaxed but also textiles, tobacco and petroleum products are outside the coverage of the Modified Value Added Tax (MODVAT) introduced in 1986. A broadening of the tax base would be crucial to ensure that indirect tax revenues do not decline in the interim period during which a national Value Added Tax (VAT) is put in place to replace the present highly distortionary indirect tax structure comprising of Union excise duties and individual state sales taxes with the attendant multiple rates and exemptions.[24]

There are two problems that would need to be resolved between the Union government and *each* of the state governments before indirect tax reform can take place. Firstly, the design of a national VAT will require coordination since each state has a constitutional right to impose sales tax(es). Secondly, the taxation of services is within the purview of the states and not the Union government. Base broadening will be (institutionally) difficult.

Though it is beyond the scope of this paper to analyse in detail how the primary gaps calculated above can be closed, two issues - the public sector wage and subsidy bill, and the performance of public sector enterprises - merit a mention. Over half of the total expenditure of general government is accounted for by compensation to its employees and various subsidies. The wage bill of the public sector has increased steadily since 1960/61 to 15 percent of GDP (Table 10). The slow growth of jobs in India in the formal sector, and the absence of a social security system, have resulted in public sector job creation being used to ease open unemployment. There is no breakdown of compensation to employees by level of government (Union, states and local authorities); but the wage bill of administrative departments by level of government is available and over half of the total bill is paid out by the state governments. It is clear that a modest reduction in the wage bill, say one to two points of GDP, would go a long

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[1] In the absence of a Computable General Equilibrium simulation it is difficult to gauge exactly how much will be collected as a result of base broadening.

way towards attaining the required fiscal consolidation. A reduction in government employment, even one administered through a freeze on new hiring and by attrition, would be difficult. Efficiency would of course require that employment (hiring and firing and promotion) decisions be based on merit and may well require involuntary employment terminations. How far we are from basing budgetary decisions on efficiency criteria becomes clear when we observe how political expediency ensured that most of the reduction in expenditure over the last two years involved capital expenditure including infrastructure investment. In addition to the wage bill, transfers in the form of subsidies total about 4 percent of GDP of which agriculture (food and fertilizer) accounts for two-fifths. Though the food and fertilizer subsidy bill has declined in recent years, it has the potential to increase again, since both subsidies are released on an *entitlement* basis. The balance of the total subsidy bill goes mainly to public sector enterprises in the manufacturing, mining and electricity generation sectors.

With the exception of central government non-departmental enterprises, complete data on profitability and capital employed by public enterprises are not available in a coherent form. In 1991/92 of the 236 Union government firms 104 made losses of 37 billion Rupees (0.6 percent of GDP). As a percentage of capital employed, the rate of return in 1991/92 was 2.1 percent and the dividend paid out was a paltry 0.6 percent on the face value of paid-up capital of 1185 billion Rupees! Note that most of these enterprises are public sector firms producing private (rival and appropriable or excludable) goods and services, without unbounded increasing returns to scale. A convincing case for loss making as socially efficient (say because of marginal cost pricing when marginal cost is below average cost) cannot be made for most of them. Even when a reasonable case can be made that making losses is socially efficient, there is no implication that public ownership is desirable. Privatization with regulation and subsidization may be a superior form of industrial organization.

Closing down the central government loss-making enterprises could result in savings of about 40 billion Rupees (0.7 percent of GDP). Of the state government enterprises, the State Electricity Boards (SEBs) are by far the most

important loss makers. The 1992/93 estimated loss of SEBs was 51 billion Rupees (0.7 percent of GDP).[25] Privatizing the loss-making PSE's and leaving the closure decision to the new private owners would be desirable for efficiency and for budgetary reasons, if the resulting improvements in economic performance were to make the privatized and restructured PSE viable and profitable without further recourse to public sector subsidies. Privatizing profitable PSE's could also be desirable on efficiency grounds, although the government would have to find additional revenues or spending cuts if the proceeds from privatization were to be less than the continuation value of the PSEs in the public sector. In view of the virtually complete absence of incentives for cost control and efficiency in Indian PSEs, privatization and the creation of a competitive post-privatization industrial organization would seem to be desirable for virtually all of them.

4. RECOURSE TO THE INFLATION TAX.

Thus far only the possibility of using revenue and expenditure measures to reduce the augmented primary deficit and thus to ensure solvency has been discussed. An additional option, apart from *de jure* repudiation, is the use of seignorage, σ_t, which was defined in equation (2.11) as $\sigma_t \equiv \frac{\Delta H_t}{P_t Y_t}$ .Denote the ratio of the end-of-period high-powered money to GDP by $h_t \equiv \frac{H_t}{P_t Y_t} \equiv V_t^{-1}$ where V is the income velocity of circulation of high-powered money. Letting $\mu_t \equiv \frac{H_t}{H_{t-1}} - 1$ denote the proportional rate of growth of the nominal stock of base money, seigniorage as a fraction of GDP can be rewritten as:

$$\sigma_t \equiv \Delta h_t + \left(\frac{(1+\pi_t)(1+g_t)-1}{(1+\pi_t)(1+g_t)} \right) h_{t-1} \tag{4.1}$$

$$\equiv \frac{\mu_t}{(1+\pi_t)(1+g_t)} h_{t-1}$$

We assume that in the long run the income velocity of circulation of base money is constant:

$$1+\mu = (1+g)(1+\pi) \tag{4.2}$$

With the help of a model of demand for high powered money we wish to investigate the relationship between σ and the long-run rate of inflation. Using annual data from 1960/61 to 1992/93, a base money demand equation in velocity form is estimated:

$$\Delta V_t = \underset{(3.64)}{8.24} - \underset{(3.57)}{0.31} V_{t-1} + \underset{(4.71)}{5.21} \pi_{t-1} - \underset{(3.63)}{1.01} \ln Y_{t-1} \tag{4.3}$$

R^2=0.53; SE=0.38; F(3,27)=12.26; DW=2.47.

Conventionally calculated t-statistics are given in the parentheses below the coefficient estimates. The Ljung-Box Q-statistic for up to two lags has a *p*-value of 0.195. There is no evidence of residual autocorrelation. The ADF test for testing the null of a unit root is rejected and the ARCH test for autoregressive conditional heteroskedasticity yields a *p*-value of 0.577. The Jarque-Bera test for checking the normality of residuals results in a *p*-value of 0.644.

