Bond financing and debt stability: theoretical issues and empirical analysis for India

Moorthy, Vivek and Singh, Bhupal and Dhal, Sarat Chandra

Reserve Bank of India

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Vivek Moorthy
Bhupal Singh
Sarat Chandra Dhal

Department of Economic Analysis and Policy
Reserve Bank of India
Mumbai

Issued for Discussion

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June 10, 2000

Vivek Moorthy
Professor,
Indian Institute of Management,
Bangalore

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BOND FINANCING AND DEBT STABILITY: THEORETICAL ISSUES AND EMPIRICAL ANALYSIS FOR INDIA

Vivek Moorthy*
Bhupal Singh
Sarat Chandra Dhal

OUTLINE OF THE STUDY

This study analyzes the consequences of the switch to market borrowing, *i.e.,* bond financing of the fiscal deficit with correspondingly less monetisation, as part of India's structural reforms initiated in 1991. It basically concludes that the move to more market borrowings to finance the deficit, instead of monetisation, is proving to be beneficial. The study is organised into two parts. Part I furnishes the theoretical rationale for using the Domar condition (GDP growth should exceed the interest rate) to evaluate the prospects for debt stability, instead of more recent approaches that test econometrically for the government's long run solvency. It then simulates the different short and long run consequences of alternative combinations of bond and money financing of budget deficits on interest rates, growth, inflation, debt/ GDP ratio and measures of the interest burden. The simulations are based upon a behavioural model that is monetarist in some crucial ways, with the central bank unable to influence real variables in the long run. However, inflation in the model is not determined by a Quantity Theory approach based upon stable money demand, but by an Aggregate Demand-Aggregate Supply formulation. The model shows that despite short-run instability, bond finance does not lead to a long-run debt trap. Instead, it increases long-run welfare, due to lower inflation.

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* Dr. Vivek Moorthy is Professor of Economics at the Indian Institute of Management, Bangalore and Shri Bhupal Singh and Shri Sarat Chandra Dhal are Research Officers in the Department of Economic Analysis and Policy of the Reserve Bank of India.

Part II first empirically evaluates the Domar debt-stability condition using relevant gross interest rates and concludes, contrary to some recent studies, that Central Government **debt is stable** at prevailing levels of the primary deficit and monetized deficit. The potential for instability in debt has arisen due to high administered rates in the Small Savings and Provident Funds schemes, i.e., due to non-market borrowings. When measures of the net interest rate are used, taking into account interest receipts of the government, Domar stability holds unambiguously. It is then argued that bond finance has contributed to fiscal consolidation, despite higher interest payments on debt, by inducing the government to reduce primary expenditures. This conclusion holds even for the combined finances of Central and State Governments. Robust evidence indicates that private borrowing costs have come down relative to those of the government, and credit conditions for private borrowers are now easier, after the move to bond finance. Further, some evidence suggests that private capital formation has surged since liberalisation, contradicting the view that the anti-inflation policy of bond finance has crowded out private investment and adversely affected growth. To summarize, despite short-run debt instability, bond financing of the deficit, i.e., the switchover to market borrowing has not led to a debt trap nor has it crowded out private investment, but instead it has helped lower inflation. The stability in market debt notwithstanding, the overall fiscal situation is precarious because of potential instability in non-market debt and due to large unfunded liabilities of the Central and State Governments.

PART I

IMPACT OF MONEY VERSUS BOND FINANCING ON DEBT AND MAJOR VARIABLES

Most analyses of bond versus money financing of the deficit fails to carefully and adequately analyze their different short and long run impact upon inflation, interest rates, interest payments and thus upon the debt burden. It is generally believed that bond finance (henceforth BF), although less inflationary than money finance (henceforth MF), is undesirable due to a rising debt burden and interest payments.[1] BF is presumed to lead to rising real interest rates, which in turn crowds out private investment, reducing capital stock and thus the real growth rate. In the extreme, BF may lead to a debt trap in which interest payments and the debt ratio grow explosively. By contrast, MF is presumed to be beneficial for growth and the debt burden, because although it does raise inflation, it lowers real interest rates, stimulates growth and thus alleviates the debt-trap problem of interest payments. The influential articles of Solow and Blinder (1973) and Sargent and Wallace (1983) support this common presumption that BF is undesirable. By contrast the monetarist view is that BF does not lead to a debt trap.

This study explains the monetarist view that conclusions about a debt trap under BF are misleading, since they apply to its short-run impact. The long-run consequences of BF versus MF are generally the opposite of the short run consequences. Compared to MF, BF does not generally lead to a debt trap in the long run and although it does raise real interest expenditures, BF is welfare enhancing compared to MF due to lower inflation. The rest of this part of the study is organized as follows. Section I.1 derives the debt-GDP ratio formula, discusses the associated debt stability condition(s), and provides a theoretical critique of the zero present value of debt criterion increasingly used to assess sustainability of debt. Section I.2 explains the rationale for the framework used here to model the macroeconomic outcomes under BF and MF. This framework incorporates the monetarist view described above that BF does not lead to a debt trap, but nevertheless avoids the Quantity Theory approach to inflation that is the hallmark of prevailing monetarist analysis of deficit and debt dynamics as in Darby (1984), and Rangarajan, Basu and Jadhav (1989).[2] Section 1.3 explains the full model based on this framework and Section 1.4 presents the simulation results under combinations of BF and MF. Section 1.5 explores aspects of the Aggregate Demand-Aggregate Supply approach and points to its limitations as a very long run theory of inflation. Section 1.6 looks at the impact of the offsetting crowding out and inflation-risk premium effects upon the interest rate and thus debt. Section 1.7 outlines the vital implications of favourable feedback effects from BF to a lower primary deficit.

I.1 The Debt-Stability Condition

The different short and long run impact of BF and MF can be analyzed using the debt stability condition in a growing economy, first outlined by Domar (1944), combined with a simple macroeconomic welfare (or loss) function in which welfare is negatively related to inflation and positively to the deviation of actual output from its **potential** level.[3] A closed economy is assumed in which debt can be financed only by either domestic borrowing (BF) or monetization (MF). In the government budget formula, external borrowing can be easily included as the third way to finance the debt, in addition to BF and MF. However to work out the short and long run dynamics of debt under external borrowing requires specifying behavioural equations for the short and long run interaction between inflation, the exchange rate, the external deficit and other variables. This in turn further requires specifying policy assumptions regarding the exchange rate regime and the degree of capital-account convertibility. Including the external sector thus greatly reduces analytical tractability, without making the conclusions more robust or useful.[4] Analytical tractability apart, the external sector in India is still relatively small. Therefore, the broad conclusions about debt under alternative policies in a closed economy by and large hold for a country like India[5].

The debt-stability condition can be derived in various ways. The derivation given below is similar to that in Darby (1984). The government budget constraint can be written, with the time period t as subscript as:

$$PRDEF + R_{t*} D_{t-1} = \Delta H_t + \Delta D_t \qquad I(1)$$

PRDEF is the primary deficit (PRDEF equals primary government spending minus taxes) R is the nominal interest rate on government bonds, D is the nominal stock of debt. Hence, $R_{t*}D_{t-1}$ is interest paid on debt and the left hand side of I(1) is the total deficit. ΔH (called siegniorage) is the change in the stock of (**high powered**) money used to finance the deficit[6]. ΔD is the value of bonds issued in period t to finance the deficit and equals the change in the value of outstanding debt D, assuming no capital gains or losses on existing bonds. The Model Schematic in Section I.3 lists relevant variable symbols and definitions.

Note that $\Delta D = g_{D.} D_{t-1}$, where g denotes the growth rate of relevant subscripted variable. Rearranging (1), substituting for Δ D, dropping the time subscript and scaling by nominal income (Y) yields[7]:

$$PRDEF/Y = \Delta H/Y + [g_D - R)]D/Y \qquad I(2)$$

which yields on rearranging,

$$D/Y = [PRDEF/Y - \Delta H/Y]/[g_D - R] \qquad I(3)$$

In the steady state, the debt/GDP ratio is stable i.e. $g_{D/Y} = g_D - g_Y = 0$.

Replacing g_D by g_Y in (3) yields the equilibrium value (D/Y)* to which the debt/ GDP ratio converges:

$$D/Y^* = [PRDEF/Y - \Delta H/Y]/[g_Y - R] \qquad I(4)$$

Using small letters to define ratios of relevant variables (D, PRDEF) to GNP, the debt ratio can be expressed as:

$$\mathbf{d^* = (prdef - sr)/(g_Y - R)} \qquad I(5)$$

where sr = ($\Delta H/Y$) is the seigniorage ratio, different from h = H/ Y, the ratio of money stock to GNP.

Equation I (5) is the basic debt-formula first derived by Domar (1944).[8] It holds when there is only BF (sr = 0) and can be extended to include foreign borrowing (EF), the third way of financing the domestic debt.[9] When the Domar stability condition is satisfied (i.e. when the growth rate of nominal income g_Y exceeds the interest rate R) then irrespective of the size of the primary deficit (plus seigniorage, if any), the debt-ratio will converge to d* and the deficit and debt can be maintained forever. Intuitively, the 'dividend' provided by adequately high growth is enough to ensure that the primary deficit and interest can be perpetually paid for, with debt remaining constant in relation to income. When stability holds, any value of the seigniorage ratio is feasible for any value of the primary deficit, so long as the primary deficit is larger. Put differently, various combinations of monetary and fiscal policy are compatible, with the debt adjusting passively.

Manipulating the debt-equation condition yields the following two equations that determine the growth of debt and the debt ratio during transition or in disequilibrium:

$$g_D = R + [prdef - sr]/d_{t-1} \qquad I(6)$$

$$d_t = d_{t-1}[1+g_D - g_Y] \qquad I(7)$$

In equilibrium, the debt ratio is stable ($g_D = g_Y$) and the formula I (4) again applies.

It is common to express the Domar condition as implying real growth must exceed the real interest rate. Let y denote real income and P the price level, with nominal income Y = P* y. Dividing all relevant variables by the same price level P converts the Domar formula into real terms. The conversion is conceptually trivial since P cancels out. Operationally though, the formulation with nominal variables is preferable in many ways, since actual expenditures and receipts in nominal terms are unambiguous, while the measures of real growth and interest rate will vary, depending on **different deflators** (price indices).

I.1.1 Debt-Stability with Taxes

If there are taxes on interest income at the rate t, then the stability condition is that the growth rate must exceed the after-tax interest rate. For simplicity of exposition and because taxes are empirically not significant in the Indian context, they have been left out of the analysis. When taxes are present, converting nominal variables to real terms changes the formula, since with inflation and taxes paid on nominal interest income, nominal rates must rise by more than the inflation rate as per the tax-adjusted Fisher equation to keep the **real return** to investors constant.

I.1.2 Debt Stability when Growth is less than the Interest Rate

Reverting back to the no-tax case, even when $g_Y < R$, the debt ratio can converge to an equilibrium value under some conditions. From the formula it can be mechanically seen that for a sufficiently large seigniorage (when sr > prdef), the debt ratio will stabilize to a positive level, although at a higher inflation rate due to higher money growth. This scenario - the need for monetary accomodation, **current or future**, to meet the intertemporal budget constraint when growth is less than the interest rate - was highlighted and stressed by Sargent and Wallace (1981). They also argued that current monetary accomodation is welfare enhancing, compared to the only other alternative of future accomodation. The validity of their argument and their underlying assumptions will be scrutinised later.

The other situation in which debt will stabilize is when there is a sufficiently large primary surplus minus siegniorage so that $[R - g_Y]d + prdef - sr > 0$ (Fischer, 1980).

In this last case, although there is no debt trap, the primary surplus is needed to keep paying the interest, for which growth does not suffice. This last expression can be viewed as a general stability condition.

I.1.3 Stability versus Sustainability

The meaning of the terms debt stability and debt sustainability needs to be discussed. Stability can be defined precisely by the algebraic condition of a converging debt ratio, and can be precisely identified from the variables in the Domar formula. By contrast, despite (or perhaps because of) widespread use of the term sustainability, there is no clear consensus in the literature as to what it means or implies and no precise way to define it. Sustainability is sometimes treated as equivalent to stability, it is sometimes taken to mean solvency, which will be discussed later, and sometimes neither of these precisely.[10]

Sustainability relates to the compatibility of the fiscal parameters with the broader economic goals or constraints the society faces. It is characterised here as follows: even without a change in underlying fiscal variables – in particular, the primary deficit – it is likely that the debt will be willingly held by the public in future periods, subject to any prevailing constraints on values of relevant macro variables such as domestic and external debt and debt service ratios, ratio of interest payments to expenditures and receipts, inflation rate etc. Sustainability entails more variable constraints than just the growth rate and interest rate, and is thus harder to satisfy than stability, which is a necessary condition for the former.

If a country has self-imposed constraints (by law, as in the Maastricht treaty with ceilings of 60 per cent debt ratio, 3 per cent public deficit and an inflation ceiling for entry into the European Union) then a large primary deficit that leads to debt stability since $g_Y > R$ may not be sustainable or feasible since the equilibrium value of debt violates the debt ceiling. Although a burst of seigniorage can arithmetically ensure debt stability within the permissible debt ratio for the given deficit, the policy will nevertheless be unsustainable if the ensuing inflation exceeds the permissible inflation rate.

Even when there are no precise macroeconomic constraints that render a stable debt outcome unsustainable, a debt burden that is perceived as **potentially unstable** can be characterised as unsustainable. Even when current period Domar values imply stability, if investors feel that the ensuing debt ratio is too high, some event could trigger a panic leading to a sell-off of bonds. The ensuing rise in interest rates could lead to debt instability by the Domar condition. Sustainability implies the possibility of instability. Assessing whether the deficit and debt are sustainable requires judgmental analysis of market debt, other government liabilities and investor preferences and characteristics that are typically left out of formula-based and econometric investigations. In particular, the proportions of debt held by financial institutions and individuals (retail investors) respectively and the extent of diffusion of retail debt across the population determines the extent of debt sustainability. In debt markets, retail investors are, in general, less speculative and tend to buy and hold in comparison to institutional investors. A 100 per cent debt ratio held mainly by retail investors may be more easily sustainable than a 50 per cent ratio held mostly by financial institutions. Similarly the dispersion of debt across different age groups, tax and income brackets is important. If the bulk of retail debt is held by retirees, who tend to be income rather than capital gains oriented investors, then *ceteris paribus* the debt is more sustainable. In general, debt is more sustainable when it is more widely dispersed across retail investors.

The maturity structure of debt is also an important determinant of debt sustainability. While the ratio of short-term to total debt is a widely used indicator in external sector analysis, analysis of public debt has not incorporated this factor into Domar-type analysis. Ceteris paribus, a given debt ratio is more sustainable the lower is the share of short-term debt. Further, debt should be measured by residual, not actual, maturity.

In short, stability is a necessary but not sufficient condition for sustainability which can be thought of as potential instability. This study empirically assesses the conditions for **stability,** with a forward-looking emphasis on likely outcomes for interest rates, based on analyzing macroeconomic trends and underlying policies. Sustainability is broadly assessed here since no precise estimates can be made.

I.1.4 Stability versus Solvency

Recent analysis of debt eschews direct comparison of the growth and interest rate. Instead, this literature focuses on the **intertemporal budget constraint** to ascertain long-run solvency, which implies that there must be future primary surpluses or seigniorage to offset a current deficit. Thus Blanchard (1980) states that the debt is sustainable if the present value of the taxes equals the present value of primary spending, interest payments and repayment of debt. Stated precisely, solvency implies the expectation at time t that the PV of future debt tend to zero or be negative in an infinite horizon economy. In a finite horizon economy solvency implies that debt in the last period be non-positive (i.e., $d_{t+n}<0$). If this present value condition does not hold, fiscal policy is on an unsustainable path and requires a change in underlying policies.

Empirically assessing solvency requires a time series investigation of whether the discounted present value of the debt is stationary [Hamilton and Flavin (1986), Wilcox (1989)]. If so, then solvency holds. Buiter and Patel (1992) find from time series tests that India's central government debt from 1970-1987 in present value terms is nonstationary and conclude that debt is unsustainable. However, the theoretical validity of the long run solvency criterion can be questioned. Solvency implies that the government balances its books over a long-term horizon. But governments, unlike individuals are infinitely long-lived and it is not clear why they should be subject to a solvency constraint. It should be feasible for the government to run a perpetual primary deficit and debt, sustained forever by paying interest on existing debt by further borrowing from future generations. All that is required for this rational Ponzi scheme to be feasible is that the Domar condition hold, resulting in a stable debt ratio. Therefore, the logic of imposing this long run solvency constraint on the government is not immediately obvious.

