An Examination of the Sustainability of Indian Fiscal Policy

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India has a long history of running fiscal deficits. This paper asks whether the magnitude of these deficits has involved a violation of India's intertemporal budget constraint. Time series evidence on Central government tax revenues and expenditures are examined for cointegration using procedures that are robust in the presence of structural change. We find no evidence of cointegration, a result that implies a violation of intertemporal solvency and that current fiscal policies are unlikely to be sustainable in the long-run.

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1 Introduction

Budget imbalances are pervasive in developing countries. The fiscal authorities of India have been no exception to this rule, and India has had a long history of running budget deficits. Indeed, the ongoing need for fiscal consolidation and the achievement of fiscal sustainability continues to be the key macroeconomic issue confronting India. India's fiscal record is of special interest, as unlike many developing countries, its large budget deficits have not been accompanied by adverse macroeconomic developments, such as periods of high inflation or negative growth in per capita income.

By the end of the 1980s the deterioration in Indian fiscal accounts, accompanied by a sharp worsening of the external current account deficit, engendered a rapid accumulation of public and external debt.[1] These internal and external imbalances resulted in the Indian economy being highly vulnerable to domestic and external macroeconomic shocks. The ensuing balance of payments crisis of 1991 resulted in the near-exhaustion of India's foreign exchange reserves, largely caused by the withdrawal of foreign-currency deposits by nonresident Indians. While the trigger for the crisis lay in domestic political difficulties and the Persian Gulf war, concern over the sustainability of Indian fiscal policy, due to rising debt and debt servicing, was the root cause of the crisis (see Chopra et al. (1995) for details). Since the crisis of

[1] In 1990/91 the central government's budget deficit was over 8 percent of India's gross domestic product (Figure 1). During the 1980s the deficit averaged about 7 percent of gross domestic product (GDP), and the government's debt-to-GDP ratio rose from 49 to 67 percent.

the early 1990s, the government has undertaken fiscal reforms in order to put fiscal policies on a sustainable path..

In this paper, we conduct a formal test of whether India's fiscal policy stance is sustainable, by examining if India has breached its intertemporal budget constraint. The intertemporal budget constraint test of the sustainability of fiscal policy asks whether the past behaviour of revenue, expenditure and the fiscal deficit could be continued indefinitely without prompting an adverse response from lenders. As such, the question of sustainability of the debt involves considerations of whether Ponzi financing (i.e., the funding of interest payments from the proceeds of new debt issues) has been used as a debt management strategy. In the absence of non-distortionary taxation, a dynamically efficient economy requires that Ponzi financing not be used (Wilcox 1989).[2] Our approach is to analyse the time series properties of the fiscal policies of Indian central governments dating back to the early 1950s, to see whether Ponzi financing arrangements have been used. This enables us to draw conclusions about the sustainability of Indian fiscal policy, and to evaluate the need for reforms of the type introduced in 1991.

The paper is organised as follows. In section 2, we formally define what

[2]Even if the economy is dynamically efficient, Ponzi financing is feasible under uncertainty as long as the competitive equilibrium allocation of resources is not Pareto efficient (Blanchard and Weil 1992). Current fiscal policies in India have been sustained by a favourable interest rate-growth rate differential. Since India's nominal GDP growth rate has typically exceeded the average nominal interest rate on government debt, due to the impact of financial repression on borrowing costs and access to concessional external borrowing, the government was for many years able to borrow to service the existing debt without causing the debt stock to explode.

we mean by a sustainable fiscal policy. The econometric methodology used to test for sustainability is outlined in section 3 and this is followed, in section 4, by a description of the data. The results from the sustainability tests are outlined in section 5 and a concluding section follows.

2 Sustainability Criteria

For simplicity, we assume that budget deficits are financed using bonds with a maturity of one period. This means that in any single period, the government faces the following budget constraint:

$$G_t + (1 + r_t)B_{t-1} = R_t + B_t, \tag{1}$$

where G is government outlays (i.e., consumption plus transfer payments), r is the one-period real rate of interest, R is government revenue and B is the stock of debt.

Iterating equation (1) forward yields the government's intertemporal budget constraint;

$$B_t = \sum_{s=0}^{\infty} \prod_{i=1}^{s} (1 + r_{t+i})^{-1} (R_{t+s} - G_{t+s}) + \lim_{s \to \infty} \prod_{i=1}^{\infty} (1 + r_{t+i})^{-1} B_{t+s}. \tag{2}$$

To derive the implications of equation (2) for the government's conduct of fiscal policy, we make two assumptions (see Flavin and Hamilton 1986 and Haug 1995). The first is that the real interest rate is stationary with an unconditional mean given by r. The second is that the real supply of bonds

does not grow, on average, at a rate in excess of the average rate of interest. These two assumptions imply that,

$$\lim_{s\to\infty}(1+r)^{-s}B_{t+s}=0. \tag{3}$$

Equation (3) states that the debt stock, when measured in present value terms, vanishes in the limit. By definition, this excludes Ponzi financing. It also implies that the government does not have the option of running perpetual primary deficits. However, as noted by Flavin and Hamilton (1986), equations (2) and (3) do not necessarily exclude a permanent, conventionally measured budget deficit (i.e. one that is inclusive of interest payments). As long as the deficits are such that the debt stock grows at a rate that is less than the rate of interest, equation (3) will be satisfied.[3]

Given equation (3), it follows that the inter-temporal budget constraint, equation (2), can be written as;

$$G_t^*-R_t=\sum_{s=0}^{\infty}(1+r)^{-s+1}(\Delta R_{t+s}-\Delta G_t^*+r\Delta B_{t+s-1}), \tag{4}$$

where G_t^* is government expenditure (i.e., outlays plus interest payments on the stock of debt carried over from the previous period).