To make inferences about the magnitude of the seignorage revenue that can be generated in the long run, we evaluate the estimated equation in the quasi-steady state with velocity constant and the logarithm of real GDP at its sample average value of $\ln\bar{Y} = 6.27$. This yields the long-run equation:

$$V = \hat{\alpha} + \beta\pi \tag{4.4}$$

with $\hat{\alpha} = 6.16$ and $\beta = 16.81$

Steady-state seignorage as a ratio to GDP is given by

(4.5) $$\sigma = \left(\frac{(1+\pi)(1+g)-1}{(1+\pi)(1+g)}\right)V^{-1}$$

From equations (4.4) and (4.5) it follows that

(4.6) $$\text{sign}\left\{\frac{\partial\sigma}{\partial\pi}\right\} = \text{sign}\left\{\hat{\alpha} - \hat{\beta}g - 2\hat{\beta}g\pi - \hat{\beta}(1+g)\pi^2\right\}$$

Since velocity is non-negative, $\pi \geq \pi_{min} = -\frac{\hat{\alpha}}{\hat{\beta}} = -0.37$. It is easily checked that at the lowest possible rate of inflation, π_{min} ,

(4.7) $$\text{sign}\left\{\frac{\partial\sigma}{\partial\pi}\right\} = \text{sign}\left\{(\hat{\beta}-\hat{\alpha})[\hat{\alpha} - g(\hat{\beta}-\hat{\alpha})]\right\}$$

Given our estimates of $\hat{\alpha}$ and $\hat{\beta}$ and any number for g below 0.58 (a fifty eight percent per annum long-run growth rate for real GDP!), seigniorage increases with the rate of inflation at π_{min} . The long-run seigniorage-inflation graph has the Laffer curve property, as shown in Figure 1[26]. With a 4 percent per annum growth rate of real GDP, steady-state seigniorage peaks at a value of just under 2.5 percent of GDP, when the rate of inflation is 52.4 percent per annum[27]. With a 5 percent annual growth rate of real GDP, the maximal amount of steady state seigniorage that can be extracted is just over 2.5 percent of GDP, at an inflation rate of just over 50.3 percent per annum[28]. As the inflation rate goes to infinity, seigniorage revenues asymptote at zero.

If the real interest rate exceeds real GDP growth rate by as little as one percentage point, stabilising the debt-GDP ratio at its 1992/93 level of 71 percent would require seignorage plus primary surplus of just under 0.7 percent of GDP. If the primary surplus is unchanged at its 1992/93 value of -4.5 percent of GDP, then the required long-run seigniorage would be 5.2 percent of GDP. Clearly, there is no constant rate of inflation, no matter how high, at which this amount of seigniorage can be extracted on a permanent basis. Inflation is not an option that can be used to ensure solvency.

In steady state, $\sigma = \left[\frac{(1+\pi)(1+g) - 1}{(1+\pi)(1+g)}\right]h$. In continuous time this simplifies to $\sigma = (g+\pi)h$. If we assume the long-run real growth rate to be independent

of the long-run rate of inflation, the inflation tax, measured by πh, moves in the same direction as seigniorage in the long run. This inflation tax should properly be called the *anticipated* inflation tax. It represents the additional amount of nominal money that can be issued by the government to offset the reduction due to inflation in the real value of the outstanding stock of nominal money balances. The budgetary position of the government is affected by anticipated inflation in ways other than through the anticipated inflation tax. The first of these is the Olivera-Tanzi effect of higher *anticipated* inflation on the primary deficit, mainly through the negative effect of a higher rate of inflation on tax collections.[29] 'Bracket creep', the effect of a higher price *level* (not of a higher rate of inflation) on the real value of tax collections if a progressive tax system is not fully index-linked, appears to be insignificant in most developing nations, probably because, whatever the formal progressivity of the direct tax system, direct tax collections tend to be an insignificant source of revenue. Higher expected inflation is therefore likely to increase the primary deficit. Finally, there is the effect of *unanticipated* inflation on the real value of nominally denominated public debt. The longer the maturity of the debt, the stronger the unanticipated capital loss incurred by holders of public debt when there is an unexpected increase in the long nominal rate of interest. An unanticipated increase in the long-run rate of inflation is likely to be reflected in market-determined long nominal interest rates. Both the practicality[30] and the morality of imposing unanticipated capital levies on holders of domestic currency denominated interest-bearing public debt through unanticipated bursts of inflation, are questionable.

5.POTENTIAL LIQUIDITY PROBLEMS ARISING FROM THE DEBT COMPOSITION

Since 1989/90, India's net domestic debt has risen by 3.2 percentage points of GDP, but the foreign debt has risen by 7.2 percentage points of GDP. This is worrying. India's foreign debt service payments both as a ratio to GDP and as a ratio to its export earnings are expected to rise as the short- and medium-term exceptional credits contracted for in the last two years become due.[31] Table 11 provides time series data for India's debt-service/export ratio (FDS) and debt-

service/GDP ratio, and for comparison FDS is provided for various groups of countries in Table 12. Currently, India's FDS is over 27 percent which is higher than that for its neighbours, the South Asian countries which have an FDS of 24 percent, and the severely indebted low income countries, whose ratio is 20.1 percent.[32] Although India is classified as a moderately indebted country, a glance at Table 11 reveals that foreign debt servicing is a potential (liquidity) problem if present trends continue.

We conducted some formal tests to check for stationarity of the foreign debt service ratios. Two of the three Phillips-Perron tests reveal that the debt servicing-export ratio and the debt-servicing-GDP ratio are characterized by unit-roots. Similarly, tests for stationarity using the $\hat{\eta}_\mu$ and $\hat{\eta}_\tau$ statistics confirm that neither of the two debt servicing ratios are stationary. The test results are reported in Tables 13 and 14.

Even the *perception* of a liquidity problem can be serious since despite extensive foreign exchange controls, in practice the capital account in India is far from being closed, and a run on the official foreign exchange reserves cannot be ruled out. The *de facto* openness of the Indian capital account reflects more than the universal ability of the private sector to play the leads and lags in the current account and generally to disguise capital transactions as current transactions. It is reinforced by (i) the Reserve Bank of India's exchange rate guarantee on the stock of foreign currency non-resident deposits that can be `called-up' at any time; and (ii) the Reserve Bank of India's Rupee-foreign currency forward swap facility for commercial banks.

6. CONSTRAINTS TO FISCAL ADJUSTMENT.

During a programme of fiscal and structural reform of the type that India has undertaken, additional sources of revenue (for instance from the substitution of tariffs for non-tariff barriers to trade) and temporary financing modalities such as privatization proceeds may become important. But what is often overlooked is that 'new' spending of a transitory nature may have to be undertaken; this is not *explicitly* recognised in equation (2.1). There are two types of potentially large expenditures that the forward-looking primary gap

calculations of Section 3 should take into account (when calculating the *actual* N-period primary surplus).