The rationale for long run solvency as a condition for debt sustainability derives from a more subtle consideration: **the dynamic efficiency implication** of growth theory which requires that the growth rate **be less than** the interest rate.[11] Therefore a permanent primary deficit (adjusted for seigniorage), which is manageable **when** growth exceeds the interest rate, is incompatible with dynamic efficiency. Instead, long run solvency must hold. Buiter and Patel (1992) emphasize the implications of dynamic efficiency in justifying their approach to ascertain sustainability by testing for the stationarity of the discounted present value of debt[12] Another way of stating this constraint is that Domar stability cannot hold since it precludes cost-benefit analysis: when the stream of benefits grows at a faster rate (g_Y) than the discount rate (R), the present value of a project is infinite, which is not possible.

There is a fundamental flaw in these arguments pertaining to the implications of dynamic efficiency for the unviability of a permanent primary deficit. These arguments fail to make a distinction between the risky rate of return on capital and the risk free rate on government bonds. Making this distinction it can be seen that the Domar condition does not necessarily imply dynamic inefficiency. The valuation of a stock in finance theory is akin to cost-benefit analysis. The well-known Gordon growth model is used to compute the present value (price) of a stock. Consider a stock that pays a dividend **div** that grows by **g** every period. If this stock is the representative stock for the economy, then g equals g_Y, the growth rate of the economy. If R(risky) is the discount rate for discounting the infinite future stream of divi-dends, then the price of the stock, obtained as the sum of the series is **div**/ [R(risky) – g_Y]. For the stock price to have a stable, finite value in fact requires that R (risky) > g_Y. There is no contradiction at all in having an economy in which R (risky) > g_Y > R(risk free), with both conditions holding, which is often the case (Moorthy, 1998).[13]

The empirical methodology employed in testing for long run solvency can also be questioned. These tests entail choosing arbitrary discount rates to arrive at the present discounted values (PV) of the debt. The conclusion about solvency can thus depend on the discount rate chosen. As Rajaraman and Mukhopadhayay (1999) have stated, the PV of debt is clearly an avoidable computational complexity. The robustness of this approach is less than that using a straight forward comparison of growth and interest rates. Therefore this paper engages in Domar condition analysis, using the debt-ratio formula I(5) to evaluate debt stability.

I.2 Short and Long Run Impact of Monetising the Deficit

The Domar debt equation is often used mechanically for making debt projections and econometric forecasts, without paying due heed to how the mode of financing affects in turn the macro variables in the stability condition. To adequately analyze the implications of different ways of financing the debt requires incorporating this equation into behavioural macroeconomic analysis that distinguishes between the short and long-run. The conceptual foundation for the debt analysis developed here is Milton Friedman's (1967) **natural rate** (of unemployment) **hypothesis**: there is no long-run trade off between growth (or unemployment) and inflation, although there is a short-run tradeoff. The combined long and short-run responses of an economy with a natural rate (i.e. supply) constraint imply Friedman's (1967) **monetarist paradox: an easy money policy leads to high interest rates** and vice versa for a tight monetary policy.[14] A monetary accomodation of the deficit is, in effect, an easy money policy while bond finance is, in effect, a tight money policy. Indeed, analysis of the impact of BF versus MF should be carried out as an **extension** of Friedman's (1967) analysis of the different short and long run consequences of increased money growth *per se,* with the **added twist of debt variables.** Such an analysis, with an important modification, is outlined below.

The policy choice that a central bank typically faces is to what extent, if at all, taking into account the need for debt stability, should a rise in government spending and thus the fiscal deficit be accomodated? To tackle this issue, it is convenient to start with a given level of the deficit, partly financed by seigniorage and then analyze the impact of varying seigniorage on the debt.[15] The above exercise can then be extended to deal with the more realistic case of choosing from permutation-combinations of money growth and bond issuance to finance a **rise** in the deficit. Clarifications and limitations of the analysis pertaining to the stability of money demand, crowding out and the inflation risk premium, and the impact of BF on the primary deficit are discussed later in Sections 1.5, 1.6 and 1.7.

I.2.1 Monetarism Versus the Quantity Theory Approach

Numerical simulations in Section I.4, based upon the model attained in section I.3, are used to show the impact of varying the amount of seigniorage used to finance the deficit. These simulations correspond to two scenarios: tight and easy money respectively. The novel feature of this model is that although it is based upon a monetarist approach, the inflation rate in this model is not determined by the Quantity theory, even in the long run. Rather, inflation is determined by an **expectations-augmented aggregate demand - aggregate supply output gap approach** (**ADAS** for short). The ADAS approach is the output equivalent of a Phillips curve embedded in a natural rate of unemployment equation. Since unemployment is not easily measu-rable and may not be the primary supply constraint in the Indian economy context, the ADAS (output gap) specification is more appropriate.

These simulations show that **monetarist** conclusions about the desirability of bond financing need not be predicated on stable money demand, i.e. a Quantity theory approach. The meaning of 'monetarist' in the above statement needs precise clarification. The following five tenets largely encompass monetarism and the Quantity Theory:

(i) The natural rate hypothesis: despite a short run trade-off, there is no long-run trade-off between growth and inflation, from which it follows that zero inflation should be the final goal of policy

(ii) The Fisher equation, with the nominal interest rate equals to the real rate plus expected inflation. The real rate of interest is **exogenous in the long run** and not amenable to long-run control by the central bank

(iii) Friedman's (1967) monetarist paradox: an easy money policy leads to high interest rates, which can be deduced as a corollary to the first two tenets.

(iv) A stable/ predictable money demand function in a Quantity theory framework. Stable does not imply velocity is constant but that it can be fairly well predicted by real income and the nominal interest rate.

(v) Money supply is exogenous and can be largely controlled by the central bank.

There is an enormous amount of confused and confusing literature on what monetarism does and does not imply. The study finds it not just useful but necessary to distinguish **between** monetarism and the Quantity theory, two approaches that are often mistakenly treated as identical. Many important conclusions in macroeconomic theory and monetary policy hinge upon clarifying and sorting out this distinction. The first three tenets, i.e. the **natural rate hypothesis**, the **Fisher equation and the monetarist paradox can be regarded as monetarism.** The Quantity theory entails the **additional tenets** (iv) and (v), that money demand is predictable, money supply is controllable by the central bank, and therefore inflation is well predicted by money growth.

Monetarism as defined here is a subset of the Quantity theory. The former can hold while the latter may not. Empirical evidence suggests that the Fisher effect is very strong while money demand is quite unstable, contrary to tenet (iv) listed above. Simple cross-country tests reveal this **wide empirical disparity** between the Fisher equation and the Quantity theory. For instance, for 14 OECD countries with relatively free debt markets, during 1993 an OLS regression of the (annual average) ten-year government bond rate on the current CPI inflation rate yields $\bar{R}^2$ of 0.70, a coefficient of 0.81 and a t-statistic of over 5. A similar regression of inflation on M1 or M2 growth yields $\bar{R}^2$ of under 0.1 and insignificant t-values. Using five-year averages of inflation on money growth **does not** change the results.[16] Cross-country regressions are a particularly good source for inference since the cross-section data embody structural, long run effects in the **current**

observation, which time series regressions using cointegration methods often do not reveal.

The fifth tenet listed above pertains to exogeneity of the money supply. Since total money supply includes not only high-powered money but also the liabilities of the banking system, the validity of this fifth tenet (that underlies the Quantity Theory) can be, and is often, empirically questioned. However, since this analysis deals only with high-powered money which can be exogenously determined by the central bank, further discussion of this fifth tenet is not required. Thus monetarism and the Fisher equation have held up empirically while the Quantity theory and stable money demand functions have not. It is not surprising that major central banks have pragmatically moved away from money growth targeting and increasingly engage in direct inflation targeting, a policy implicitly based on an ADAS approach to inflation[17].

The approach defined here as monetarism could perhaps be called just classical, to sharply distinguish it from the Quantity Theory. However, it is very commonplace to describe these tenets (i), (ii) and (iii) as monetarist, perhaps because they were first clearly enunciated by Milton Friedman (1967), **along** with the Quantity Theory tenets (iv) and (v), and jointly used by him to recommend that the central bank follow a money growth rate rule to achieve price stability. Therefore, rather than fight conventional usage, the term monetarist is used here as well to describe the first three tenets. Besides, the term classical may be too broad and misleading to describe these (monetarist) tenets, since a classical view subsumes so many other doctrines not germane to this issue.[18] In a lighter but definitely illuminating vein, monetarism as defined here could be instead labelled **realism,** to connote the realistic and pragmatic view that the central bank cannot (favourably) affect most **real variables** in the long run. In particular, it cannot boost real output growth by lowering real interest rates and supporting the government's borrowing programme.

Since money supply is used to partly finance the deficit, analysis of debt dynamics and its potential stability crucially hinges on what assumptions are made regarding the macroeco-nomic impact of money supply. The prevailing analysis of debt stabilization from a monetarist perspective is **also** based upon a stable money demand function and a Quantity-theoretic approach (Darby, 1984). The seminal paper modelling debt dynamics in the Indian context by Rangarajan, Basu and Jadhav (1989) is also based on a price equation linking inflation to the change in reserve money. Khundrakpam (1998) also uses a Quantity Theory approach to model inflation. By contrast, the model of debt developed below completely eschews the Quantity theory approach to inflation.

I.3 The Aggregate Demand-Aggregate Supply Output Gap Model

The model used here is based on an IS/ LM approach, in which output (growth) is determined by the real interest rate. In this scenario, monetary policy works via its impact on the (expected) real interest rate, unlike the black box transmission of the Quantity Theory approach. Inflation is determined by an Aggregate Demand/ Aggregate Supply approach, more specifically by an adaptive expectations augmented Output Gap equation. Nominal interest rates are determined by an adaptive expectations Fisher equation. The real interest rate falls in the short run when seigniorage is increased and vice versa. This model displays neutrality properties in the long run: real growth and the real interest rate are independent of the inflation rate, of the money growth rate and of the central bank's actions, and the monetarist paradox holds. But it is not a Quantity theory model since inflation is not linked to money growth or seigniorage but is determined only by the output gap equation.

The simulations developed from this model imply that BF is less inflationary than money finance. With regard to debt stabilization and debt policy, the simulations imply that although BF lowers welfare, and leads to a short-run debt trap for the specific numerical values of the real interest rate and growth rate used here, BF raises welfare in the long run **without** a debt trap. The accompanying Flow Chart: Model Schematic for Debt Simulations, outlines the whole model. The equations and relevant variables of the model can be described as follows:

The exogenous variables are g_y* and r*, the long run real growth and real interest rate respectively.

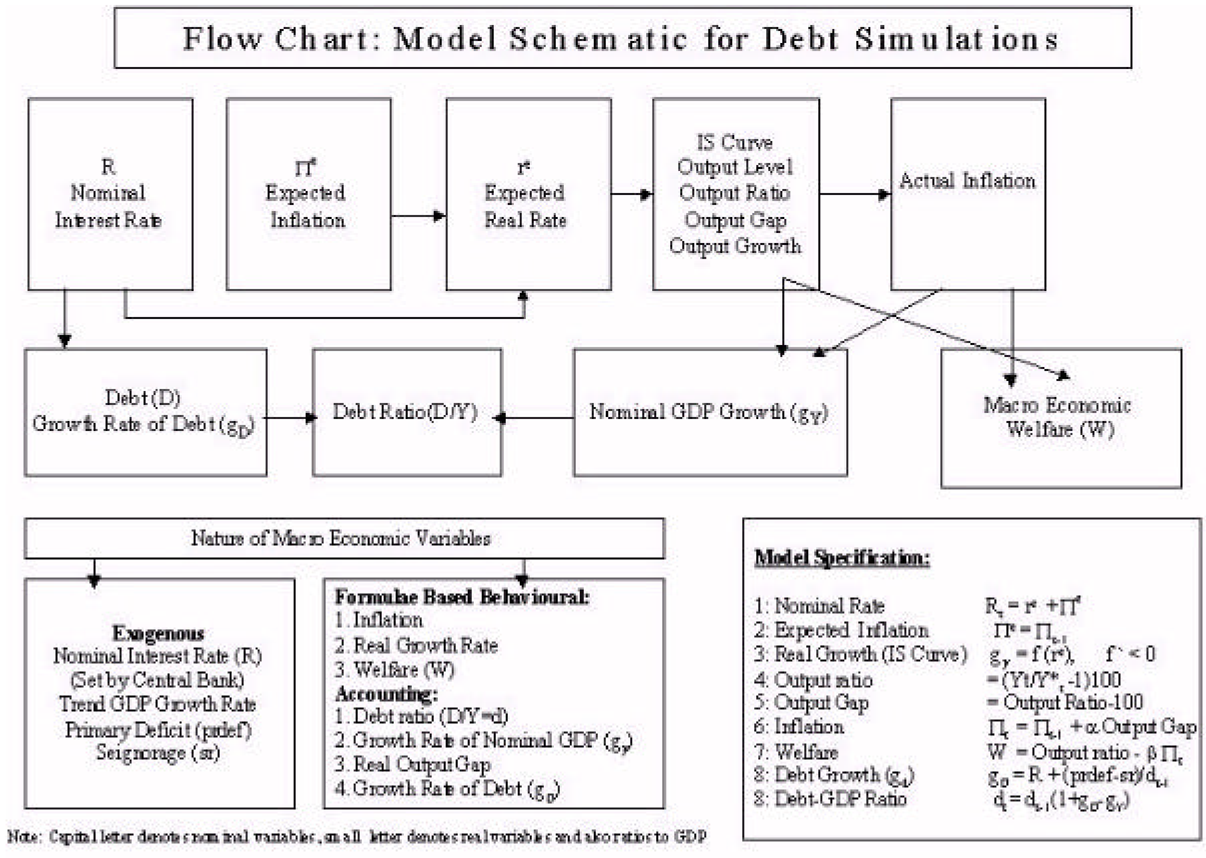
The inflation rate is $\Pi = (P_t - P_{t-1})/P_{t-1}$, and it is determined by the AD/AS approach in the equation below. (P is the price level).

$$\Pi_t = \Pi_t^{\text{expected}} + \alpha \text{ (Output Gap)},$$
where Output Gap = $(y_t / y^*_t - 1) * 100$ and $\alpha > 0$

$$= \Pi_{t-1} + \alpha \text{ (Output Gap) assuming } \Pi_t^{\text{expected}} = \Pi_{t-1} \qquad \text{I(8)}$$

$$g_y = f \text{ (expected real interest rate)}, f' < 0 \qquad \text{I(9)}$$

The growth rate of real output (not its level) is inversely linked to the real interest rate, in effect, an *ad hoc* IS curve equation. The change in monetary policy implies a sequence of nominal interest rates, listed in the summary Table I.2, to which there corresponds a sequence of real interest rates and real growth rates. This *ad hoc* equation I(9) is used instead of a precise equation since it is difficult to model convergence to equilibrium using a precise equation (e.g. g_y = constant - β real interest rate). Why? Because there has to be a period of **overshooting** (or undershooting) in the **growth rate** of real output, for the level of real output to converge to its trend level. During this period of over/ undershooting, the normal inverse link between real growth and the real interest rate has to be suspended.



Flow Chart: Model Schematic for Debt Simulations
R
Nominal
Interest Rate
Π^e
Expected
Inflation
r^e
Expected
Real Rate
IS Curve
Output Level
Output Ratio
Output Gap
Output Growth
Actual Inflation
Debt (D)
Growth Rate of Debt (g_D)
Debt Ratio(D/Y)
Nominal GDP Growth (g_Y)
Macro Economic
Welfare (W)
Nature of Macro Economic Variables
Exogenous
Nominal Interest Rate (R)
(Set by Central Bank)
Trend GDP Growth Rate
Primary Deficit (prdef)
Seignorage (sr)
Formulae Based Behavioural:
1. Inflation
2. Real Growth Rate
3. Welfare (W)
Accounting:
1. Debt ratio (D/Y=d)
2. Growth Rate of Nominal GDP (g_y)
3. Real Output Gap
4. Growth Rate of Debt (g_D)
Note: Capital letter denotes nominal variables, small letter denotes real variables and also ratios to GDP
Model Specification:
1: Nominal Rate R_t = r^e + Π^e
2: Expected Inflation Π^e = Π_{t-1}
3: Real Growth (IS Curve) g_y = f (r^e), f` < 0
4: Output ratio = (Yt/Y*_t -1)100
5: Output Gap = Output Ratio-100
6: Inflation Π_t = Π_{t-1} + α Output Gap
7: Welfare W = Output ratio - β Π_t
8: Debt Growth (g_d) g_D = R + (prdef-sr)/d_{t-1}
8: Debt-GDP Ratio d_t = d_{t-1}(1+g_D-g_Y)

The real interest rate in turn is inversely linked in the **short run** to the tightness of monetary policy, indicated by the seigniorage ratio (sr), with arbitrary values again chosen for this link. In most macro economic analyses, the monetary policy variable is typically the money growth rate (high-powered or total money stock), not **sr**. When velocity is constant (or a function of income growth and the nominal interest rate), then in long run equilibrium **sr** could be expressed in terms of a corresponding money growth rate.[19] However, since this is not a Quantity Theory model, it is not just convenient but even necessary to ignore money growth and express monetary policy in terms of the **sr**. For these reasons, in the simulation an arbitrary sequence of values is also chosen for the short-run impact of a change in the seigniorage ratio on the real interest rate. The seigniorage ratio sr has no long run impact on the real interest rate.