As regards the first of these, it has become increasingly clear that when a country embarks on an agenda of fiscal consolidation **and** structural reforms (trade liberalization, financial market reform, public sector reform, etc.), social costs are incurred due to, for example, (short-term) job dislocation. Developing economies usually don't possess an economy-wide social security system. For both equity considerations, and in order to maintain a certain threshold of support within the polity to carry out the reform programme, governments may have to put in place a *social safety-net* and/or maintain a certain level of expenditure for the provision of minimum basic social services to mitigate the costs of adjustment. Expenditures such as golden handshakes to public sector employees, even if they are modest may result in an increase in government transfers in the first few years of a reform programme. To date the amounts that have been earmarked for a social safety-net have been modest - about 10 billion Rupees annually in 1992-93 and 1993-94. Undoubtedly much more will be spent in the years ahead, if reforms proceed.

Earlier in this paper we alluded to the fact that the public sector has financed part of its deficits with *implicitly subsidised loans from the banking sector*.[33] In part because of this, the nationalized banking system may require substantial budgetary support to recapitalize the banks and to permit them to achieve a prudent capital asset ratio. Recognition of bad debts and an eventual attainment of minimum prudential norms may require a capital injection of about 100 billion Rupees. It is notoriously difficult to gauge the magnitude of the problem with any degree of certainty and the estimate just given may well increase.[34] *Contingent implicit liabilities* that would result in the public debt burden increasing as a result of the present state of the Indian banking system will need to be explicitly taken into account to identify accurately the scope of the future fiscal adjustment that is required.[35] It follows that fiscal adjustment, to the extent that additional expenditures need to be undertaken to implement structural reforms, will be more difficult to achieve. A *structural reforms-adjusted* deficit measure would be a better forward-looking indicator of

the underlying fiscal stance for economies in transition, but we do not attempt to construct such a measure here.

7. FISCAL FEDERALISM.

Overall fiscal consolidation in India is constrained by the federal nature of public administration. The constitution allows the states considerable responsibility and discretion in the areas of both taxation and expenditure.[36] On the expenditure side, over two-thirds of health, education and other human capital related services are provided by the states. Table 15 provides the necessary evidence. The decentralised provision of services (local public goods) in a diverse country like India is, in principle, efficient since this caters more effectively to the local preferences of the population. Fiscal consolidation by the Union government not withstanding, some form of revenue sharing will have to continue, given the substantial obligation of the states to provide social services.

On the revenue side the individual state governments are responsible for collecting taxes on certain sectors of the economy such as agriculture and professional services, and for imposing sales taxes. In addition to getting budgetary support from the centre in the form of grants, the states also get a share of income tax and excise duties that are collected by the central government.[37] Irrespective of whether or not central government support is netted out, there has been a rising trend in the fiscal deficit of the states since the early 1980s. Table 16 illustrates the evolution, since the mid-1970s, of *three* different deficit measures for the states. The states have borne almost none of the burden of the fiscal adjustment of the past two years. The deficit measured net of revenue-sharing and grants from the Union government actually increased in the first year of adjustment to 8.8 percent of GDP in 1991/92. The gross fiscal deficit has more than doubled as a ratio to GDP over the last decade and reached a peak of 3.5 percent in 1990/91 before declining slightly to 3.2 percent in 1992/93.

The main sources of financing for the states' growing deficits in recent years have been the central government, `forced' lending by commercial banks

through the Statutory Liquidity Ratio, and in some years (for example, 1984/85) the central bank. It is doubtful whether more than a handful of the 25 state governments would, given the present state of their finances, be able to float loans in the market without a guarantee from the central government. Given the magnitude of fiscal correction that is required to ensure solvency, it is clear that one of the major (institutional) challenges facing India is how to ensure that the states will bear more of the burden of the required fiscal adjustment.

8. CONCLUSION.

There are three principal conclusions.

First, despite the fiscal adjustment that has already been undertaken, solvency is not assured.

Second, further fiscal retrenchment (strictly speaking an increase in the augmented primary surplus) by the public sector of the order of four and a half points of GDP is needed to achieve the (modest) objective of stabilising the debt-GDP ratio. Apart from expanding both the direct and indirect tax nets, three categories of public spending where economies could be implemented were identified. They are the government wage bill, food and fertilizer subsidies[38], and operating and capital subsidies to public sector enterprises. The presumption should be that all public enterprises producing private goods and services (that is, the overwhelming majority of the state enterprises) are to be privatized and cut off from further government subsidies. Only where it can be argued convincingly that (1) the efficient and equitable supply of a good or service requires a pricing policy that results in systematic losses and that (2) the benefit of any subsidies provided to cover these losses exceeds the cost of raising the necessary public revenues elsewhere, should subsidization of the (privatized) PSEs be considered. PSEs that do not meet these criteria should sink or swim on their own.

Third, the estimated base money demand function implies that[39] even maximal use of the inflation tax would not succeed in closing permanently more than half of the primary gap.

The need for fiscal retrenchment and for changes in the structure of expenditures and taxes were apparent three years ago. A modest beginning has been made, but most of the difficult spending cuts and revenue increases still remain to be made. Several key expenditure categories (the public sector wage bill, food and fertilizer subsidies, transfers to state governments and subsidies to loss-making public sector enterprises) are viewed as little less than "entitlements" by the beneficiaries and the *rent-seeking* interest groups representing them. Any reduction in these spending categories through minor tinkering (as was achieved during the last two years) will only have temporary effects. In the current (1993/94) fiscal year all subsidy bills (food and fertilizer) that had been kept down "artificially" during the last two years have overshot their targets considerably. In 1993/94, the overall public sector deficit will be over one percentage point of GDP higher than in 1992/93. The hard fiscal work still remains to be done.

REFERENCES.

Blanchard, Olivier [1990], "Suggestions for a new set of fiscal indicators", OECD, Department of Statistics Working Papers, No. 79, April.

Buiter, Willem H. [1983], "The theory of optimum deficits and debt", in Federal Reserve Bank of Boston, Conference Series No. 27, *The Economics of Large Government Deficits*, October 1983, pp. 4-69, reprinted in W.H. Buiter, *Macroeconomic Theory and Stabilization Policy*, Manchester University Press, 1989.

Buiter, Willem H. [1985], "A guide to public sector debt and deficits", *Economic Policy*, October, pp. 4-69.

Buiter, Willem H. [1990a], "The arithmetic of solvency", in W.H. Buiter, *Principles of Budgetary and Financial Policy*, MIT Press, pp. 144-159.

Buiter, Willem H. [1990b], "Some thoughts on the role of stabilization and structural adjustment in developing countries", in W.H. Buiter, *Principles of Budgetary and Financial Policy*, MIT Press, pp. 407-448.

Buiter, Willem H. [1991], "Consistency checks on the design of fiscal, financial and monetary policy", Mimeo, LAC, IBRD, June.

Buiter, Willem H. [1992], "Indicators of fiscal sustainability", Mimeo, Department of Economics, Yale University, November.

Buiter, Willem H. and Urjit R. Patel [1992], "Debt, deficits and inflation: An application to the public finances of India", *Journal of Public Economics* 47, pp. 172-205.

Buiter, Willem H., Giancarlo Corsetti and Nouriel Roubini [1993], "Excessive deficits; sense and nonsense in the Treaty of Maastricht", *Economic Policy*, 1.

DeJong, David N., John C. Nankervis, N.E. Savin and Charles H. Whiteman [1992],"Integration versus trend stationarity in time series", *Econometrica* 60, pp. 423-433.

Dickey, David A. and Wayne A. Fuller [1979], "Distribution of the estimators for autoregressive time series with a unit root", *Journal of the American Statistical Association* 74, pp. 427-431.

Dickey, David A. and Wayne A. Fuller [1981], "Likelihood ratio statistics for autoregressive time series with a unit root", *Econometrica* 49, pp. 1057-1072.

Diebold, Francis X. and Glenn D. Rudebusch [1991], "On the power of Dickey-Fuller tests against fractional alternatives", *Economics Letters* 35, pp. 155-160.

Fuller, Wayne A. [1979], *Introduction to statistical time series* (Wiley, New York).

Government of India [1993a], *Indian Economic Statistics* (Public Finance), volume for 1992, Department of Economic Affairs, Ministry of Finance.

Government of India [1993b], *Economic Survey*, 1992-93, Ministry of Finance, Economic Division.

Government of India [1993c], *Indian Public Finance Statistics*, 1992. Ministry of Finance, Department of Economic Affairs, Economic Division.

Kwiatkowski, David, Peter C.B. Phillips and Peter Schmidt [1991], "Testing the null hypothesis of stationarity against the alternative of a unit root: How sure

are we that economic time series have a unit root?", Cowles Foundation Discussion Paper No. 979, May.

Phillips, Peter C.B. [1988], "Regression theory for near-integrated time series", *Econometrica* 56, No. 5, pp. 1021-1043.

Phillips, Peter C.B. and Pierre Perron [1988], "Testing for a unit root in time series regression", *Biometrica* 75, No. 2, pp. 335-346.

Said, S.E. and D.A. Dickey [1984], "Testing for unit roots in autoregressive-moving average of unknown order", *Biometrica* 71, pp. 599-607.

Schwert, Gerald W. [1989], "Testing for unit roots: A Monte Carlo investigation", *Journal of Business and Economic Statistics* 7, No. 2, pp. 599-607.

Footnotes.

1.Since July 1991 the central government has also initiated major trade and industrial sector structural reforms. This included the dismantling of most central government industrial licensing, the opening up to the private sector of many industries previously reserved for the public sector and the liberalization of foreign investment. Trade liberalization has consisted in removing quantitative restrictions on capital and intermediate goods, and reducing peak tariffs rates from 150 percent to 85 percent. In February 1993 the government announced full convertibility of the Rupee on the trade account. Non-tariff barriers (such as licensing) imposed by state governments were, however, left untouched.

2.There has not been any reduction in public sector employment, and the bloated public sector payroll has in fact been boosted further through the granting of inflation-indexed wage increases to government employees.

3.As a ratio to GDP revenues from direct taxes - about 2.7 percent in 1992/93 have not changed since 1950/51 (Government of India [1993a]).

4.The following table is instructive.

India: Number of Sales tax Rates in Selected States, 1991/92

State	Number of tax rates	General rate of sales tax (%)
Andra Pradesh	13	6
Bihar	16	8
Gujarat	22	14
Haryana	9	10
Kerala	15	5
Madya Pradesh	16	8
Maharashtra	10	10
Orissa	6	12
Punjab	9	7
Rajasthan	13	10
Tamil Nadu	16	8
Uttar Pradesh	11	10
West Bengal	10	8

Source: Sales Tax Systems in India: A Profile, NIPFP, 1993

5.There are over a thousand public sector enterprises, about 700 of which are owned by the States. As on 31 March 1992, there were 246 Central public sector enterprises (excluding 8 companies with Central Government investment but without direct responsibility for management, 6 insurance companies and 3 financial institutions). Of these, 9 were in the construction sector, 72 in services and 165 in manufacturing (Government of India [1993b]).

6.Insolvency was avoided in 1991 through a combination of emergency borrowing from the IMF and the World Bank and severe import compression measures. Together these ensured that foreign debt service payments could be made on schedule.

7.Part of the increase in the debt-GDP ratio can be explained by the valuation effect of a fifty percent nominal depreciation of the rupee vis-a-vis the U.S.dollar that has taken place since mid-1991.

8.India's foreign debt is not traded in the secondary market.

9.For instance, $b_t \equiv \frac{B_t}{P_t Y_t}$; $b_t^* \equiv \frac{E_t B_t^*}{P_t Y_t}$; $\rho_t^* \equiv \frac{E_t R_t^*}{P_t Y_t}$; $k_t \equiv \frac{K_t}{Y_t}$; $\tau_t \equiv \frac{T_t}{P_t Y_t}$; $n_t^* \equiv \frac{E_t N_t'}{P_t Y_t}$ etc.

10.Note that $a_t \geq 0$.

11.We ignore for simplicity any internal adjustment costs associated with fixed capital formation.

12.Again, adjustment costs associated with fixed capital formation are ignored.

13.Unless otherwise noted, all references to stocks (flows) will mean stocks (flows) as fractions of GDP.

14. The two ways of writing the solvency constraint involving the domestic interest rate, and equivalent to (2.33) are given in (2.33') and (2.33''). Equation (2.33''') is the solvency constraint based on the foreign rate of interest. The latter is equivalent to (2.33) *i.f.f.* UIP holds *ex-post*.

(2.33') $$\lim_{N\to\infty} \prod_{j=0}^{N-1} \left(\frac{1}{1+r_{t+j}}\right) \frac{B_{t-1+N}}{P_{t-1+N}} \leq 0$$

(2.33'') $$\lim_{N\to\infty} \prod_{j=0}^{N-1} \left(\frac{1}{1+i_{t+j}}\right) B_{t-1+N} \leq 0$$

(2.33''') $$\lim_{N\to\infty} \prod_{j=0}^{N-1} \left(\frac{1}{1+i_{t+j}^*}\right) \frac{B_{t-1+N}}{E_{t-1+N}} \leq 0$$

15.Or equivalently, when the long-run real rate of interest exceeds the long-run growth rate of real GDP.

16.We ignore the empirically implausible case of "supersolvency" with $\alpha_1 < 0$.

17.Again, the case of supersolvency ($\alpha_0 < 0$) is ignored as not empirically plausible.