The real interest rate is the underlying exogenous variable in this model. The nominal rate is the derived 'exogenous' policy variable, chosen by the central bank. Operationally the central bank can only choose the **nominal rate R** as its operating target or instrument, not the real rate.[20] But in doing so, given expected inflation from last period, the central bank is effectively targeting an expected real rate that influences private sector investment decisions. This would require the central bank to estimate the private sector's expected inflation rate. In this scenario, the central bank knows that, since it cannot control the real interest rate and growth in the long run, it should periodically adjust the nominal rate R in response to changing inflation. Nevertheless it can use the nominal rate R to choose an expected real rate(s) to achieve its inflation target, ideally taking into account the impact of the real rate on real growth, inflation and welfare over a multi-period horizon. For instance, starting from 7 per cent steady inflation, a nominal rate of 11 per cent, and so a real rate of 4 per cent, if the central bank raises the nominal rate to 14 per cent by its money market operations, in effect it has raised the expected real rate to 7 per cent. This policy will reduce inflation below 7 per cent because of its contractionary effect, and so the expected real rate will be lower than the actual real rate. However, the actual real rate does not affect economic decisions and so is ignored in this analysis. The term real rate implicitly refers to the (expected) real rate. In long run equilibrium, actual and expected real rates are equal at the exogenous level r*. Thus R, the policy variable chosen by the central bank, can be expressed as:

$$R = r^{expected} + \Pi^{expected} = r^{expected} + \Pi_{t-1} \text{ since } \Pi^{expected} = \Pi_{t-1} \qquad \text{I(10)}$$

Macroeconomic welfare (W) is positively related to the Output Ratio (y/ y*)100 and inversely to inflation, since inflation, even when anticipated, has significant menu (transactions) costs[21]

$$W_t = \text{Outputratio}_t - \lambda\Pi_t \qquad \text{I(11)}$$

A rise in output is welfare enhancing even when it pushes up the economy above its potential level because the coefficient λ is relatively small. (Implicitly, the rise in employment implies a drop in involuntary unemployment which can exist, even at the natural rate, as in efficiency wage models, such as Stiglitz and Weiss (1984)). Inflation lowers welfare primarily due to transaction costs, as stressed by Okun (1980)[22]. Since in long run equilibrium, the output ratio is constant (assumed 100 here) the welfare function implies that a goal or final target of zero inflation target is the best policy. Present-value calculations with the welfare function can also be used to numerically demonstrate, given society's rate of time preference, that for a moderately long but not infinite time horizon, it is better to continue with the existing inflation rate than push the economy to low or zero inflation by inducing a recession.

I.4 Simulation Results and the Adjustment Process

The process of adjustment after a change in **sr**, for the tight money case, is outlined below. The numerical results are presented in Tables I.1(a) and (b) and depicted in the accompanying Chart I (a) to (f). The fall in **sr** raises the nominal (and real) rate of interest, lowers real growth and raises the debt burden on both grounds (periods 1 through 5). At the start, **sr** is 1 per cent and, given the values of other variables, the debt-GDP ratio is 50per cent. Then **sr** is reduced to 0.5per cent, a one-time permanent change. A debt-trap develops during the transition when the real interest rate exceeds the growth rate, with the debt ratio rising explosively. (periods 1 to 4).

However, this instability is temporary or short-run. The commonly held view that bond financing leads to a debt trap, is based on an **empirically erroneous extrapolation** of this short-run impact of tight money. Since growth has fallen, output level falls below trend and inflation declines **whenever** this is so (periods 1 to 6)[23]. The decline in inflation gets built into expectations and nominal interest rates begin to fall, and the real interest rate falls and begins to return to its old level (periods 2 to 6). There is a final adjustment (periods 6 and 7) when output growth overshoots its trend value, to enable catch up in output level. From period 8 onwards, all the macro flow variables have returned to their equilibrium values, with the debt ratio rising stable. The economy gradually converges to long-run equilibrium with a higher, stable debt ratio (see simulation results).

The tight money policy does increase the debt burden in an operational sense since it raises the ratio of real interest payments to GDP (r.d). For these numerical values, the interest burden rises in nominal terms also, but this need not always be the case. Welfare falls during most of the adjustment as real output falls increasingly below potential, despite the continuing drop in inflation (periods 1 through 5) but then rises as inflation falls and output growth rises. The weights in the welfare function have been chosen so as to heavily weigh the gain due to output, in comparison to the loss from inflation. Under the tight money

Table I.1(a) : Adjustment Process under Tight Money Policy

Assumptions:

Primary Deficit (prdef) = 2%, Seignorage ratio (sr) = 1%
Reduce sr to 0.5%

inflation = [infation(-1) + 0.015 * (Output Gap)]
Welfare = [Output Ratio - 20 * inflation]

Period	Nominal Interest Rate	Real Interest Rate	Real GDP Growth	Infla-tion	Nominal GDP Growth	Real Output	Trend Output	Output ratio	Welfare	Growth Rate of Debt	Debt-ratio	d(Debt-ratio)
-2	0.1100	0.04	0.06	0.07	0.130	889.99	889.99	100.00	98.60		0.5000	
-1	0.1100	0.04	0.06	0.07	0.130	943.40	943.40	100.00	98.60	0.1300	0.5000	
0	0.1100	0.04	0.06	0.07	0.130	1000.00	1000.00	100.00	98.60	0.1300	0.5000	0.0000
1	0.1400	0.07	0.06	0.07	0.124	1055.00	1060.00	99.53	98.14	0.1700	0.5229	0.0229
2	0.1343	0.07	0.05	0.07	0.117	1107.75	1123.60	98.59	97.25	0.1630	0.5468	0.0239
3	0.1222	0.06	0.05	0.06	0.108	1157.60	1191.02	97.19	95.93	0.1496	0.5696	0.0228
4	0.1130	0.05	0.04	0.06	0.096	1203.90	1262.48	95.36	94.24	0.1393	0.5942	0.0247
5	0.1010	0.05	0.06	0.05	0.103	1270.12	1338.23	94.91	93.94	0.1263	0.6078	0.0136
6	0.0884	0.04	0.09	0.04	0.135	1384.43	1418.52	97.60	96.70	0.1131	0.5946	-0.0132
7	0.0848	0.04	0.09	0.04	0.131	1503.63	1503.63	100.00	99.10	0.1100	0.5822	-0.0124
8	0.0848	0.04	0.06	0.04	0.105	1593.85	1593.85	100.00	99.10	0.1105	0.5856	0.0034
9	0.0848	0.04	0.06	0.04	0.105	1689.48	1689.48	100.00	99.10	0.1104	0.5889	0.0033
10	0.0848	0.04	0.06	0.04	0.105	1790.85	1790.85	100.00	99.10	0.1102	0.5921	0.0032
197	0.0848	0.04	0.06	0.04	0.105	96662150.99	96661905.67	100.00	99.10	0.1049	0.7464	0.0001
198	0.0848	0.04	0.06	0.04	0.105	102461880.05	102461620.01	100.00	99.10	0.1049	0.7465	0.0001
199	0.0848	0.04	0.06	0.04	0.105	108609592.85	108609317.21	100.00	99.10	0.1049	0.7465	0.0001
200	0.0848	0.04	0.06	0.04	0.105	115126168.42	115125876.25	100.00	99.10	0.1049	0.7466	0.0001

Table I.1(b) : Adjustment Process under Easy Money Policy

Assumptions:

Primary Deficit (prdef) = 2%, Seignorage ratio (sr) = 1%
Increase sr to 1.5%

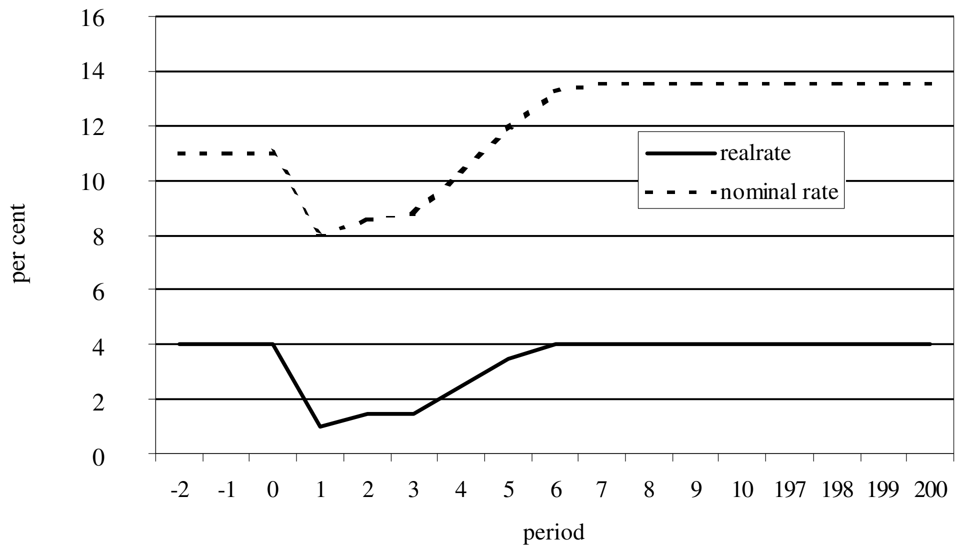
inflation = [infation(-1) + 0.015 * (Output Gap)]
Welfare = [Output Ratio - 20 * inflation]

Period	Nominal Interest Rate	Real Interest Rate	Real GDP Growth	Infla- tion	Nominal GDP Growth	Real Output	Trend Output	Output ratio	Welfare	Growth Rate of Debt	Debt- ratio	d(Debt- ratio)
-2	0.1100	0.04	0.06	0.070	0.1300	889.99	889.99	100.00	98.60		0.5000	
-1	0.1100	0.04	0.06	0.070	0.1300	943.40	943.40	100.00	98.60	0.1300	0.5000	
0	0.1100	0.04	0.06	0.070	0.1300	1000.00	1000.00	100.00	98.60	0.1300	0.5000	0.0000
1	0.0800	0.01	0.07	0.071	0.1357	1065.00	1060.00	100.47	99.06	0.0900	0.4771	-0.0229
2	0.0857	0.02	0.07	0.073	0.1428	1139.55	1123.60	101.42	99.96	0.0962	0.4549	-0.0223
3	0.0878	0.02	0.08	0.077	0.1521	1225.02	1191.02	102.85	101.31	0.0988	0.4306	-0.0242
4	0.1021	0.03	0.08	0.084	0.1643	1323.02	1262.48	104.80	103.11	0.1137	0.4089	-0.0218
5	0.1193	0.04	0.07	0.092	0.1572	1409.01	1338.23	105.29	103.44	0.1315	0.3984	-0.0105
6	0.1322	0.04	0.03	0.095	0.1200	1444.24	1418.52	101.81	99.91	0.1448	0.4082	0.0099
7	0.1350	0.04	0.04	0.095	0.1365	1504.17	1503.63	100.04	98.14	0.1472	0.4126	0.0044
8	0.1350	0.04	0.06	0.095	0.1550	1594.43	1593.85	100.00	98.10	0.1471	0.4094	-0.0033
9	0.1350	0.04	0.06	0.095	0.1550	1690.09	1689.48	100.00	98.10	0.1472	0.4062	-0.0032
10	0.1350	0.04	0.06	0.095	0.1550	1791.50	1790.85	100.00	98.10	0.1473	0.4030	-0.0031
197	0.1350	0.04	0.06	0.095	0.1550	96696921.69	96661905.67	100.00	98.10	0.1547	0.2535	-0.0001
198	0.1350	0.04	0.06	0.095	0.1550	102498737.00	102461620.01	100.00	98.10	0.1547	0.2534	-0.0001
199	0.1350	0.04	0.06	0.095	0.1550	108648661.22	108609317.21	100.00	98.10	0.1547	0.2534	-0.0001
200	0.1350	0.04	0.06	0.095	0.1550	115167580.89	115125876.25	100.00	98.10	0.1548	0.2533	-0.0001

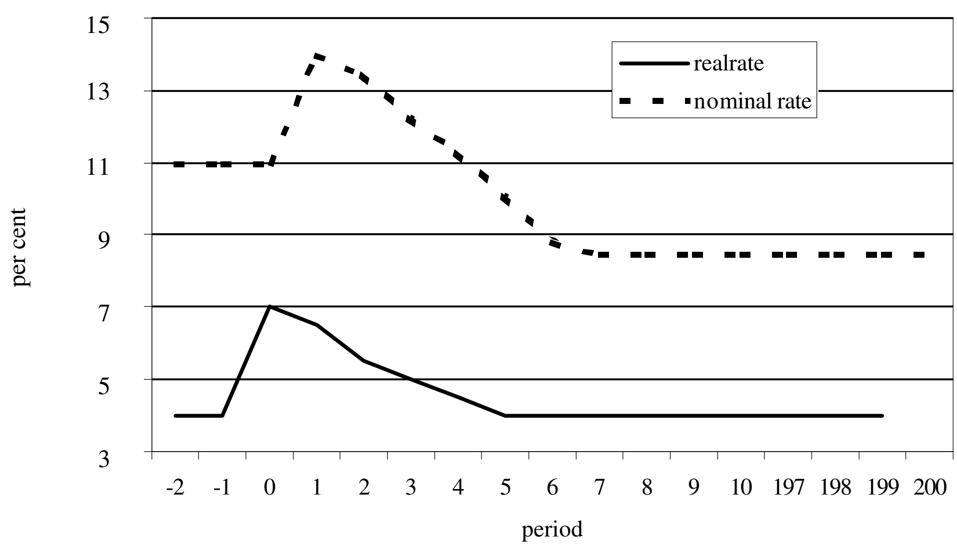
* The output ratio actually stabilises at 100.04 in period 8, but has been changed to 100.00, the correct theoretical value.