18.See for example Phillips and Perron [1988], Schwert [1989], Dejong, Nankervis, Savin and Whiteman [1989] and Diebold and Rudebusch [1990].

19.The infinite sum of stationary stochastic processes may be nonstationary.

20.Provided $r_t^N \neq g_t^N$

21.Again provided $r_t^N \neq g_t^N$

22. $GAP^N(t)$ and $GAP^i(t)$ are equal when r_t, g_t and $\tilde{s}_t$ are constant over time; this is the case regardless of whether b_{t-1} is equal to b_{t-1+N} or not.

23. India with a population of 850 million has only 8.3 million registered income tax payers!

24. It is not unusual for indirect tax revenues to decline for a period of as long as two to three years when an economy moves from a sales tax based system to a VAT.

25. The main reasons for the persistent losses are large real increases in employment (9.5 percent increase since 1985) and a very poor average collection rate of only 103.5 paisa/kwh compared to a cost of 124.4 paisa/kwh.

26. Figure 1 is drawn for a 5 percent annual growth rate of real GDP.

27. The steady-state seigniorage-GDP ratio maximizing rate of inflation is given by $\pi = -\frac{g}{1+g} + \frac{\sqrt{\beta[\alpha - g(\beta-\alpha)]}}{\beta(1+g)}$

28. Over the sample period, the average annual rate of growth of real GDP is 4.2 percent.

29. This requires that tax arrears are not index-linked or that no proper interest rate is charged on tax arrears.

30. At least if we wish to use the capital levy repeatedly.

31. The break up of the U.S.S.R. resulted in a collapse of Indian exports to the non-convertible currency Rupee trade area. Exports to the erstwhile U.S.S.R. had accounted for about 20 percent of total Indian exports until 1990.

32. India's debt servicing-GDP ratio is less compared to the same groups of countries.

33. Another factor has been the policy of directed credit to achieve a variety of economic and social objectives. Up to 45 percent of credit *has* to be made available to the so called priority sector, which includes agriculture and small scale industries, irrespective of whether or not this is financially optimal for banks.

34. As in the case of the S&Ls in the U.S.A.

35. There is always a temptation to have expenditures related to provisioning for contingent liabilities of the banking sector to be made off-budget.

36. States in India are not allowed to contract for foreign debt, and domestically they cannot borrow without the permission of the Union government.

37. The states' share of income tax and excise duties are 85 percent and 45 percent respectively.

38. *Selective* or *targeted* food subsidies can be effective anti-poverty instruments. As currently implemented, however, food subsidies frequently benefit other than those at risk of malnutrition or the very poor.

39. This holds if the long-run real interest rate of the Indian economy exceeds the long-run real growth rate by as little as one percentage point and GDP growth is as high as 5 percent per annum.

Figure 1 Seigniorage and Inflation in the Long Run

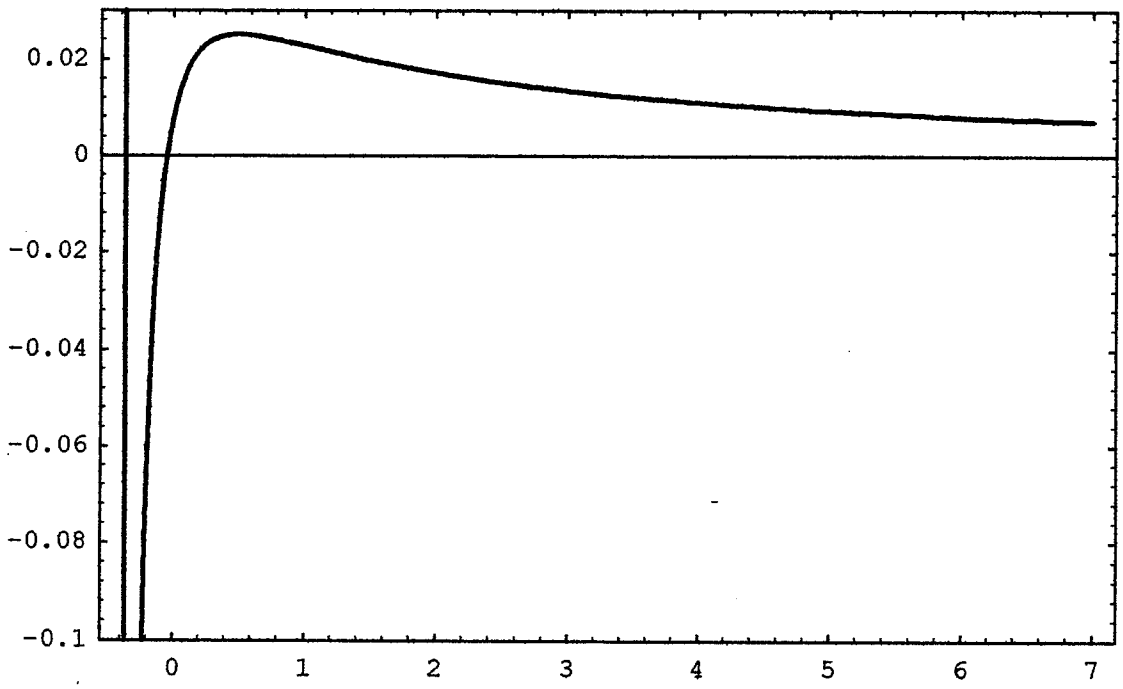

TABLE 1: TOTAL PUBLIC SECTOR DEBT, 1970/71-1992/93
(% OF GDP)

	NTD	NTDD	NTFD
1970/71	34.1	21.7	12.3
1971/72	35.2	22.4	12.8
1972/73	36.6	23.3	13.3
1974/75	31.9	20.0	11.9
1974/75	31.1	19.3	11.9
1975/76	31.2	19.1	12.1
1976/77	32.0	21.2	10.8
1977/78	29.9	21.2	8.7
1978/79	29.6	22.3	7.3
1979/80	29.8	23.1	6.7
1980/81	30.1	22.3	7.8
1981/82	32.5	22.8	9.7
1982/83	37.4	25.8	11.7
1983/84	38.6	26.1	12.4
1984/85	41.0	27.4	13.6
1985/86	45.1	29.6	15.5
1986/87	49.3	31.5	17.7
1987/88	52.4	33.6	18.8
1988/89	55.1	36.0	19.0
1989/90	60.6	39.1	21.5
1990/91	62.6	40.6	22.0
1991/92	67.9	42.1	25.7
1992/93	71.0	42.3	28.7

SOURCES:

1. Report of the Committee to Review the Working of the Monetary System, April 1985, RBI, Bombay.
2. India, Bureau of Public Enterprises, Public Enterprises Survey: Annual Report on the Working of Industrial and Commercial Undertakings of the Central Government, Volumes for 1970/71 to 1991/92.
3. Report on Currency and Finance, RBI, Volumes for 1977/78-1990/91.
4. Economic Survey, Government of India, 1992/93.
5. World Debt Tables: External Debt of Developing Countries, 1988/89 and 1992/93, Volumes II and III, Country Tables, Washington, DC. (Note: The World Debt Tables exclude defense related foreign debt).