Chart I : Policy Simulation for Tight and Easy Money Policies

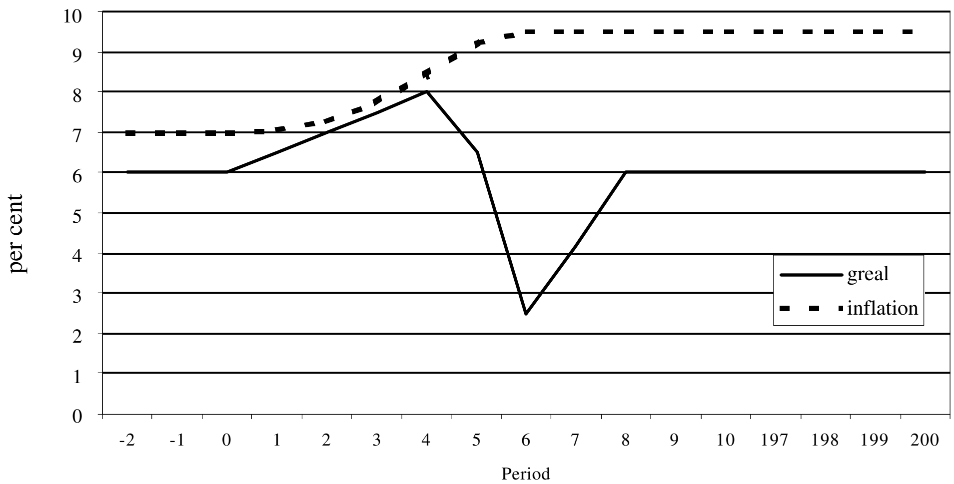
(a) Impact of an Easy Money Policy on Interest Rates



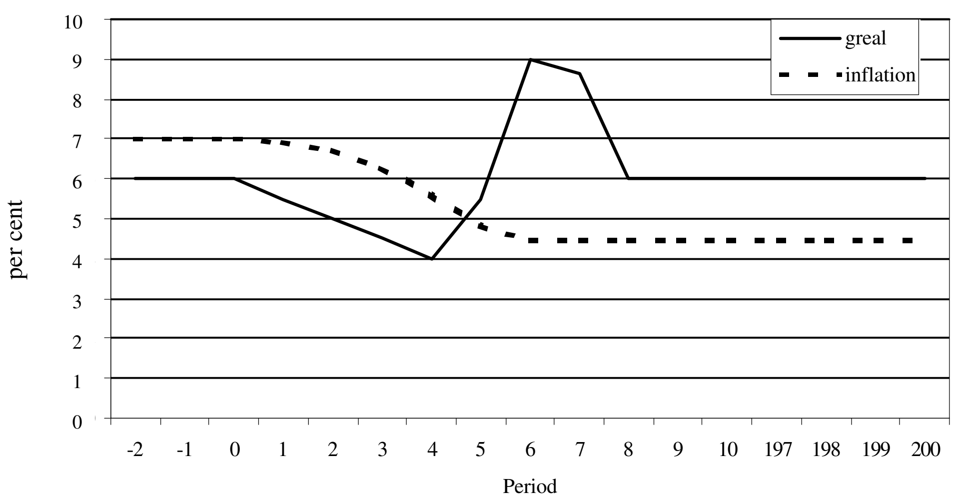
(b) Impact of a Tight Money Policy on Interest Rates



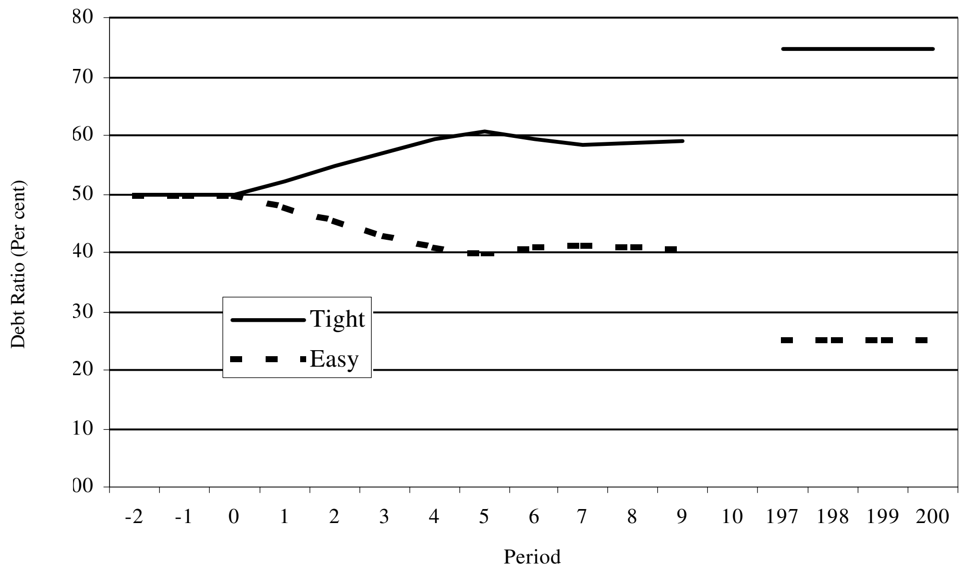
(c) Impact of an Easy Money Policy on Real Output Growth and Inflation Rate



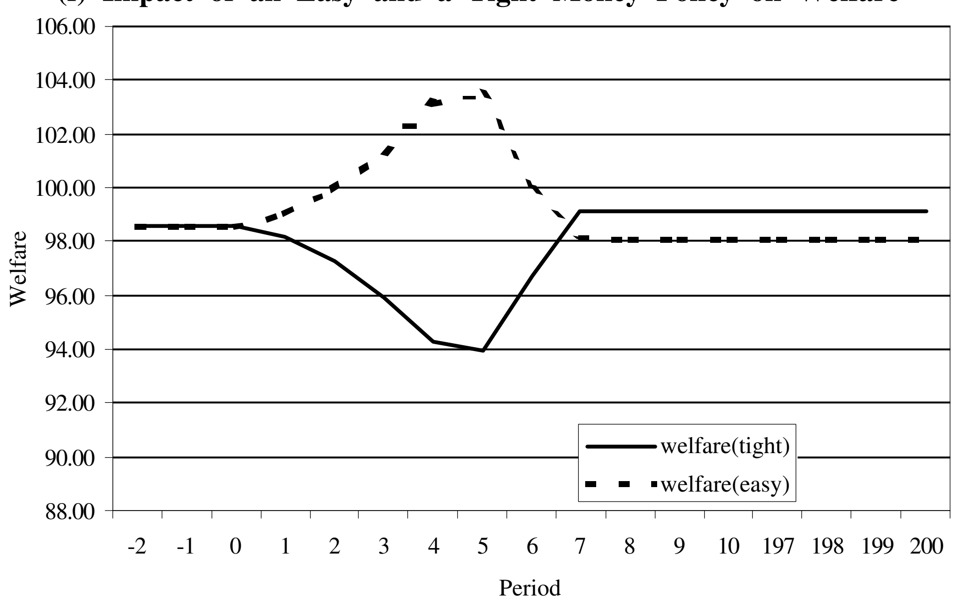
(d) Impact of a Tight Money Policy on Real Output Growth and Inflation Rate



(e) Impact of an Easy and a Tight Money Policy on Debt Ratio



(f) Impact of an Easy and a Tight Money Policy on Welfare



policy, welfare is higher in the long run due to lower inflation, with the same output growth.

For the easy money scenario, in which **sr** is raised from 1 per cent to 1.5 per cent, the outcome is just the **reverse** of the tight money scenario. The numerical values chosen are mostly symmetrical. As the nominal and real interest rate fall, output growth rises. The output **level** keeps rising above potential, even as the real interest rate returns to its equilibrium value. As rising inflation enters expectations, nominal rates rise above their initial level. In the undershooting period, GDP growth falls rapidly to enable actual output to come back to the potential level. In the long run, inflation is higher, the debt-GDP ratio is lower and welfare is lower since inflation has risen.

The charts I(a) to (f), accompanying the Tables listing values of all relevant variables for periods 1 through 10 and 197 to 200, provide a good picture of the relative impact of more bond versus money financing of the deficit (or tight versus easy money) respectively. The summary statistics of the numerical simulations are set out in Table I.2 which reports values of relevant variables in long run equilibrium for initial (starting), tight and easy money scenarios respectively.

The US experience during the early 1980s broadly fits the outcome in these simulations. Following an extremely tight monetary policy starting in late 1979, combined with a very loose fiscal policy starting in 1980, after a debt-trap period (1981 to 1983) nominal rates fell sharply and debt stabilized, contrary to the Sargent-Wallace predictions and policy prescriptions, although the correlation between money growth and inflation remained weak [Moorthy (1995a,b), Table I.3].

Table I.2 : Summary Table of Long Run Equilibrium Values

Primary Deficit (prdef) = 2.0%, Real Interest Rate (r) = 4%,
Real Growth Rate = 6%, Inflation = 7%, Seignorage ratio (sr) = 1%

	Initial	Tight Money Policy	Easy Money Policy
Inflation	7.0%	4.5%	9.5%
Nominal GDP Growth	13.0%	10.5%	15.5%
Nominal Interest Rate (R)	11.0%	8.5%	13.5%
Seignorage ratio (sr)	1.0%	0.5%	1.5%
Debt-GDP Ratio (d)	50.0%	75.0%	25.0%
Nominal Interest Payment/ GDP = R.d	5.5%	6.4%	3.4%
Real Interest Payment/ GDP = r.d	2.0%	3.0%	1.0%
Operational Deficit*	4.0%	5.0%	3.0%

* sum of Primary Deficit and Real Interest payments.

Sequence of Nominal Interest Rates Chosen by Central Bank

Period	Tight Money Policy	Easy Money Policy
0	11.00%	11.00%
1	14.00%	8.00%
2	13.43%	8.57%
3	12.22%	8.78%
4	11.30%	10.21%
5	10.10%	11.93%
6	10.10%	13.22%
7	8.48%	13.50%
8	8.48%	13.50%
9	8.48%	13.50%

Corresponding Sequence of Real Interest Rates

Period	Tight Money Policy	Easy Money Policy
0	4.00%	4.00%
1	7.00%	1.00%
2	6.50%	1.50%
3	5.50%	1.50%
4	5.00%	2.50%
5	4.50%	3.50%
6	4.00%	4.00%
7	4.00%	4.00%
8	4.00%	4.00%
9	4.00%	4.00%

Table I.3 : Interest Rates and Inflation: The U.S. Experience

(per cent)

	1980	1981	1982	1983	1987-89 Average
Ten Year Treasury Rate	11.46	13.91	13.00	11.10	8.56
Inflation (CPI)	12.5	8.90	3.80	3.80	4.50
Real Interest Rate	-1.00	5.00	0.20	7.30	4.10
Real GDP Growth	-0.50	1.80	2.20	3.90	3.20
Deficit/ GDP Ratio	2.80	2.70	4.10	6.30	3.20
Debt/ GDP Ratio	26.80	26.50	29.40	34.10	43.50

Source: **U.S. Economic Report of the President, 1991.**

I.5 Inflation Rate Determination in the AD-AS Approach

It is now necessary to clarify aspects of inflation rate determination in this AD-AS model, and point out the limitations of this model as well. When **sr** is reduced to 0.5 per cent under tight money, inflation stabilizes at 4.48 per cent. What determines the long-run inflation rate in the AD-AS approach? The coefficients of the Output Gap equation and the values of the real growth rates during adjustment that bring output back to its trend. Changes in these alter the long-term inflation rate. If, for instance, the coefficient α on the Output Gap variable in Equation I(8) doubles to .003 from .0015, then inflation settles at 1.95%, not at 4.48% for the tight money policy. Also, any change in the time path of output and thus Output Gap during the transition before it returns to equilibrium permanently affects inflation. Once output is at its trend level, inflation continues at its prevailing rate.

In this AD-AS model, the inflation rate displays path-dependence. There is no nominal anchor for the price level. Implicitly velocity is changing arbitrarily, and may be trending up or down without limit.[24] Is this realistic? For the **very long run** (say period 20 onwards), the ADAS approach to inflation is thus **inadequate.** However, for the **operational long run** (say periods 8 through 20), the ADAS approach is likely to be more relevant for determining inflation than the Quantity theory. (The operational long run can be defined as a time period over which the Fisher equation holds with the real interest rate constant at its long run value). This operational long run phase is **long enough** to ensure that the tight money policy lowers nominal interest rates, that the debt trap disappears and that the debt/ GDP ratio settles onto a convergent path, while **short enough** to allow for significant velocity variations.

It should be reemphasized that the ADAS approach to inflation used here has significant limitations as a very long-run theory of inflation. There is no evidence to suggest that the trend output growth rate or the short run trade off between growth and inflation (i.e. parameters of the Output Gap equation) are particularly stable in the long run, in comparison to income velocity measures. However, the AD-AS approach used in these simulations is mainly useful in illustrating that debt can stabilize under monetary tightening when velocity varies substantially, which is quite often the case.

I.6 Crowding-out versus Risk Premium Effects Under Bond Finance

For analytical convenience, the policy choices above correspond to changing the amount of seigniorage, for a given primary deficit. The more realistic dilemma that a central bank is typically confronted with is whether or not to accommodate a rising deficit. There is one slight difference in this case. The higher primary deficit and associated debt is likely to raise the equilibrium real interest rate, unless Ricardian equivalence holds. As long as the long-run rise in the real rate is small and the stability condition is still met, the operational policy choice is the same as earlier: monetary accomodation raises growth in the short run but lowers welfare in the long run, and vice versa if the rise in the deficit is not accomodated. Only numerical values of relevant variables will differ.[25] However, if the new higher real rate does not satisfy the stability condition, then monetary accomodation may be able to stabilize the debt, as explained earlier in Section I.1.2, provided it does not induce a further rise in the primary deficit.

When Ricardian equivalence holds, the debt does not affect interest rates since it has no impact on spending decisions. In the numerical simulations in Section 5, the real rate was taken as exogenous. It was assumed to be unaffected by the debt ratio and thus by the mode of debt financing. Under this assumption, it was shown that BF is unambiguously better in the long run. When

Ricardian equivalence does not hold, the larger debt stock, by raising perceived wealth, will raise consumption and thus the real interest rate, and more generally fiscal policy will have adverse crowding out effects. There are compelling reasons why Ricardian equivalence may not hold - the existence of income constraints and imperfect capital markets, to cite just two. The major proponent of the Ricardian view, Barro (1989) has also pointed out its limitations. Easterly and Schmidt-Hebbel (1991) provide robust cross-country evidence against Ricardian equivalence.[26]

Under non-Ricardian circumstances, the fundamental conclusion in sections 4 and 5 that BF is preferable needs to be reexamined. In their analysis, Rangarajan, Basu and Jadhav (1989) point out that although their model assumes that inflation and growth are not affected in the long run by bond finance, they state that the 'realistic scenario' under BF would be one in which the growth rate and inflation are adversely affected due to a higher real rate. Thus BF can reduce long-run welfare when compared to MF by reducing growth and lead to debt instability through a sufficiently large crowding out effect, reducing growth and raising the real rate.

I.6.1 The Opposing Inflation Risk Premium Effect

Even when Ricardian equivalence does not hold and crowding out effects are present, it does not follow that BF adversely influences the real rate and lowers welfare. There are other macroeconomic effects at work that need to be considered. Even if a higher debt burden leads, *ceteris paribus*, to a higher interest rate, the risk premium effect works in the opposite direction. The real interest rate has an inflation risk premium component. While credibility effects are not mechanical and are more likely to comprise of interest rate responses to discrete events, nevertheless one can postulate that the risk premium component is negatively related to actual inflation. Credibility is achieved by an actual decline in inflation. The (sovereign) interest rate can be conceptually thought of as:

Nominal rate = Real Risk-Free Rate + Expected Inflation + Inflation Risk Premium.

On government bonds, there is only inflation risk, no default risk.

The BF policy lowers inflation but raises the stock of debt. The net impact is ambiguous. If the risk premium effect is stronger than the wealth effect, then the real rate will fall and vice versa.[27] Not only will the debt stabilize, but real growth will increase. There is a wide array of broad evidence to suggest that this risk premium channel of influence is important. During the gold standard era, yields on long-term bonds were under 3 per cent for long periods, despite a build-up in debt during war years. During the 1950s in the USA, despite a debt ratio of over 100 per cent for some years, 10-year bond yields averaged 2.75 per cent. There is a burgeoning literature providing empirical evidence, by comparing the yield on inflation-indexed and regular bonds in the UK and elsewhere, about the inflation risk premium. This evidence is either cited or surveyed in Chitre *et al.* (1996). When the Bank of England was formally granted independence in May 1997, regular bond yields fell considerably. Further investigation of the inflation risk premium and credibility effects on interest rates would be useful in further analyzing the implications of the mode of debt financing. The inflation risk premium can be incorporated into debt models, by making it a function of inflation and thus of the mode of debt finance.

1.7 Impact of Bond Finance on the Primary Deficit

At a more fundamental level BF may have a beneficial effect of far greater importance than the favourable impact of lower inflation on the risk premium component of interest rates. By forcing the government to borrow and partially subjecting it to a hard budget constraint, **BF creates indirect pressure to reduce the primary deficit.** This effect cannot be incorporated into a debt model which has to assume a given primary deficit and then trace out the evolution of the secondary deficit (i.e. interest payments), as done above.

However, as a practical matter this effect is likely to be of enormous importance and worth investigating by conducting country studies of expenditure levels and spending patterns in response to changing monetary accomodation. Indeed, a fundamental flaw in Sargent-Wallace (1981) type recommendations to monetize the deficit is that they ignore the feedback effect of monetization on the primary deficit. The impact of reduced monetary accomodation during the 1990s on primary expenditures in India is analyzed in Section II.3 of Part II.

PART II

EMPIRICAL ANALYSIS OF DEBT STABILITY AND DEFICIT TRENDS IN INDIA

The theoretical analysis in Part I provided the analytical framework to evaluate the prospects for deficit control and debt stability in the Indian economy over the next few years. It is commonly argued that the present high level of the fiscal deficit and the associated debt burden represents a potential threat to economic growth and stability.[28] However, opinion is divided as to the appropriate policies. One view is that greater reliance on more market borrowing and bond finance (BF) since the onset of financial liberalization has led to an excessive debt burden, with interest payments now accounting for about three-fourths of the fiscal deficit and a third of revenue expenditures during 1990s. According to this view, less borrowing (or its equivalent: more monetization of the deficit) would have been preferable despite higher inflation, since it would have ensured a lower debt burden and **less** potential or actual debt instability.[29] The opposing view is that although more BF has pushed up real interest payments, this switch has been necessary to curb rising inflation, and that any resulting instability due to more BF has been temporary.

Evidence supporting this opposing view is provided here. Section II.1 examines the Domar debt-stability condition using relevant interest rates and concludes that Central government debt is stable at present, contrary to general views on, and recent studies of, this subject. This conclusion is very robust when using measures of the **net** interest rate, adjusting for interest receipts. Section II.2 discusses how the empirical evaluation of debt stability needs to be modified due to declining financial repression. Section II.3 provides evidence suggesting that more BF has helped curb primary expenditures and thus reduced the Centre's fiscal deficit and debt ratio, **despite** rising interest payments. It goes on to look at the combined Centre-State finances and tentatively concludes that the fiscal crisis of the States is not likely to have engendered total domestic debt stability. Section II.4 documents the decline in interest rates paid by private borrowers relative to rates on government debt since liberalization, a very noteworthy development and Section II.5 points to the enormous rise in private capital formation simultaneously taking place. Section II.6 summarizes the main results.

II.1 Basic Domar Condition Evidence

The Domar condition implies that the debt-GDP ratio is stable if growth exceeds the interest rate on government debt and vice versa. In applying the condition empirically, it is necessary to choose the most appropriate measure(s) of growth and interest rates. Debt stability is best evaluated only by comparing **nominal GDP growth with the nominal interest rate(s)** that correspond(s) most closely to the cost of financing Government debt, since actual interest payments, expenditures and revenues are made at current prices.

Often comparisons are made between real GDP growth and some estimated real interest rate. The Domar comparison in real terms should be eschewed since the results vary substantially with the inflation measure, i.e. the deflator that is used to compute real values.[30] If the deflator (price index) used to compute real GDP is also used to compute the real interest rate, the deflation is superfluous and cancels out; the comparison is effectively between nominal GNP growth and the nominal interest rate. However insofar as the CPI or WPI is used to compute the real interest rate, as is usually done, an independent real interest rate measure is obtained. With a big divergence between WPI and CPI inflation in recent years, the common practice of using the WPI as the deflator overstates the real interest rate and thus the prospects for debt stability. Since 1995-96, CPI inflation has averaged 9.9 per cent, while WPI inflation has averaged 6.5 per cent (Table 1). This difference is so large that when assessed in real terms, the WPI can indicate debt instability while the CPI can indicate debt stability. Conceptually, the CPI is best for computing the real interest rate, if needed, since it corresponds most closely to the bundle of goods consumed and so to the Fisherian adjustment of nominal rates to expected inflation that keeps the real return to saving, i.e. deferred consumption, constant. Nevertheless, the Domar comparison is analytically most meaningful and accurate when carried out in nominal terms.

Another empirical consideration in applying the Domar condition is whether interest payments should be adjusted for tax on interest income received by the government. If all interest income is taxed at the rate t, then the after-tax rate R(1-t) is relevant for stability. With a tax rate of say even 20-30 per cent, taxes paid on interest income can make a significant difference in ensuring stability. For India, it is empirically valid to ignore the tax rate since the bulk of interest income is not taxed. Most government debt is held by commercial banks, the bulk of whose interest income is tax exempt.[31]

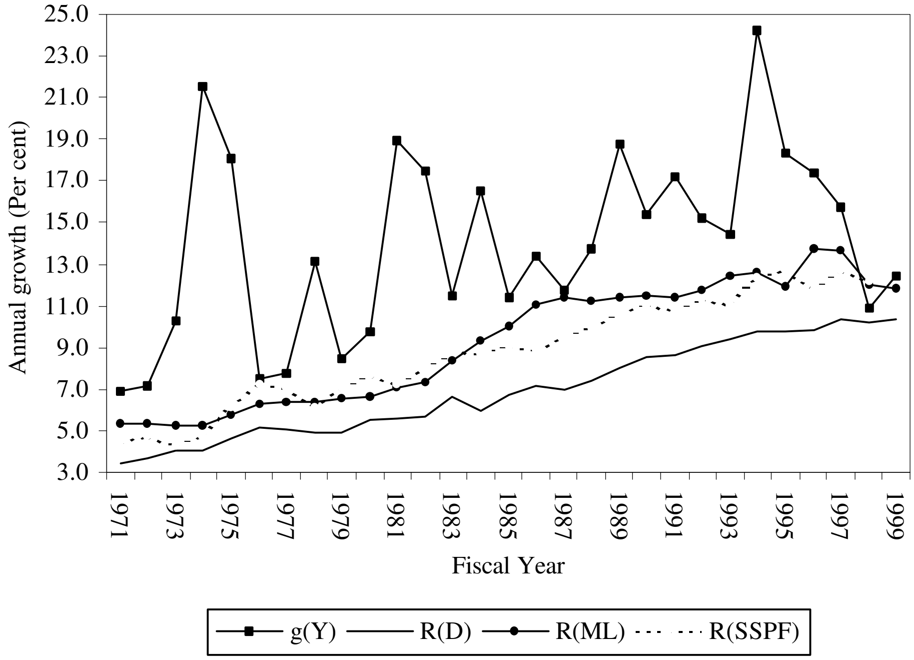
The basic Domar comparison is made between nominal GDP growth and different interest rates, using data from Table 1. The first column in Table 1, labelled g_Y is the **nominal growth rate of GDP** (at current market prices). Upto 1989-90 the old GDP (1980-81 base) series is used and from 1990 onwards, the new series (1993-94 base) is used. This change in base year barely affects the measured growth rates, as can be seen in Table 2 which lists, from 1990 onwards, both series and, just for comparison, two other measures: GDP at factor cost at current prices and national income, i.e. NNP at factor cost at current prices. The data in Table 2 indicate that no matter which of the four nominal income series is chosen, growth rates are roughly similar.[32] For empirical analysis, the debt ratio should also be computed using the same national accounts series that is used to measure growth.

The choice of interest rate for the Domar condition is not straightforward, more so for India. In the textbook exposition of the debt model, as in Part II, there is only one interest rate. Implicitly, all the debt is one period, and is fully rolled over every period at the current (market) interest rate. In reality, even in a well functioning financially open economy, debt is of varying maturity and is contracted at different rates.[33] Short and long rates on current debt differ, and the weighted average rate paid on new, currently issued debt differs from that on old, past debt. A careful analysis of the economic implications of different interest rate series is thus crucial to empirical Domar condition analysis.

Three major interest rate series that reflect the cost of financing Government debt are listed in Table 1. The first series is R(D), the **average interest rate** on total Central Government debt, obtained by dividing interest payments on all types of borrowing, by the previous year's debt stock. The second rate R(ML) is the **weighted interest rate on market loans**, a more 'forward looking' measure than R(D) since it comprises only of interest rates on current borrowings.[34] The third series is R(SSPF), the **average interest rate on Small Savings and Provident Fund liabilities**, computed like R(D). As argued in Part I, a straightforward examination of the Domar condition provides the best way to assess the prospects for debt stability. As can be seen from Table 1 or Chart II.1, R(D) has always been lower than nominal GDP growth, although the gap has narrowed considerably in the last three years. Thus for the average interest rate incurred on all Central government debt, stability has always held. The second series to consider is R(ML), the weighted (average) rate on current loans. The benefits and limitations of R(ML), generally considered a forward looking measure compared to R(D), as the appropriate measure of debt costs, will be discussed later. With the exception of **1997-98**, R(ML) has also always been **less than** nominal GDP growth. During 1997-98, **despite** falling sharply by 250 basis points that year, R(ML) crossed over g_Y **due to the decline in GDP**

growth, resulting from both a drop in agricultural output and the ongoing industrial recession. But that year was an aberration; GDP growth has revived during 1998-99, restoring debt stability with respect to R(ML). Clearly when the Domar condition is violated because of a large temporary drop in GDP growth **despite** a fall in interest rates, it does not imply debt is unsustainable.

Chart II.1: Nominal GDP Growth Rate and Nominal Interest Rate Crossover



The series R(ML) does not include bills with maturity under one year. Since short term yields are invariably lower than long term yields, the weighted current interest rate on all debt would be lower than R(ML). However, since these bills, which are issued mainly for cash management purposes form only a small part of debt, their impact on cost of debt is negligible.

However, the SS&PF component of debt has shown signs of instability. The R(SSPF) yield exceeded nominal GDP growth during 1997-98 by a big margin. As is well known, the stickiness of R(SSPF) in the face of other declining market rates reflects the guaranteed returns, unchanged since 1991 upto 1998, on PPF accounts and similar schemes, some of which have been paying more than 12%. If R(SSPF) rates had moved more in tandem with R(ML), the potential instability in this debt component would be lower. The cost of SSPF debt is actually far higher when tax deductions are taken into account, which has not been done for R(SSPF). While taxes on interest income are small enough to be ignored, this is not the case for tax deductions. Some estimates of the impact of these deductions and exemptions are provided in Mohanty and Raje (1999). Due to the widely availed 20% deduction for investments upto Rs. 60,000 in PPF and similar schemes, the effective cost to the government at a 33% tax rate for PPF deposits paying 12%, works out to be 18% for the first year. While this deduction does not continue in later years, the effective rate on SSPF deposits, as opposed to the average rate R(SSPF) computed here, could still be well higher than nominal income growth in current **and** future years. In short, it is not market borrowing, but the absence of market borrowing due to guaranteed SSPF rates, that has been responsible for the potential instability of this component of, and thereby, of total debt.

II.1.1 Market Responses to Lower PPF Rate

The immediate and subsequent response of yields on government securities to the 1 per cent reduction in the PPF rate, announced in January 2000, supports the view that these high administered yields are holding up the cost of Government debt.[35] As of late February 2000, government bonds of maturities up to ten years were trading below 11 per cent, typically around 100 basis points or more lower than before the PPF rate cut.

While the decision to reduce these **administered** rates is welcome, on a longer term basis, market indexation of the small savings schemes needs to be thought out carefully, bringing in needed flexibility without sacrificing some of the income stability that is the main feature of such schemes all over the world. Directly linking these yields to inflation could be problematic, given the large swings in, and divergence between, CPI and WPI inflation. A link to a composite, moving average of market rates on government debt and that of suitable commercial bank interest rates might be able to provide the right balance between stability and flexibility. [36]

II.1.2 Previous Studies of Debt Stability

Despite the growing burden of small savings schemes, the data examined above suggest that there is no overall debt instability. However, a recent detailed study by Rajaraman & Mukhopadhyay (1999), which examines the Domar condition for various interest rates, concludes that there is a debt trap. They point to the 'crossover' of R(D) and R(SSPF), above g_Y for 1997-98 and interpret the data as indicating that debt is unsustainable.[37]

The authors then focus on their preferred measure, **the redemption yield on Government securities, here labelled R(RY),** and investigate it in detail. This is a measure of the yield to maturity in the secondary market. The authors use a structural time series model to forecast a redemption yield of 16.5 per cent upto 2003. They state that "as a long-run forecast for redemption yields, it (i.e. 16.5 per cent) sets a useful floor for the nominal growth rate in terms of debt sustainability regimes. Unless nominal growth is at or above 16.5 per cent, net primary deficits (net of seigniorage and foreign borrowing) will not be consistent with debt stabili-zation" (Rajaraman & Mukhopadhayay, 1999).

Cutting the primary deficit to improve the fiscal situation, a recommendation of their study, is always desirable and most definitely so under current Indian conditions. This study unequivocally endorses this recommendation. Nevertheless, their basic conclusion – **at current levels** of the primary deficit and other variables (seigniorage, foreign borrowing and real growth) the **debt cannot stabilize** – is not backed up by the evidence. The policy ramifications of a correct empirical assessment of Domar stability in India presently are substantive. If, for some reason the primary deficit cannot be cut, policy makers may wrongly conclude from their analysis that a burst of seigniorage is now needed to stabilize the debt. Not only will the ensuing inflation reduce welfare, but increasing seigniorage now may induce a larger primary deficit with deleterious consequences, an empirical effect that will be analyzed later.

To begin with, as argued earlier, the crossover that occurred during 1997-98 due to the temporary drop in GDP growth, **despite** falling interest rates, should not be interpreted as indicating instability. Turning to the chosen interest rate measure of these authors, it is not clear that the redemption yield R(RY) is a better measure of current debt servicing costs than the weighted interest rate on current market loans, R(ML) used here. Their rationale for using R(RY) is that, since it is based on secondary market prices, it reflects market conditions better than the cost of borrowing in the primary market. It is certainly the case that the Indian primary market is affected by primary placement with and devolvement upon the RBI, and so a measure of current borrowing costs, such as R(ML) may understate the true current cost of borrowing. However, the secondary market is very thin and also distorted, partly because of the absence of a healthy primary market. So R(RY) is unlikely to be a better indicator of debt costs than R(ML). More crucially, their time series forecast, and judgmental assessment has not held up: the redemption yield R(RY) fell by over 200 basis points to 10.59 per cent during fiscal year 1997-98

(Table 1). Their conclusion that debt cannot be sustained unless nominal income grows by at least by 16.5 per cent (forecasted interest rate) is rather tenuous.[38]

Another study (Jha, 1999) concludes that the debt is not sustainable by showing that although Domar stability holds with respect to R(D), it generally does not hold with respect to the call money rate and the commercial bank lending rate. While the author is correct in emphasising that R(D) reflects low interest rate debt contracted earlier and not the current cost of servicing debt, it does not follow that the call money rate and the commercial bank lending rate should instead be used to assess stability. Since these private borrowing rates incorporate default risk, they are higher than the current rate on government debt, R(ML). Assessing stability using private borrowing rates overstates the scope for debt instability.

II.1.3 Domar Condition with Net Interest Rate

The empirical evidence of Domar stability has so far used different measures of the gross interest rate, in line with most previous analyses. For the gross interest rate, stability has generally held although by a small margin. However, since the Centre receives interest on its loans, the **most appropriate** measure of borrowing costs is the net interest rate. Interest receipts on loans made by the Centre to States (and other miscellaneous receipts) are substantial. For the fiscal year 1998-99, interest receipts comprised 40 per cent of gross receipts. Thus, the effective net interest rate on all Government debt for 1998-99 was 6.27 per cent, well below the gross interest rate of 10.45 per cent. The last column in Table 1 lists the net interest factor. Multiplying one minus this factor by relevant interest rates in Table 1 [R(D), R(ML) and R(SSPF)] yields corresponding net interest rates. Despite falling considerably over the last two decades, the net interest factor is still large. Thus one can unambiguously state that for the **net interest rate,** no matter which series is used, **debt stability has always held** and is **likely to hold** by a considerable margin, allowing for the possibility of significant drops in GDP growth and rises in interest rates.

II.2 The Domar Gap under Declining Financial Repression

The theoretical monetarist analysis in Part I and simulations imply that, under more BF, the nominal interest rate on government debt will decline in the long run to below its starting level, when the real rate returns to its long run equilibrium value. This has not been the case, as is evident from the data in Table 1. Although the 200 basis point rise in R(ML) during 1995-96 has reversed itself, by 1998-99 R(ML) had only fallen back almost to the starting (i.e. 1991-92) level of 11.78 per cent, but had not declined below it.

However, the failure of R(ML) to decline below its starting level in response to more BF does not necessarily imply that the monetarist analysis in Part I fails to explain the long run impact of BF on nominal interest rates in India, for two reasons. Firstly, the Fisher effect typically applies after a large and sustained decline in inflation. Insofar as this has not taken place, there is little reason to expect nominal rates to decline below their starting levels. The data on Table 1 suggest that the drop in inflation has been small. The CPI for the last five fiscal years averaged 9.90 per cent, a small drop from the previous six years average of 10.46 per cent from 1991-96 to 1996-97, although the WPI has shown a corresponding large decline to 6.50 per cent from an average of 10.64 per cent. Since the CPI is relevant for the Fisherian inflation adjustment, it is not surprising that R(ML) is close to its starting levels.

Secondly, and more crucially, the empirical assessment of debt stability needs to be modified to deal with (an economy characterized by) financial repression. When there is financial repression, it is necessary to examine the **spread** between R(ML) and R(D), the current and average interest rates on government debt respectively, and not **only** the current gap between R(ML) and g_Y as per the Domar stability condition (Section I.1).[39] A large spread between R(ML) and R(D), when the government borrows at concessional rates, indicates that the primary deficit may be unsustainable even when the Domar condition is currently satisfied for R(ML). This is because financial repression cannot be sustained indefinitely and, without primary fiscal adjustment, would culminate in higher R(ML). Ceteris paribus, for any given **Domar gap, [i.e. g_Y *minus* R(ML)],** a lower **spread,** [R(ML) *minus* R(D)], implies an improvement in the debt condition and vice versa.[40] A period of time when the Domar gap falls is an adverse development, when viewed in isolation. But if **simultaneously** the spread between R(ML) and R(D) has declined due to declining financial repression, the debt situation may have improved, since there will be less upward pressure on R(ML) in the future.

A numerical example may help clarify this point. Suppose in period t, nominal income growth g_Y is 15 per cent, R(ML) is 10 per cent and R(D) is 5 per cent. The 5 per cent spread between R(ML) and R(D) due to financial repression indicates that R(ML) is likely to **rise.** Thus the debt scenario is less comfortable than indicated by the big 5 per cent current Domar gap. As financial repression eases, suppose in period t+5, g_Y is still 15 per cent, R(ML) is 13 per cent and R(D) is also 13 per cent. The Domar gap has shrunk to 2 per cent. However, since R(ML) = R(D), a long run equilibrium situation, the expected future value of R(ML) is the same. Hence the smaller 2 per cent gap in period t + 5 may imply a more comfortable debt situation than the 5 per cent gap in period t.