DEFINITIONS OF VARIABLES:

NTD ≡ NTDD + NTFD (see notes to Tables 2 and 3).

TABLE 2: DOMESTIC PRIVATE HOLDINGS OF CENTRAL GOVERNMENT, STATE AND PUBLIC ENTERPRISE LIABILITIES, 1970/71-1992/93
(% OF GDP)

	CDD	SDD	PEDD	NTDD
1970/71	16.8	4.6	0.3	21.7
1971/72	17.3	4.8	0.3	22.4
1972/73	18.1	4.9	0.4	23.3
1973/74	15.3	4.5	0.2	20.0
1974/75	14.4	4.4	0.5	19.3
1975/76	13.7	4.7	0.7	19.1
1976/77	15.2	4.9	1.1	21.2
1977/78	15.5	4.7	1.0	21.2
1978/79	16.1	4.9	1.3	22.3
1979/80	16.5	4.9	1.6	23.1
1980/81	15.9	4.7	1.6	22.3
1981/82	16.6	4.6	1.6	22.8
1982/83	18.9	4.8	2.0	25.8
1983/84	19.1	4.9	2.2	26.1
1984/85	20.1	5.0	2.4	27.4
1985/86	21.9	5.2	2.5	29.6
1986/87	23.4	5.4	2.8	31.5
1987/88	24.5	5.8	3.3	33.6
1988/89	26.1	5.9	4.1	36.0
1989/90	28.1	6.2	4.8	39.1
1990/91	29.1	6.4	5.1	40.6
1991/92	29.8	6.6	5.7	42.1
1992/93	30.6	6.8	5.0	42.3

SOURCES:

1. Report of the Committee to Review the Working of the Monetary System, April 1985, RBI, Bombay.
2. India, Bureau of Public Enterprises, Public Enterprises Survey: Annual Report on the Working of Industrial and Commercial Undertakings of the Central Government, Volumes for 1970/71-1991/92.
3. Report on Currency and Finance, RBI, Volumes for 1977/78-1990/91.
4. Economic Survey, Government of India, 1992/93.

DEFINITIONS OF VARIABLES:

NTDD ≡ CDD + SDD + PEDD.

CDD: Internal Debt of Central Government except special securities issued to the Reserve Bank of India, Treasury bills issued to the Reserve Bank of India and to State Governments: plus Small Savings Scheme; plus Five-Year Time Deposits; plus Provident Funds etc: minus loans and debentures to Public Enterprises.

SDD: Internal debt of State Governments less Ways and Means Advances from the Reserve Bank of India; plus Provident Funds; less loans to Public Enterprises.

PEDD: Rupee denominated debt of Public Enterprises not held by Central Government or States.

TABLE 3: FOREIGN LIABILITIES AND ASSETS OF THE PUBLIC SECTOR, 1970/71-1992/93 (% OF GDP)

	TFD	R	NTFD
1970/71	13.6	1.3	12.3
1971/72	14.3	1.5	12.8
1972/73	14.7	1.4	13.3
1973/74	13.2	1.3	11.9
1974/75	13.0	1.2	11.9
1975/76	14.3	2.2	12.1
1976/77	14.4	3.6	10.8
1977/78	13.6	4.9	8.7
1978/79	12.7	5.4	7.3
1979/80	11.7	5.0	6.7
1980/81	11.8	3.9	7.8
1981/82	12.1	2.4	9.7
1982/83	14.3	2.6	11.7
1983/84	15.2	2.8	12.4
1984/85	16.6	3.0	13.6
1985/86	18.4	2.9	15.5
1986/87	20.4	2.7	17.7
1987/88	21.0	2.2	18.8
1988/89	20.7	1.7	19.0
1989/90	22.8	1.3	21.5
1990/91	22.8	0.9	22.0
1991/92	28.2	2.4	25.7
1992/93	31.6	2.9	28.7

SOURCES:

1. World Debt Tables: External Debt of Developing Countries, 1988/89 and 1992/93, Volumes II and III, Country Tables, Washington, DC.
2. Economic Survey, Government of India, 1992/93.

DEFINITIONS OF VARIABLES:

NTFD ≡ TFD - R.

TFD: Public and Publicly Guaranteed Long-Term debt plus use of IMF Credit plus imputed Short- term Public Debt*.

R: Official foreign exchange reserves plus SDRs.

* We assumed that the Public Sector's share of total short-term external debt was the same as its share of total long-term debt.

TABLE 4: THE PUBLIC SECTOR DEFICITS, ITS COMPONENTS AND SEIGNORAGE, 1960/61-1992/93 (% OF GDP)

	DEFICIT	PRIMARY DEFICIT	INTEREST PAYMENTS	SEIGNORAGE
1960/61	4.5	3.8	0.7	NA
1961/62	4.1	4.7	0.8	0.7
1962/63	4.7	3.8	0.9	1.0
1963/64	5.2	3.8	1.4	1.2
1964/65	5.1	3.7	1.4	0.7
1965/66	6.2	4.6	1.6	1.1
1966/67	5.4	3.7	1.8	0.7
1967/68	4.8	3.1	1.6	0.7
1968/69	4.0	2.4	1.6	0.8
1969/70	3.4	1.8	1.6	1.1
1970/71	4.2	2.5	1.7	0.9
1971/72	5.2	3.4	1.8	1.2
1972/73	4.9	3.2	1.7	1.3
1973/74	4.1	2.4	1.6	2.0
1974/75	3.9	2.3	1.6	0.5
1975/76	4.3	2.5	1.9	0.3
1976/77	4.9	2.9	2.1	2.3
1977/78	4.2	2.4	1.8	1.2
1978/79	5.3	3.2	2.1	3.0
1979/80	6.3	3.9	2.3	2.2
1980/81	7.9	5.8	2.2	2.1
1981/82	7.3	4.9	2.4	1.0
1982/83	7.8	5.2	2.6	1.2
1983/84	8.2	5.5	2.7	2.8
1984/85	9.9	7.0	3.0	1.1
1985/86	9.4	6.4	3.1	2.6
1986/87	11.4	7.8	3.6	2.3
1987/88	10.7	6.8	3.9	2.6
1988/89	10.3	6.1	4.1	2.4
1989/90	11.3	6.7	4.5	3.2
1990/91	11.6	6.9	4.7	1.9
1991/92	9.9	4.7	5.2	1.9
1992/93	10.0	4.5	5.5	1.2

SOURCES:

1. Economic Survey, Government of India, Volumes 1962/63-1992/93. Note that Budgetary figures for 1960/61-1963/64 do not include Union Territories.
2. Report on Currency and Finance, RBI, Volumes 1970/71-1990/91.
3. Statistical Appendix: Supplement to the RBI Occasional Papers, Volume (1), June 1982, Monetary Policy in India: Issues and Evidence.
4. Reserve Bank of India Bulletin, Monthly, Volumes for 1963/64-1992/93.