The situation in India during the late 1990s to a large extent fits this last example. Although the Domar gap is currently much lower and is likely to continue to be so when compared to the

1980s, this lower gap does **not** imply that the debt situation is worse. When the first steps toward financial liberalization were undertaken in 1985 in accordance with the Chakravorty Committee recommendations, the spread between R(ML) and R(D) was about 400 basis points. This had declined to 270 basis points at the start of liberalization in 1991, and as of 1998-99, the spread was 150 basis points (Table 1). This gradual sustained decline in the spread is an indication, ceteris paribus, of an improved debt situation under BF even though R(ML) has not declined much since 1991. In effect the long-run stability that does result under BF is manifest in the Indian financial markets not so much in a lower current market rate, as in a **lower current spread.**

II.2.1 Implications of the Spread Under Financial Openness

When there is no financial repression and government debt is fully subscribed to by the public, the implications of the divergence between R(ML) and R(D) for Domar condition analysis need to be clarified. The long run equilibrium benchmark situation under openness is one where R(ML) on average equals R(D). The random walk and rational expectations approach applies in this situation and current R(ML) is the best predictor of future R(ML). In this case debt stability can be assessed using only the current period value of R(ML); there is no extra information about the debt situation to be gained by knowing R(D).

However, due to the transitional effects of monetary policy, there is a substantial and non-random divergence between R(ML) and R(D). When monetary policy is tightened, R(ML) rises relative to R(D) and vice versa, when it is eased. During the early transitional phase of tight money, when R(ML) rises relative to R(D), the current period Domar gap will overstate the debt burden, since R(ML) will fall as actual and expected inflation fall.[41] In general, other data are required to form a judgement as to whether the spread between R(ML) and R(D) represents financial repression or the temporary tight money phase of a financially open economy, with opposite implications for debt stability. The Indian economy is gradually moving to a situation where the spread will increasingly reflect the stance of monetary policy more than it does the extent of financial repression.

II.3 Impact of Bond Finance on the Primary Deficit

The evidence presented in Sections 2 and 3 above indicates that Domar stability has generally held, and that due to declining financial repression R(ML) is less likely to rise now, compared to earlier. It still can be argued that BF should be avoided due to the higher debt burden. As outlined in Part I, BF raises the real interest payments-GDP ratio and the debt-ratio, **for a given primary deficit**. The **tradeoff** is between a higher inflation rate under MF and the higher debt burden under BF, with many economists advocating the former.

However, as a guide to policy the above conclusion can be misleading because it treats the level of the primary deficit as exogenous, independent of the mode of financing. This may not be the case. The link between the primary deficit and the mode of financing needs to be first examined before policy recommendations can be made. In a given year, primary expenditures are decided at the outset as part of the budget process, and to some extent the monetized deficit is determined endogenously later in the year. However, over longer periods such as a decade, the monetized deficit should be treated as exogenous, its magnitude determined by the degree of autonomy and inflation policy of the central bank. Thus, over long periods, if the primary deficit and/ or primary expenditures are positively correlated with the monetized deficit, then prevailing academic analysis of the impact of bond versus money finance, which assumes the primary deficit constant, will be irrelevant. Insofar as BF leads to **lower** primary spending by imposing indirect indiscipline on the government, BF can reduce the total deficit and debt burden of the government. The extent to which such an adjustment mecha-nism has been operative in the Indian context is documented below.

Table 3 provides data on twelve different deficit and expenditure measures since 1970. Simple stylized facts are documented below. Comparing decennial averages reported at the bottom, during the 1980s the big rise in the fiscal deficit over the 1970s was partially monetized. The rise in primary expenditures went mainly to increase revenue expenditures, while capital expenditures increased only slightly. Conversely during the 1990s, despite the move to market borrowing, the fiscal deficit has reduced by almost a percentage point from the 1980s. The reduction in the primary deficit and primary expenditures has been greater than the rise in interest payments. Although the cut in primary expenditures has been mainly in capital expenditures, **primary revenue expenditure** has been cut as well by almost a percentage point, a noteworthy development. Comparing fiscal year 1998-99 with 1990-91, at the onset of the structural adjustment program, is instructive. The monetized deficit has fallen by about two percentage points (2.5 per cent to 0.7 per cent) and primary expenditures have fallen by about three percentage points (14.5 per cent to 11.4 per cent). Despite rising interest payments, the gross fiscal deficit has come down. However, during the last two fiscal years, there has been slippage in fiscal consolidation. The monetized deficit has risen and, simultaneously, there has been some reversal of primary expenditure reduction.

It should be pointed out here that the inverse link between BF and the primary deficit outlined here is based on what can be called a reaction-to-borrowing-pressure approach. This approach differs from that of prevailing analysis, which is based on the Keynes-Olivera-Tanzi (henceforth KOT) effect: the price elasticity of nominal expenditures is greater than that of nominal receipts, due to nominal rigidities in tax rates and collections. When inflation falls, expenditures, much of which is closely indexed to inflation, **fall more** than receipts. Evidence of the long-run beneficial impact of more bond finance via this channel of lower inflation is provided by Khundrakpam (1998) and Jadhav and Singh (1990), among others. But this KOT effect relies on nominal rigidities to obtain this inverse link, and it may not hold for very long periods. As documented by Schmidt-Hebbel (1991) the KOT effect is of small magnitude: the response of the primary deficit to a drop in inflation is about 0.1.

By contrast, under the borrowing pressure approach, even without a drop in inflation the primary deficit can fall, since the government is compelled by the difficulties of borrowing to cut its expenditures. Statistical causality tests also provide some evidence suggesting that reducing the monetized deficit reduces primary expenditures (Annexure II.A).

II.3.1 Indicators of Support for Government Borrowing

It should be emphasized that the monetized deficit is not a very accurate indicator of the extent of the RBI's support to the Government. The monetized deficit is a year end figure that may not be able to fully reflect intra-year variations in monetization that may have a permanent economic impact. It is a hybrid measure that combines both primary support (Ways and Means Advances, primary placements, etc) and secondary market activity (changes in Reserve Money due to open market operations). Further, for any given monetized deficit, variations in Net Foreign Exchange Assets would ease or strengthen the pressure on the government's market borrowing program. Hence tests of the links between the monetized deficit and primary expenditures may not be very informative.

More concrete measures of borrowing support are the magnitude of Ways and Means Advances, to Centre and States respectively, the absolute or proportional amounts of primary placements with and devolvements upon the RBI, changes in coupon rates over succeeding auctions, the ratio of competitive to non-competitive bids in the debt auctions etc. How exactly these measures would affect the budgetary process and expenditure decisions of the Government needs to conceptualised, operationally formulated and then empirically tested. To more accurately test the hypothesis advanced here - that the government reduces its primary expenditure when it faces borrowing pressure - would be an extremely useful avenue for further research.

II.3.2 Economic Implications of Revenue Deficit

Much of the analysis of the fiscal deficit divides expenditures into two categories: 'unproductive' revenue expenditure (sum of primary revenue expenditure and interest payments) versus productive capital expenditure. Typically it is stated that revenue receipts and/ or government borrowing the fiscal deficit should be used to finance capital expenditure instead of being wasted on revenue expenditure, considered to be current consumption e.g. Joshi (2000). It is somehow presumed that reducing market borrowing will reduce interest payments and thus enable the revenue expenditure, treated as exogenous, to be spent more usefully.

This line of reasoning is not valid. First, as the model in Part II demonstrates, reduced market borrowing reduces interest rates and payments only in the short run. More crucially, leaving aside the productivity of capital expenditure for now, the view that revenue expenditure is all current consumption can be questioned.[42] At present, the revenue deficit is due to large interest payments, essentially a **transfer.** It can be used for private capital formation (such as housing) by individuals and for lending for capital formation by financial institutions. *A priori* it cannot be ascertained that interest payments fully finance current consumption. Finally, the ratios of interest payments to revenue receipts and revenue expenditures respectively are not good measures of the debt burden. These ratios are bound to rise when the size of the government shrinks as part of the liberalization process. The rise in the ratio of interest payments to revenue receipts does not by itself imply a worsening debt situation, although there is a **harder** cash flow constraint to be met. The ratio of interest payments to GDP is a more appropriate measure of the debt burden. Since this ratio has been fairly constant in recent years (between 4-5 per cent of GDP in nominal terms, with a small increase in real terms due to lower inflation, Table 3), the debt burden is not worsening in a major way. Analysis should focus on the primary deficit, fiscal deficit and debt ratio, and the ratios of other fiscal variables to GDP, not to each other.

II.3.3 Impact of Bond Finance on Debt Ratio

From the Domar formula it can be seen that if the reduction in primary deficit is greater than the reduction in seigniorage i.e. if numerator **prdef – sr** declines, then despite a possible rise in R due to more BF, the debt ratio can decline. Data for various debt ratios from 1970 onwards, listed in Table 4, provides evidence for such a tendency. Yearly changes in the ratio are not likely to be reflective of underlying fiscal changes, due to possible large variations in GDP growth. But over longer periods, systematic trends should be discernible. Comparing 1998-99 with 1990-91, the Centre's debt ratio has come down by almost 7 percentage points. All other debt ratios have also declined over the decade. This is a noteworthy fact and contrary to the general presumption that continuing with bond finance is making India's debt level unsustainable. In terms of the Domar formula, the numerator (prdef – sr) has fallen so much that, despite the fall in the denominator (g_Y – R), as financial repression has eased, the debt ratio has fallen.

II.3.4 Implications of Shift in Centre-State Finances

An alternative view is that the apparent improvement in the primary deficit and debt ratio is merely a result of the shift in the debt burden from the Centre to the States, which are subject to a growing fiscal crisis, judged by a variety of indicators. To assess whether the shift in expenditures and borrowing from Centre to States has led to an unmanageable crisis requires an examina-tion of trends in, and comparison of interest rates, primary deficits and debt ratios for the Centre, States and the aggregate (Centre plus State).

Turning to the primary deficit, the rising primary and fiscal deficits of the State governments could be a major factor undermining the stability that currently prevails. However, the **combined Centre-State fiscal deficit has declined** since the financial liberalization program in 1990-91 and, despite the rise in the States deficit over the last few years, it is lower than at the outset of liberalization, as can be seen in Table 5. Thus the move to more market borrowing has not led to a secular rise in the combined deficit. Given total domestic debt, this **shift** in the composition of the debt burden to the States from the Centre can and should be viewed as a favourable development and not an unfavourable one. Since State governments cannot monetize their deficits at all, unlike the Centre which has some scope to do so, a reduction in their primary expenditures is bound to occur sooner than for the Centre, thus restoring debt stability. Similarly, turning to the debt ratios in Table 6, it can be seen that the combined Centre-State domestic debt ratio (after netting out relevant liabilities) **has fallen** slightly since 1990-91.

II.3.5 Unfunded Liabilities of Central and State Governments

This study has concluded, by analysing trends in growth, interest rates and fiscal variables, that the debt is stable. However, debt stability does not imply that the overall fiscal situation is sound. The unfunded liabilities of the Central and State governments, arising from employee pensions and other partially funded insurance and pension obligations are likely to be large. At present, estimates of the magnitude of such liabilities and the timing of future cash outflows from the budget on account of them, are not available. Computing accurate estimates will be difficult for a variety of reasons. First and foremost, the cash outflows from defined pension benefit schemes are always hard to estimate because of uncertain life expectancy. Further, precise information in India on the age structure of the employees covered by the various schemes, needed to identify retirement ages and to compute estimate of pension payments based upon assumed life expectancies, is also not available. Finally, a fundamental difficulty is that the government's matching contributions to pensions and similar social welfare schemes are not properly reflected in the budgetary accounts.

The contingent liabilities due to loan guarantees, foreign exchange risk guarantees etc., are also substantial. The Central Government extends guarantees for loans raised by government companies or corporations, Railways, Union Territories, local bodies, cooperative institutions etc. The State governments also provide guarantees for borrowings raised by statutory corporations and boards, government companies, joint-stock companies, state co-operative banks and societies, municipal bodies, other institutions and private parties. At present, the outstanding value of guarantees provided by both Central and State governments are estimated at around 9 per cent of GDP (RBI Annual Report 1998-99). These non-market liabilities which, by their very nature, cannot be introduced into Domar condition analysis, may pose serious challenges to fiscal stability.

II.4 Private versus Government Borrowing Costs

The most important consequence of financial repression is the spread between private and government borrowing costs. The impact of BF on private borrowing costs due to the reduction in financial repression needs to be looked at in order to assess its overall economic impact. The argument that BF crowds out private investment by raising interest rates fails to distinguish between the rate on government debt and private borrowing costs. A financially repressed regime, with the central bank typically supporting the government's borrowing programme will tend to have a large spread between the rate on government debt and private sector borrowing costs. Financial liberalization, at a given inflation rate, will typically result in a rise in rates on government debt, coupled with a **decline in the spread** between government and private borrowing costs.[43] When the government preempts a large share of funds at concessional rates by statutory requirements and similar means, the market for available private funds clears at rates that entail a high spread between government bond yields and private sector borrowing. Thus with financial liberalization, the spread and thereby private borrowing rates can come down, despite a rise in government yields.

Evidence of such a development is documented in Table 6, by comparing R(ML) with two interest rate measures of private sector borrowing costs - the overnight call money rate and R(CB), the **weighted average of the commercial banks lending rate**. While these rates were subject to, and in some ways still are, direct or indirect regulation, their high levels reflect the consequences of financial market repression. In 1984-85, just before the Chakravorty Committee recommendations were made, the weighted average lending rate of the commercial banks, R(CB) was 15 per cent, with a 500 basis points spread over R(ML). At the onset of liberalization, approximately the same spread prevailed. However, by 1997-98, this spread had come down to under 300 basis points, with a decline in R(CB) to 14-15.5 per cent. The call rate, which was controlled until April 1989, was about 400 basis points higher than R(ML) during 1990-91, but has since declined to well below the level of R(ML). While R(CB) and the call rate may not closely correspond with the overall cost of private debt, let alone with the cost of private capital (debt plus equity), it is likely that overall private borrowing costs have fallen after liberalization. The spread between PLR_{IDBI} (prime lending rate of IDBI) and R(ML) has also declined considerably.[44] It is quite noteworthy that not just the spread, but all private sector interest rates have **declined** since the onset of liberalisation (Table 6).

II.5 Impact of Cutting Primary Deficit on Total Investment

The evidence indicates that the move to market borrowing has managed to reduce the primary deficit by more than the ensuing rise in interest payments, thereby contributing to overall deficit reduction. It is often argued that such a policy is nonetheless still undesirable because the expenditure reduction falls mainly on capital expenditures, thus adversely affecting growth.[45]

However, the impact on market borrowing on total capital formation - public and private - should be the criterion. The columns of Table 7 list the ratios of public and private capital formation to GDP. The drop in public capital formation (1.9 percentage points) has been offset by a greater rise in private capital formation (3.8 percentage points) during the 1990s, indicative of a (reverse) crowding out effect, and not the crowding-in effect that is often emphasized. Total capital formation as a percentage of GDP has risen by 1.9 percentage points during the 1990s. The indices of capital formation may be more informative in some respects, since the absolute amount of investment and not the ratios to GDP determine the potential output of a country. The evidence in Table 8 points to an enormous surge in private capital formation since

1990-91. The capital stock of the private corporate sector is almost seven times higher than it was during 1989-90. Private investment is substituting for public investment. Since private investment is generally more efficient than public investment, the overall impact on growth is likely to be positive.[46]

Although some infrastructure component of public capital expenditure may not be substitutable by private activity, the decline in **total** public capital expenditure due to more market borrowing, as a first approximation, does not seem to have had overall adverse economic consequences. Thus the appropriate policy is not to monetize the prevailing level of capital expenditures, but to direct the lower level of capital expenditures solely towards infrastructure projects if warranted and to maintain the pressure to reduce the primary deficit by continuing to reduce the monetized deficit.

At another level, the view that public spending on and/ or publicly provided infrastructure is needed to boost growth can be questioned. Noted economists, such as Bauer (1973) have used the nineteenth century experience to argue that under well-defined private property rights, the private sector is quite capable of building infrastructure and even some public goods. As Ronald Coase pointed out, private ship-owners even built lighthouses, the proverbial public good. The role of the government is to provide **legal infrastructure** by spending on police and on the judicial/ legal system to ensure enforcement of contracts, payment of dues, and to prevent theft or evasion of payment for electricity, privately financed tollways etc. When and where the State has provided legal infrastructure, the private sector has usually provided much of the required physical infrastructure.