TABLE 5:
DISCOUNTED DEBT, DISCOUNTED PRIMARY DEFICIT AND DISCOUNTED SEIGNIORAGE
1970/71-1992/93

(current Rupees discounted to 1970/71)

(CR. RS)

	NTD	PRIMARY DEFICIT	SEIGNIORAGE
1970/71	14707	1077	378
1971/72	15493	1497	532
1972/73	16813	1480	587
1973/74	16913	1291	1059
1974/75	18495	1379	268
1975/76	18781	1497	155
1976/77	19518	1742	1431
1977/78	19444	1535	773
1978/79	19632	2151	2000
1979/80	20352	2696	1489
1980/81	22998	4394	1615
1981/82	27246	4130	811
1982/83	32632	4559	1033
1983/84	36349	5182	2594
1984/85	39833	6748	1113
1985/86	45405	6438	2569
1986/87	50428	7949	2323
1987/88	55338	7137	2696
1988/89	62762	6960	2771
1989/90	71501	7955	3803
1990/91	77855	8608	2381
1991/92	86970	6019	2473
1992/93	93698	5997	1525

* Discounted using the Long-Term Government Bond Yield

SOURCES:
Same as for Tables 1-4

KEY FOR TABLES 6A, 6B AND 7.
(All tests cover the 1970/71-1992/93 period).
B_1 is the debt measured in Rupees discounted at the Long-Term Government Bond Yield.
B_2 is the debt measured in Rupees discounted at the average Advance Rate.
B_1^* is the debt measured in U.S. dollars discounted at the Foreign All Creditors dollar interest rate.
B_2^* is the debt measured in U.S. dollars discounted at the Foreign Official Creditors dollar interest rate.
NTD/GDP is the ratio of net total debt to gdp.
PDV($\tilde{S}$) is the augmented primary surplus in Rupees discounted at the Long-Term Government Bond Yield.

TABLE 6A
UNIT ROOT AND STATIONARITY TESTS FOR DISCOUNTED DEBT

	$Z(\alpha)$	$Z(t_\alpha)$	$Z(\Phi_3)$	$\hat{\eta}_\mu$	$\hat{\eta}_\tau$
B_1	0.403	0.403	26.853	1.085	0.303
B_2	-1.266	-0.663	3.533	0.082	0.062
B_1^*	-9.316	-2.035	2.073	1.160	0.144
B_2^*	-8.298	-2.085	2.075	1.160	0.178
Critical Values	-25.1	-3.66	7.16	0.463	0.146

TABLE 6B
UNIT ROOT AND STATIONARITY TESTS FOR DIFFERENCED DISCOUNTED DEBT

	$Z(\alpha)$	$Z(t_\alpha)$	$Z(\Phi_3)$	$\hat{\eta}_\mu$	$\hat{\eta}_\tau$
ΔB_1	-13.861	-2.855	3.783	0.935	0.089
ΔB_2	-12.964	-2.734	-3.350	0.044	0.044
ΔB_1^*	-18.102	-3.570	5.795	0.129	0.129
ΔB_2^*	-18.099	-3.575	5.785	0.126	0.130
Critical Values	-25.1	-3.66	7.16	0.463	0.146

TABLE 7
UNIT ROOT AND STATIONARITY TESTS FOR PDV($\tilde{S}$) AND NTD/GDP

	$Z(\alpha)$	$Z(t_\alpha)$	$Z(\Phi_3)$	$\hat{\eta}_\mu$	$\hat{\eta}_\tau$
PDV($\tilde{S}$)	-18.866	-3.597	6.382	1.331	0.265
NTD/GDP	-0.733	-0.603	12.770	0.975	0.307
Critical Values	-25.1	-3.66	7.16	0.463	0.146

TABLE 8

GENERAL GOVERNMENT MINIMAL REQUIRED PERMANENT PRIMARY SURPLUS & SEIGNORAGE TO STABILIZE THE DEBT-GDP RATIO

1	Real interest rate (% p.a.)	4.00	5.00	6.00
2	Growth rate of real GDP (% p.a.)	4.00	4.00	4.00
3	Initial Debt-GDP ratio (annual, %)	71.00	71.00	71.00
4	Required permanent primary surplus plus seignorage (% GDP)	0.00	0.68	1.37
5	Assumed permanent seignorage (% GDP)	1.20	1.20	1.20
6	Required permanent primary surplus (%GDP)*	-1.20	-0.52	0.16
7	1992/93 Actual primary surplus (% GDP)	-4.50	-4.50	-4.50
8	Permanent primary gap (% GDP)**	3.30	3.98	4.66

* 6 = 4 - 5
**8 = 6 - 7

TABLE 9

GENERAL GOVERNMENT MINIMAL REQUIRED PRIMARY SURPLUS & SEIGNORAGE TO REDUCE DEBT-GDP RATIO BY 5 POINTS OVER 5 YEARS

1	Real interest rate (% p.a.)	4.00	5.00	6.00
2	Growth rate of real GDP (% p.a.)	4.00	4.00	4.00
3	Initial (1992) Debt-GDP ratio (annual, %)	71.00	71.00	71.00
4	Terminal (1997) Debt-GDP ratio (annual, %)	66.00	66.00	66.00
5	Required 5-year primary surplus plus seigniorage (% GDP)	1.00	1.66	2.33
6	Assumed 5-year seigniorage (% GDP)	1.20	1.20	1.20
7	Required 5-year primary surplus*(% GDP)	-0.20	0.46	1.13
8	1992/93 Actual primary surplus (% GDP)	-4.50	-4.50	-4.50
9	Myopic 5-year primary gap (% GDP)**	4.30	4.96	5.63

* 7 = 5 - 6
** 9 = 7 - 8

TABLE 10: PUBLIC SECTOR COMPENSATION TO EMPLOYEES AND SUBSIDIES 1960/61-1992/93 (% of GDP)