II.6 Conclusion

The major conclusions of the empirical part of this study can be summarized as follows: First, relevant interest rate data indicate no evidence of a systematic shift to an unstable debt regime during the 1990s. The component of debt that displays potential instability is that of SS&PF liabilities, because the administered rate has not been allowed to decline in tandem with other market interest rates. Second, the reduction in monetization has helped curb the fiscal deficit by inducing a fall in primary expenditures larger than the rise in interest payments. Third, the decline in private sector interest rates due to the move to market borrowing indicates that overall costs of private borrowing are likely to have declined. Simultaneously, there has been a surge in private investment relative to public investment. In short, the move to market borrowings or bond finance, has been beneficial. Nevertheless, Central and State Government finances are in a precarious condition due to large non-market debt, unfunded liabilities and contingent liabilities.

Annexure II.A

Causality Between Monetised Deficit and Primary Revenue Expenditure

Using annual data on primary revenue expenditure and the monetised deficits ratios to gross domestic product, we tested for Granger causality between the two variables in a bi-variate vector autoregression (VAR) framework. The ADF unit Root test indicated that the monetised deficit ratio is stationary series where as the primary expenditure raio is stationary after being passed through a first order autoregressive filter. For a one lag VAR model, the null hypothesis that the monetised deficit does not Granger cause primary expenditure can be rejected at the 1 per cent significance level. Similarly, null hypothesis that primary expenditure does not Granger cause monetised deficit. can be rejected at the 5 per cent significance level (see χ^2 statistics and associated significance levels).

Granger's Causal Analysis

X causes Y	χ^2	Inference
Primary Revenue Expenditure does not cause Monetised Deficit	4.77 (0.029)	There is bi-directional causality between the two indicators.
Monetised Deficit does not cause Primary Revenue Expenditure	7.89 (0.005)	

Looking at generalised forecast error variance resulting from the VAR model, it appears that monetised deficit has relatively stronger impact on primary expenditure than vice versa. The monetised deficit can explain about 20-30 per cent of variation in primary expenditure over a horizon of 1 to 12 years whereas primary expenditure can explain only about 7-14 per cent of the variation in the monetised deficit during the same horizon.

Accounting for Sources of Generalised Forecast Error Variance in the VAR Model*				
Horizons (years)	**Primary Revenue Expenditure (PREVEXPR)**		**Monetised Deficit (MDEFR)**	
	PREVEXPR	MDEFR	PREVEXPR	MDEFR
1	0.88	0.21	0.07	0.97
2	0.85	0.26	0.10	0.95
3	0.84	0.28	0.11	0.94
4	0.83	0.29	0.12	0.93
5	0.82	0.30	0.13	0.92
6	0.82	0.31	0.13	0.92
7	0.82	0.31	0.13	0.92
8	0.82	0.31	0.13	0.92
9	0.82	0.31	0.14	0.92
10	0.82	0.31	0.14	0.92
11	0.82	0.31	0.14	0.92
12	0.82	0.31	0.14	0.92

* Unlike orthogonal decomposition, the sum of the sources will not be equal to 100%.

Notes

1. In practice, the choice between BF and MF is not necessarily between two extremes, but between **varying** degrees of BF and MF respectively. The terms are used here and should be understood in this latter sense.

2. The analysis here builds upon that of Moorthy (1998), who critiques the Solow-Blinder and Sargent-Wallace advocacy of BF and also compares the steady state outcomes under BF and MF assuming stable velocity, i.e. a Quantity Theory approach. By contrast, this analysis derives values of relevant macro variables during the transition and allows the velocity of money to vary arbitrarily throughout.

3. The term potential output is alternatively called natural, sustainable, or the full-employment level of output. For convenience only the term potential will be used here.

4. Much macroeconomic analysis pays great attention to determining *per se* the outcomes for the current account deficit and nominal and real exchange rates. But the impact of these variables on macroeconomic welfare *via* their impact on inflation and output growth is seldom analyzed. Unless such analysis is carried out, the current account deficit and exchange rates are just accounting variables whose economic impact cannot be ascertained.

5. The amount of external borrowing to finance the fiscal deficit and the external public debt have been a small proportion of the fiscal deficit and domestic debt respectively during this decade, and can be ignored.

6. The total money stock equals the money multiplier times the stock of high-powered money. Since total money stock does **not** enter into the analysis here, for brevity and for convenience, high-powered money is referred to as money. However, the symbol H has been chosen to indicate that it is high-powered money (also called reserve money or the monetary base). Seigniorage here is only from high-powered money.

7. While all other variables are for period t, money and debt stocks are for period t -1, but can be approximated by period t values. This approximation is similar to using the approximation $(1 + g)/(1 + R) = 1 + g - R$ that is used to derive the Domar condition as the solution of a first order difference equation. Alternatively equation (2) can be derived using a continuous time formulation.

8. Implicitly, all debt is one period in the basic Domar formula, or the same interest rate prevails for debt of all maturities. The complications due to varying interest rates will be discussed later. Capital gains and losses on outstanding bonds are ignored in calculating the impact of changing R on D/Y in the formula.

9. With external finance (EF) also, the formula becomes:
$d^* = (prdef - sr - ef)/[g_Y - R]$, where $ef = \Delta EF/Y$.

10. Different concepts of stability, sustainability, solvency are outlined or discussed in Spaventa (1987), Blanchard (1980), Buiter (1990).

11. The logic is as follows: in full equilibrium, the marginal product of capital equals the long run interest rate, ignoring taxes and depreciation. If the growth rate exceeds the marginal product of capital, society has sacrificed too much and over accumulated capital. In such a situation, the return on capital is an amount of future consumption that is less than the amount that can be had by just allowing for ongoing growth, and the current generation of consumers can gain (and no other generation of consumers can lose) by consuming some of the nation's capital stock. This is explained in Scarth (1998).

12. "We assume in what follows that while the interest rate can be below the growth rate for extended periods of time, the Indian economy is not dynamically inefficient, and that there are no free lunches to be had by increasing the public debt." (Buiter and Patel, p. 108) Buiter and Patel also make an insightful distinction between solvency and strict solvency. Solvency by itself does not preclude the debt-ratio from rising explosively, which is unsustainable. Strict solvency would also require that the debt-ratio is stationary, or that it does not have a stochastic or deterministic trend.

13. Abel, Mankiw and Summers and Zeckhauser (1987) test for dynamic efficiency and claim that it holds since the value of profits exceeds the value of investment for many countries for many periods. Darby (1984) points out to evidence for the USA that the long run growth rate has averaged 3 per cent while the long run real interest rate has averaged 2 per cent. Therefore the stylized facts are in consonance with both dynamic efficiency and debt stability.

14. The monetarist paradox can be stated more precisely as: higher money growth, or an easy money policy, leads to higher (nominal) interest rates in the long run.

15. The term deficit here simply refers to the gap between government revenue and expenditure, whether or not that is financed by borrowing (issuing bonds) or printing money.

16. For India Rangarajan (1988) and Rangarajan and Arif (1990) use an econometric model to conclude that money demand is stable over five-year periods. This conclusion requires more careful scrutiny with 1990s data. For the USA, as Benjamin Friedman (1988) has pointed out, a well specified money demand function has been extremely unstable even over five-year periods.

17. The ADAS approach to inflation does not necessarily imply that the central bank bases its policy on an estimated natural rate of unemployment and/or potential GDP growth rate. While the central bank may have prior beliefs as to what the

supply constraints in the economy are, and sometimes act preemptively based on these beliefs, it can also adjust its policy reactively in response to actual inflation data. If inflation tends to rise, this indicates that the Output Gap is positive and vice versa. However, a numerical exposition of debt dynamics using an ADAS approach entails specifying in advance the potential GDP growth rate. For a discussion of direct inflation targeting in the Indian context see Kannan (1999).

18. Another fruitful way to distinguish between these two views is to label (what has been defined as monetarism) the first three tenets as 'the weak form of monetarism' while the Quantity Theory can be called 'the strong form of monetarism'.

19. This can be seen by expressing the seigniorage ratio as follows:
sr = ΔHt/ Yt = (ΔHt/ Ht)*Ht/ Yt, which can be approximated by sr = g_H/ Income Velocity. When velocity varies arbitrarily, the correspondence does not hold: a fall in **sr** need not necessarily correspond to lower money growth.

20. The central bank can alternatively choose some monetary aggregate as its target, a practice that has been abandoned due to its poor performance.

21. Strictly speaking, welfare should be related not to the Output ratio, but to the Output gap, which is zero when y = y*. For simplicity, the output ratio is chosen. There should be another term to capture the standard of living e.g., output per capita. Comparing two economies growing at trend (Output ratio = 100) and with the same inflation, the country with a higher per capita income should have a higher welfare. This term is also ignored here for analytical convenience.

22. In addition, inflation has shoe-leather costs, if the amount of real balances held falls with a rise in the inflation rate and thus the nominal interest rate. Even when money demand is interest-inelastic, or agents hold mostly interest-bearing inside-money deposits, inflation substantially reduces welfare due to transactions costs.

23. The initial values for inflation, GDP growth, primary deficit and other variables have been chosen to roughly correspond to current values. However, it must be stressed that this is only an illustrative, theoretical simulation. For acutal estimates of the Output Gap equation for India, see Vasudevan, Bhoi and Dhal (1999).

24. To compute velocity, the starting value of money stock needs to be specified. Then from the values of the **sr** and nominal income, velocity for different periods can be computed.

25. For instance, if the primary deficit rose to 3 per cent of GDP and raised the real interest rate to 4.5 per cent, then if **sr** was unchanged at 1 per cent, given other parameter values, the debt would stabilize at 133.3 per cent.

26. For India, Charan Singh (1999) recently provides strong evidence against Ricardian equivalence.

27. A numerical example can elucidate this point. Suppose a 10 percentage point rise in the debt ratio raises the real rate by 2 basis points while a 1 percentage point drop in inflation lowers it by 5 basis points. Starting from the base case, under the tight money policy, debt goes up by 50 percentage points and inflation falls by 2.86 percentage points. Thus, Δ real rate = .2(50) + 5(-2.86) = -4.3 basis points.

28. Such agreement is not universal, though. From a Ricardian viewpoint, neither the deficit nor the debt matter. This analysis eschews the Ricardian view and concurs with the more general view that a lower deficit and debt are desirable, at any **given level** of primary spending.

29. Proponents of this view are Venkitaramanan (1995a,b, 2000), Chandrasekhar (2000), among others. In recent years, the Economic Survey and other official publications have repeatedly voiced concerns about the fiscal deficit and the growing burden of interest payments. However, no clear position is taken as to whether it would be desirable, at a **given** level of primary deficit, to increase monetization **or** instead tolerate a higher debt burden and higher interest payments. Typically, fiscal stringency is strongly advocated, while simultaneously the RBI's role in helping the Government put through its borrowing program is lauded. (Cf. Annual Report 1998-99, Sec. 1.2, 1.9, 3.1) Such **ambivalence** damages the clear formulation and implementation of monetary policy in the face of a large deficit.

30. However, the interest burden (the ratio of interest payments to GDP) should be computed in **real** terms to remove that component of interest payments which is compensation for erosion of principal (Cf. Part I). Estimates of measures of the real interest burden for India are presented in Khundrapakam (1996).

31. For 1998-99, the breakdown of the holding of government dated securities is as follows : 63 per cent Commercial banks, 18.7 per cent LIC, 2.8 per cent RBI and 15.5 per cent others which includes retail investors. Out of the Rs. 223375 crore of Government Securities held by commercial banks, Rs. 178505 crore was held to meet SLR requirements and thus tax exempt (this amount is calculated as 25 per cent of NDTL for that year which was Rs. 714020 crore for that year). The taxable portion is thus about Rs. 45,000 crore. With an interest rate of 10 per cent and a tax rate of 25 per cent the tax paid on this interest income would have been Rs. 900 crore. Regarding bonds held by the public, due to both tax evasion and tax exemption upto Rs. 12,000 on interest income, the amount of tax paid on interest is also small.

32. The cumulative increase between 1990-91 to 1995-96 for the four income series in Table 2 from left to right are: 141.5%, 140.51%, 142% and 138.4%. The compound annual growth rates over this period for the old and new GDP series are respectively 15.87% and 15.56%, a difference that is small enough to ignore.

33. A well functioning financially deregulated economy does not refer here to external financial sector openness but to the absence of domestic financial repression that leads to preferential government access to credit and to the lack of an active

secondary market for government debt that equalizes prices for similar new and old issues.

34. The implications of the difference between R(D) and R(ML) under conditions of both financial openness and financial repression respectively will be discussed later.

35. Rates were reduced effective January 1999 for most of the Small Saving schemes [for details, cf. Report on Currency & Finance, 1997-98, Pg. 228. However, the 1999 reductions were small, a maximum of 1 per cent, the same as the reduction for PPF rates in 2000. However, since R(SSPF) is the average rate and all SSPF deposits made between 1991-1998 pay over 12%, R(SSPF) will decline by much less than 1 per cent for 1999-2001.

36. An early recommendation in a 1997 conference along these lines was made by the former Finance Secretary "interest rate deregulation requires that interest rates on postal savings be made more flexible, perhaps by linking them to interest rates in the banking system in some way." [Ahluwalia (1999)]

37. The actual average interest rates R(D) and R(SSPF) Rajaraman and Mukhopadhayay (1999) have labelled implicit interest rates. They state that both R (D) and R (SSPF) crossed over g_Y in 1997-98 but the data presented in Table 1 indicate that this occurred only for R(SSPF).

38. "Even without the formal forecasting exercise, it is clear that interest rates will not be forecast to fall, given their steady rise over time (p.69)"

39. It is also necessary to look at the spread between private borrowing rates and R(ML) in assessing the total economic consequences of the debt, but this comparison is dealt with later sections.

40. In this Section II.2, the Domar gap is defined with respect to R (ML) but it can be measured for any rate.

41. This is contrary to the situation under financial repression, under which a large spread between R (ML) and R (D) implies that the Domar gap understates the debt burden. Financial repression can be thought of as analogous to the easy money, Keynesian liquidity phase of a financially open economy.

42. The accounting categories of capital versus primary revenue expenditure may not correspond to their economic impact. Some of the expenditure on social services can be considered as investment in human capital. Conversely, some of the capital expenditure is wages and does not go to creating capital assets.

43. Financial liberalization often entails policies that change in the inflation rate and thus levels of nominal interest rates. But *ceteris paribus* liberalization should lead to a higher government rate and a lower private rate.

44. The difference between banks actual investment in approved government securities and the SLR, reported in the last two columns in Table 6, is one indicator of declining financial repression.

45. Along these lines, in the simulation model of Rangarajan and Mohanty (1997), monetization of capital expenditures augments capital stock and raises GDP growth in the long run, at the cost of higher inflation.

46. Khan and Reinhart (1990) have found that private investment has been more closely related to growth than public investment in developing countries. The cross-country study by Greene and Villaneuva (1991) finds that there is no obvious correlation between high rates of private and public investment. This finding should not be surprising. When public investment is financed by financial repression this reduces private investment which would tend to offset any complementarity between public and private investment that may otherwise exist.

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Table 1 : Macroeconomic Variables for Assessing Debt Stability

(Per cent)

Year	g(Y)	R(D)	R(ML)	R(SSPF)	R(RY)	$Infl_{WPI}$	$Infl_{CPI}$	Net Interest Factor
1970-71	6.87	3.42	5.37	4.48	..	5.5	4.5	0.95
1971-72	7.17	3.70	5.30	4.76	..	5.6	3.2	0.89
1972-73	10.26	4.00	5.26	4.28	..	10.0	7.8	0.92
1973-74	21.57	4.01	5.26	4.71	5.18	20.2	20.8	0.83
1974-75	18.11	4.64	5.75	6.09	5.79	25.2	26.8	0.78
1975-76	7.55	5.15	6.25	7.26	..	-1.1	-1.3	0.76
1976-77	7.79	5.05	6.38	7.10	5.73	2.1	-3.8	0.80
1977-78	13.16	4.94	6.36	6.12	5.82	5.2	7.6	0.95
1978-79	8.46	4.90	6.52	7.08	5.84	0.0	2.2	0.78
1979-80	9.76	5.53	6.64	7.64	5.87	17.1	8.8	0.62
1980-81	18.94	5.57	7.03	7.22	6.36	17.7	11.4	0.69
1981-82	17.46	5.69	7.29	7.91	6.76	9.8	12.5	0.69
1982-83	11.50	6.64	8.36	8.78	7.34	4.9	7.8	0.72
1983-84	16.54	5.96	9.29	8.71	7.72	7.5	12.6	0.56
1984-85	11.44	6.69	9.98	9.02	8.50	6.5	6.3	0.66
1985-86	13.36	7.16	11.08	8.90	9.03	4.4	6.8	0.61
1986-87	11.71	7.03	11.38	9.47	9.84	5.8	8.7	0.58
1987-88	13.74	7.42	11.25	10.06	10.19	8.2	8.8	0.51
1988-89	18.78	8.04	11.40	10.64	10.90	7.5	9.4	0.49
1989-90	15.42	8.51	11.49	11.05	11.96	7.4	6.1	0.48
1990-91	17.23	8.65	11.41	10.81	12.30	10.3	11.6	0.41
1991-92	15.17	9.09	11.78	11.28	13.36	13.7	13.5	0.41
1992-93	14.45	9.38	12.46	11.06	13.23	10.1	9.6	0.40
1993-94	24.23	9.72	12.63	12.38	13.53	8.3	7.5	0.41
1994-95	18.35	9.72	11.90	12.67	11.55	10.8	10.1	0.36
1995-96	17.36	9.82	13.75	11.72	12.87	7.8	10.2	0.37
1996-97	15.75	10.39	13.69	12.70	12.69	6.4	9.3	0.37
1997-98	10.90	10.22	12.01	12.15	10.59	4.9	7.0	0.39
1998-99	12.45	10.46	11.86	..	..	6.9	13.1	0.40
1999-2000	..	10.70	11.77	..	..	3.0	4.8	0.37
Averages								
1970s	11.07	4.53	5.91	5.95	5.71	8.98	7.66	0.83
1980s	14.89	6.87	9.86	9.17	8.86	7.97	9.04	0.60
1990s	16.21	9.81	12.33	11.85	12.52	8.22	9.67	0.39

g(Y) = Nominal GDP growth
R(D) = Average interest rate on total interest bearing debt
R(ML) = Weighted interest rate on market loans (above one year maturity)
R(SSPF) = Average interest rate on small savings and provident funds
R(RY) = Redemption yield on Central government securities
Inf_{WPI} = Inflation rate based on WPI
Inf_{CPI} = Inflation rate based on CPI
Net interest factor is the ratio of interest receipts to gross interest payments.
Source : Handbook of Statistics on Indian Economy, RBI, 1999.

Table 2 : Alternative Measures of Nominal Income Growth

(Per cent)

Year	NNP/ FC	GDP/ FC	GDP/ CMP Old	GDP/ CMP New
1990-91	17.0	16.9	—	17.2
1991-92	14.7	15.7	15.1	15.2
1992-93	13.8	14.1	14.4	14.5
1993-94	17.0	16.2	14.8	14.9
1994-95	18.9	18.4	18.8	18.4
1995-96	16.0	15.9	16.1	17.4
1996-97	14.4	14.2	14.1	15.7
1997-98	—	—	10.8	10.9
1998-99	—	—	—	12.5

NNP/ FC: Net National Product at Factor Cost (old series)
GDP/ FC: Gross Domestic Product at Factor Cost (old series)
GDP/ CMP: Gross Domestic Product at Current Market Prices (old series: Base 1980-81)
GDP/ CMP: Gross Domestic Product at Current Market Prices (new series: Base 1993-94)

Source : Economic Survey, GOI, Various Issues.

Table 3 : Central Government Fiscal Indicators

(Ratio to GDP in per cent)

Year	MD	PRIME REVEXP	CAPEXP	PRIME EXP	INTP	REVEXP	TOTEXP	RR	GFD	PRDEF	RD
1970-71	0.5	5.5	5.3	10.9	1.3	6.8	12.2	7.63	3.0	1.7	-0.3
1971-72	1.2	6.6	5.8	12.4	1.3	7.9	13.8	8.36	2.3	2.1	0.2
1972-73	2.2	6.8	6.0	12.8	1.4	8.2	14.2	8.87	4.6	2.5	0.0
1973-74	0.9	5.8	5.1	10.9	1.3	7.1	12.3	8.09	2.6	1.3	-0.4
1974-75	0.7	5.9	5.4	11.3	1.3	7.2	12.5	8.80	2.9	1.6	-1.0
1975-76	-0.3	6.7	6.3	13.1	1.4	8.2	14.5	9.98	3.6	2.1	-1.0
1976-77	0.9	7.5	5.9	13.4	1.5	9.0	14.9	10.09	4.1	2.5	-0.3
1977-78	-0.3	7.3	6.2	13.5	1.5	8.8	14.9	9.93	3.5	2.0	-0.4
1978-79	1.9	7.9	7.2	15.0	1.6	9.5	16.7	10.53	5.1	3.3	-0.3
1979-80	2.1	7.8	5.8	13.5	1.8	9.5	15.3	9.71	5.9	3.3	0.6
1980-81	2.4	8.0	5.7	13.7	1.8	9.8	15.5	9.10	5.6	3.9	1.4
1981-82	-1.9	7.1	5.7	12.8	1.8	8.9	14.6	9.40	5.0	3.2	0.2
1982-83	1.7	7.7	6.3	13.9	2.0	9.7	16.0	9.79	5.5	3.5	0.7
1983-84	1.8	7.8	5.9	13.7	2.1	9.9	15.8	9.50	5.8	3.7	1.1
1984-85	2.4	8.7	6.4	15.0	2.4	11.1	17.4	10.14	7.0	4.6	1.7
1985-86	2.2	9.3	6.6	15.9	2.6	12.0	18.6	10.69	7.7	5.1	2.1
1986-87	2.2	10.0	7.0	16.9	2.9	12.9	19.9	11.29	8.3	5.4	2.5
1987-88	1.8	9.7	6.1	15.8	3.1	12.8	18.9	11.12	7.5	6.4	2.5
1988-89	1.5	9.3	5.8	15.1	3.3	12.6	18.5	11.01	7.2	2.3	2.5
1989-90	2.8	9.4	5.8	15.2	3.6	13.0	18.8	11.45	7.2	1.8	2.4
1990-91	2.5	9.0	5.5	14.5	3.7	12.7	18.2	10.26	7.7	4.0	3.2
1991-92	0.8	8.3	4.4	12.7	4.0	12.3	16.7	10.71	5.4	1.5	2.4
1992-93	0.6	8.1	3.9	12.0	4.1	12.1	16.1	10.50	5.3	1.2	2.4

(Contd.)

Year	MD	PRIME REVEXP	CAPEXP	PRIME EXP	INTP	REVEXP	TOTEXP	RR	GFD	PRDEF	RD
1993-94	0.0	8.1	3.8	12.0	4.2	12.3	16.2	8.60	6.9	2.7	3.7
1994-95	0.2	7.5	3.7	11.2	4.2	11.8	15.5	8.78	5.6	1.3	3.0
1995-96	1.6	7.4	3.2	10.5	4.1	11.5	14.6	9.04	4.9	0.8	2.4
1996-97	0.1	7.1	3.0	10.0	4.2	11.3	14.3	8.96	4.7	0.5	2.3
1997-98	0.8	7.3	3.3	10.6	4.2	11.5	14.8	8.56	5.7	1.5	3.0
1998-99	0.7	7.9	3.5	11.4	4.4	12.3	15.8	8.48	6.4	2.0	3.9
1999-00(RE)	-	8.3	2.6	10.9	4.7	13.0	15.6	9.23	5.6	0.9	3.8
Averages											
1970s	1.0	6.8	5.9	12.7	1.4	8.2	14.1	9.2	3.8	2.2	-0.3
1980s	1.7	8.7	6.1	14.8	2.6	11.3	17.4	10.3	6.7	4.0	1.7
1990s	0.8	7.9	3.7	11.6	4.2	12.1	15.8	9.3	5.8	1.6	3.0

MD = Monetised deficit
PRIME REVEXP = Primary revenue expenditure
CAPEXP = Capital expenditure
PRIME EXP = Primary Expenditure
INTP = Interest Payments
REVEXP = Revenue expenditure
TOTEXP = Total Expenditure
RR = Revenue Receipts
GFD = Gross fiscal deficit
PRDEF = Primary Deficit
RD = Revenue Deficit = RR - REVEXP
GFD = PRDEF + INTP
REVEXP = PRIME REVEXP + INTP
TOTEXP = REVEXP + CAPEXP
PRIME EXP = PRIME REVEXP + CAPEXP

Source : Same as Table 1 (based on GOI Budget Documents).

Table 4 : Trends in Central and State Debt

(Per cent of GDP)

Fiscal Year (End-March)	Centre (Domestic)$	States	Centre & States (Total Domestic)	External* (Centre)	Public Debt (All Combined)
1980-81	35.6	17.6	40.8	8.3	49.1
1981-82	35.0	17.4	40.4	7.7	48.1
1982-83	40.0	18.4	45.1	7.7	52.8
1983-84	38.6	18.3	43.9	7.3	51.2
1984-85	41.8	19.3	47.9	7.2	55.1
1985-86	45.5	20.5	51.5	6.9	58.5
1986-87	49.9	20.7	56.1	6.9	63.0
1987-88	51.7	21.0	57.9	7.0	64.9
1988-89	51.5	20.5	57.8	6.5	64.3
1989-90	52.5	20.6	59.1	6.2	65.3
1990-91	52.9	20.6	59.6	5.9	65.5
1991-92	51.5	20.5	58.5	6.0	64.5
1992-93	50.9	20.1	58.2	6.0	64.2
1993-94	49.1	18.3	55.8	5.4	61.2
1994-95	47.0	17.8	53.7	4.9	58.6
1995-96	45.6	17.4	52.4	4.2	56.6
1996-97	44.1	17.3	51.0	3.8	54.9
1997-98	46.2	18.0	53.5	3.5	57.0
1998-99 (RE)	46.6	19.4	54.8	3.2	58.0
1999-00 (BE)	46.7	20.5	57.0	2.8	59.8

$ Domestic debt of the Central government = Marketable Debt + Other Liabilities (i.e. Small Savings, provident funds, Other Deposits etc.).

* At historical exchange rate.

Source : Same as Table 1.

Table 5 : Central and State Government Deficits

(Per cent of GDP)

Year	Primary Deficit			Gross Fiscal Deficit		
	Centre	State	Combined	Centre	State	Combined
1990-91	4.32	1.89	5.3	8.33	3.51	10
1991-92	1.58	1.29	2.4	5.89	3.06	7.4
1992-93	1.29	1.09	2.3	5.69	2.96	7.4
1993-94	2.68	0.55	3.2	6.87	2.35	8.1
1994-95	1.31	0.80	1.9	5.56	2.67	6.9
1995-96	0.84	0.78	1.5	4.95	2.58	6.4
1996-97	0.51	0.83	1.2	4.73	2.64	6.2
1997-98	1.49	0.90	2.1	5.69	2.83	7.1
1998-99 (RE)	1.51	2.18	3.2	5.90	4.28	8.5
1999-2000(BE)	-0.40	1.65	2.1	4.00	3.90	7.5

Source : Annual Report, RBI, Various Issues upto 1998-99.

Table 6 : Interest Rates on Government Bonds vis-à-vis other Market Interest Rates

(Per cent)

Year	R(ML)	R(Lwgt)	R(L_{SBI})	R(Call)	PLR_{IDBI}	SLR	INV/ NDTL
1970-71	5.37	9.38	7.00-8.50	6.38	8.50		
1971-72	5.30		8.50	5.16	8.50		
1972-73	5.26		8.50	4.15	8.50		
1973-74	5.26		8.50-9.00	7.83	9.00		
1974-75	5.75		9.00-13.50	12.82	10.25		
1975-76	6.25	13.78	14.00	10.55	11.00		
1976-77	6.38		14.00	10.84	11.00		
1977-78	6.36		13.00	9.28	11.00		
1978-79	6.52		13.00	7.57	11.00		
1979-80	6.64	14.90	16.50	8.47	11.00		
1980-81	7.03	14.82	16.50	7.12	14.00	34.0	34.7
1981-82	7.29	14.73	16.50	8.96	14.00	34.5-35.0	34.6
1982-83	8.36	14.60	16.50	8.78	14.00	34.5-35.0	35.7
1983-84	9.29	14.50	16.50	8.63	14.00	34.5-35.0	35.1
1984-85	9.98	15.03	16.50	9.95	14.00	35.0-36.0	38.9
1985-86	11.08	14.42	16.50	10.00	14.00	36.5-37.0	35.8
1986-87	11.38	14.29	16.50	9.99	14.00	37.0	37.6
1987-88	11.25	14.10	16.50	9.88	14.00	37.5-38.0	39.4
1988-89	11.40	14.62	16.50	9.77	14.00	38.0	39.0
1989-90	11.49	14.94	16.50	11.49	14.00	38.0	38.6
1990-91	11.41	16.38	16.50	15.85	14.00-15.00	38.0-38.5	39.0
1991-92	11.78	16.70	16.50	19.57	18.00-20.00	38.5	39.1
1992-93	12.46	16.00	19.00	14.42	17.00-19.00	37.25-38.5	39.3
1993-94	12.63	16.40	19.00	6.99	14.50-17.50	37.25-34.75	42.1
1994-95	11.90	15.00	15.00	9.40	15.00	31.50-34.75	38.6
1995-96	13.75	16.50	16.50	17.73	16.00-19.00	31.5	38.0
1996-97	13.69	14.00-15.50	14.50	7.84	16.20	31.5	37.7
1997-98	12.01	..	14.00	8.69	13.30	25.0-31.50	36.1
1998-99	11.86	..	12.00-14.00	7.83	13.50	25.0	36.5
1999-2000	11.77	..	..	4.00-9.50	..	25.0	34.3
Averages							
1970s	5.91	12.69	12.50	8.31	9.98	..	..
1980s	9.86	14.61	16.50	9.46	14.00	36.75	36.93
1990s	12.33	16.16	16.38	12.04	14.50	31.63	38.48

R(ML) = weighted interest rate on market loans (above one year maturity)

R(Lwgt) = Weighted average commercial bank lending rates

R(L_{SBI}) = SBI advance rate, R(Call) = commercial bank call money rates

PLR_{IDBI} = Prime lending rate of IDBI SLR = Statutory Liquidity Ratio

INV/ NDTL = Ratio of commercial banks' investment in government securities to net demand and time liabilities.

Source : Same as Table 1.

Table 7 : Trends in Public and Private Capital Formation

(Per cent of GDP)

Year	Public Sector	Private Sector	Total
1980-81	8.7	12.3	22.7
1981-82	10.4	13.4	21.4
1982-83	11.1	11.4	20.4
1983-84	10.0	11.1	20.1
1984-85	10.8	10.3	19.7
1985-86	11.2	13.0	22.2
1986-87	11.7	11.5	20.9
1987-88	9.9	12.6	22.9
1988-89	9.9	14.4	24.5
1989-90	10.0	14.1	25.1
1990-91	9.7	15.5	27.7
1991-92	9.2	13.5	23.4
1992-93	8.9	15.1	23.9
1993-94	8.2	13.0	23.1
1994-95	8.8	14.8	26.1
1995-96	7.6	18.9	27.2
1996-97	7.0	14.9	24.6
1997-98	6.7	16.7	26.2
1998-99	6.6	15.2	23.4

Source : Economic Survey, GOI, 1999-2000.

Table 8 : Comparative Index of Public and Private Capital Formation

(Per cent)

Year	Public Sector	Private Corporate Sector	Households	Gross Capital Formation
1970-71	6.2	5.3	7.8	6.3
1971-72	7.2	6.7	8.8	7.0
1972-73	8.2	6.9	8.1	7.1
1973-74	10.4	8.4	10.9	10.3
1974-75	12.2	14.0	13.7	11.7
1975-76	16.6	11.1	14.8	12.9
1976-77	18.8	6.7	17.4	14.6
1977-78	17.2	12.1	19.5	16.4
1978-79	21.7	11.6	24.5	21.2
1979-80	25.9	15.7	26.3	22.0
1980-81	25.8	17.8	29.2	26.9
1981-82	36.4	47.2	27.0	29.8
1982-83	43.3	52.2	22.7	31.7
1983-84	45.6	36.0	35.4	36.5
1984-85	55.0	52.3	30.5	39.7
1985-86	64.6	74.5	43.3	50.7
1986-87	74.9	80.2	40.3	53.3
1987-88	72.6	62.2	65.8	66.7
1988-89	86.4	82.7	90.7	84.6
1989-90	100.0	100.0	100.0	100.0
1990-91	114.5	119.4	132.3	129.3
1991-92	124.1	187.8	104.2	126.1
1992-93	137.7	245.5	131.2	147.4
1993-94	155.5	252.1	138.2	173.1
1994-95	194.1	360.8	176.4	230.2
1995-96	198.2	564.9	249.4	280.6
1996-97	209.4	545.2	280.8	292.5
1997-98	221.9	680.5	276.1	346.0

Source : Handbook of Statistics on Indian Economy, RBI, 1999.

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