	Compensation to employees	Food and fertilizer subsidy	Total subsidy
1960/61	7.2	0.6	0.6
1961/62	7.6	0.6	0.6
1962/63	8.0	0.8	0.8
1963/64	7.9	0.7	0.7
1964/65	7.8	0.6	0.6
1965/66	8.4	0.7	0.7
1966/67	8.4	1.4	1.4
1967/68	8.3	1.0	1.0
1968/69	8.7	0.8	0.8
1969/70	8.9	0.7	0.7
1970/71	9.4	0.8	0.8
1971/72	9.8	0.9	0.9
1972/73	9.9	1.1	1.1
1973/74	9.7	1.1	1.1
1974/75	10.7	0.4	1.6
1975/76	11.5	0.3	1.4
1976/77	11.6	0.7	1.6
1977/78	11.3	0.8	1.8
1978/79	11.6	0.9	2.1
1979/80	12.1	1.1	2.2
1980/81	12.3	0.9	2.3
1981/82	12.1	0.7	2.2
1982/83	12.8	0.7	2.4
1983/84	13.0	0.9	2.7
1984/85	13.6	1.3	3.4
1985/86	14.0	1.4	3.3
1986/87	14.5	1.3	3.3
1987/88	15.1	1.3	3.4
1988/89	14.9	1.4	3.6
1989/90	14.9	1.6	3.9
1990/91	NA	1.3	NA
1991/92	NA	1.3	NA
1992/93	NA	1.3	NA

SOURCE:

1. National Accounts Statistics of 1989, 1991 and 1992, Government of India.
2. Indian Economic Statistics (Public Finance), Government of India, volumes for 1975-1992.

TABLE 11: FOREIGN DEBT SERVICE RATIOS, 1970/71-1992/93

	Foreign Debt Servicing as % of GDP	Foreign Debt Servicing as % of Exports
1970/71	0.9	23.0
1971/72	0.9	22.5
1972/73	0.9	20.9
1973/74	0.8	18.3
1974/75	0.9	16.5
1975/76	0.9	12.8
1976/77	0.9	10.6
1977/78	0.8	9.6
1978/79	0.8	10.5
1979/80	0.8	8.8
1980/81	0.7	8.6
1981/82	0.7	8.9
1982/83	0.9	12.0
1983/84	1.0	13.2
1984/85	1.1	13.1
1985/86	1.3	17.3
1986/87	1.8	24.7
1987/88	1.6	21.0
1988/89	1.7	22.0
1989/90	1.8	21.3
1990/91	2.0	23.3
1991/92	2.6	26.2
1992/93	3.1	27.3

SOURCES:

World Debt Tables: External Debt of Developing Countries, 1988/89 and 1992/93, Volumes II and III, Country Tables, Washington, DC.

TABLE 12: FOREIGN DEBT SERVICE AS PERCENT OF EXPORTS FOR FIVE GROUPS OF COUNTRIES, 1970-1992

	I	II	III	IV	V
1970	1.0	10.7	16.5	18.2	11.2
1980	1.1	7.2	10.8	9.4	8.0
1985	1.7	24.1	20.3	16.9	17.9
1986	1.5	23.7	26.0	21.7	20.0
1987	1.1	16.7	25.0	19.5	17.2
1988	1.2	22.3	26.7	19.9	19.2
1989	1.0	21.8	23.9	19.2	18.7
1990	1.1	20.6	22.7	20.2	17.7
1991	1.1	19.7	23.7	21.0	17.9
1992	1.1	20.1	24.2	21.2	17.8

I All Countries
II Severely Indebted Low Income Countries
III Moderately Indebted Low income Countries
IV South Asia
V Low Income Countries

SOURCES:

World Debt Tables: External Debt of Developing Countries, 1988/89 and 1992/93, Volumes II and III, Country Tables, Washington, DC.

TABLE 13
UNIT ROOT AND STATIONARITY TESTS FOR DEBT SERVICING RATIOS

	$Z(\alpha)$	$Z(t_\alpha)$	$Z(\Phi_3)$	$\hat{\eta}_\mu$	$\hat{\eta}_\tau$
FDS/GDP[1]	2.210	0.942	10.865	0.914	0.282
FDS/EXP[2]	-19.628	-4.212	7.664	0.439	0.287
Critical Values	-25.1	-3.66	7.16	0.463	0.146

[1]**FDS/GDP is the ratio of foreign debt service payments to gdp.**
[2]**FDS/EXP is the ratio of foreign debt service payments to total exports.**

TABLE 14
Unit root and stationarity tests for differenced debt servicing ratios

	$Z(\alpha)$	$Z(t_\alpha)$	$Z(\Phi_3)$	$\hat{\eta}_\mu$	$\hat{\eta}_\tau$
ΔFDS/GDP	-2.627	-1.515	5.297	0.643	0.094
ΔFDS/EXP	-22.004	-4.916	10.041	0.563	0.084
Critical Values	-25.1	-3.66	7.16	0.463	0.146

TABLE 15: PUBLIC SECTOR EXPENDITURE ON EDUCATION, HEALTH AND HOUSING 1974/75-1992/93 (% of GDP)

	Centre	States & UTs
1974/75	0.3	2.8
1975/76	0.5	3.0
1976/77	0.5	3.2
1977/78	0.5	3.2
1978/79	0.5	3.4
1979/80	0.5	3.5
1980/81	0.4	3.6
1981/82	0.4	3.6
1982/83	0.5	3.8
1983/84	0.4	3.8
1984/85	0.5	3.9
1985/86	0.5	4.0
1986/87	0.6	4.1
1987/88	0.7	4.3
1988/89	0.7	4.1
1989/90	0.6	4.3
1990/91	0.6	4.2
1991/92	0.6	4.1
1992/93	0.5	3.8

SOURCE:
Indian Economic Statistics (Public Finance), Government of India, volumes for 1975-1992.

TABLE 16: THREE MEASURES OF FISCAL DEFICIT OF STATES AND UNION TERRITORIES 1974/75-1992/93 (% of GDP)

	Gross deficit	Net of tax revenue from centre	Net of tax revenue and grant from centre
1974/75	1.3	3.0	4.4
1975/76	0.8	2.9	4.5
1976/77	1.9	3.9	5.7
1977/78	1.0	2.9	4.8
1978/79	1.3	3.2	5.6
1979/80	0.6	3.6	5.5
1980/81	1.6	4.3	6.4
1981/82	0.8	3.5	5.3
1982/83	1.3	3.9	5.9
1983/84	3.0	5.5	7.6
1984/85	3.6	6.1	8.3
1985/86	2.9	5.7	8.2
1986/87	3.2	6.1	8.5
1987/88	3.3	6.2	8.8
1988/89	3.0	5.7	8.1
1989/90	3.4	6.3	8.2
1990/91	3.5	6.1	8.5
1991/92	3.3	6.1	8.7
1992/93	3.2	5.8	8.2

SOURCE:
Indian Economic Statistics (Public Finance), Government of India, volumes for 1975-1992.