The intertemporal budget constraint, under the no-Ponzi scheme rule, imposes restrictions on the time series properties of government expenditure and revenue. These follow from the specification of the right hand side of

[3]Since the sustainability condition relates to the discounted value of the debt stock in the limit, it is also possible for a deficit equal to some constant value d in each period to be sustainable. To see this, note from equation (1), that $\Delta B_t = d \ \forall \ t$. Therefore, the stock of debt in period s will be $B_s = B_0 + sd$ which implies that $\lim_{s\to\infty}(1+r)^{-s}B_s = 0$.

equation (4). This will be stationary, as long as government expenditure, revenue and the stock of debt are all stationary in first differences. The stationarity property restricts the extent to which G_t^* and R_t, can deviate from each other over time. In particular, if G_t^* and R_t are I(1), they will be cointegrated. Cointegration implies that there exists an error correction mechanism pushing government finances towards the levels required by the intertemporal budget constraint. In the absence of cointegration, the error correction mechanism will not operate and there is no likelihood that equation (3) will hold. In these circumstances, we would conclude that under unchanged fiscal policies, India's debt stock is unsustainable.

3 Econometric Methodology

Following Hakkio and Rush (1991), sustainability of the debt stock can be evaluating by estimating the regression

$$R_t = \alpha + \beta G_t^* + \epsilon_t, \tag{5}$$

where $0 < \beta \leq 1$ and testing to see whether G_t^* and R_t form a cointegrating relation.[4] A necessary condition for the existence of cointegration is that the individual series are integrated of order one. Should only one of the series be

[4]Non-violation of the budget constraint does not necessarily require that $\beta = 1$. However, should $\beta < 1$, government expenditure will always be larger than revenue. In the limit, the undiscounted stock of bonds will reach infinity which is likely to make the marketing of the debt prohibitively difficult (Hakkio and Rush 1991). Note that Quintos (1995) defines a situation in which cointegration is rejected and $0 < \beta < 1$ as weak form sustainability.

I(1), with the other being stationary, the two series will permanently diverge and equation (3) will not hold.

Three separate tests for the order of integration are used in this paper. These are the augmented Dickey-Fuller (1981) test, the Kwiatowski, Phillips, Schmidt and Shin (1992) test and the Zivot and Andrews (1992) test. The Dickey-Fuller and Zivot and Andrews tests have, as their null hypothesis, that the dynamics of the respective series are characterised by a unit root. They differ, however, in that the Zivot and Andrews test makes allowance for the possible existence of a one-off structural change under the alternative hypothesis. This is an attractive feature of the test since Perron (1989, 1997) and Zivot and Andrews (1992) have demonstrated that the augmented Dickey-Fuller test has low power in the presence of a structural break. The Zivot-Andrews test also has the advantage of not requiring the a priori specification of the possible timing of a structural break. It also allows a check to be made as to whether there has been a significant "regime shift" in the data generating process for the fiscal variables. The Kwiatowski et. al. test, on the other hand, is based on the null hypothesis of stationarity. There is some Monte Carlo evidence that the Kwiatowski et. al. test is less affected by departures from normality in the residuals than unit root tests (Silvapulle 1993).

Cointegration requires that the residuals from equation (5) be stationary. The standard way of testing whether this requirement is met by the data is to use Engle and Granger's (1987) procedure on the residuals from the coin-

tegrating regression. This involves estimating the autoregressive parameter from the "second stage" regression, $\varepsilon_t = \rho\varepsilon_{t-1} + \mu$, where μ is a stationary error term. If $|\rho| < 1$, cointegration is not rejected.[5] However, as with the unit root tests, this procedure has low power in the presence of a structural break or regime change. Therefore, as well as reporting the results from the Engle-Granger procedure, cointegration is also tested using the technique devised by Gregory and Hansen (1996). This procedure is a robust test for cointegration even if there is a structural break or regime change at an unknown date.[6]

4 The Data

The data are taken from official sources. Definitions and descriptions of the various data manipulations are detailed in Appendix I. The period covered ranges from 1951-52 (marking the beginning of India's first five-year plan) to 1997-98. Expenditure and revenue of the central government are measured, respectively, by aggregate disbursements (current expenditure, capital outlays, loans and advances and interest payments), net of recovery of loans and advances of the central government; and the sum of revenue receipts (including external grants) plus non-debt capital receipts of the central government. Accordingly, the fiscal deficit measure includes the central government's loans

[5]It is important that correct critical values are used. These have been tabulated by Davidson and MacKinnon (1993).

[6]Our use of the Gregory-Hansen procedure extends the work and Tanner and Liu (1994) who allowed for a level-shift in the cointegrated relationship between U.S. Revenue and expenditure.

and grants to the states on the expenditure side, and its receipt of interest and loan repayments from the states on the revenue side.[7] The implicit GDP deflator is used to convert the series into real terms. The data are presented in Figure 1.

5 Results

The results from the unit root and stationarity tests are detailed in Table 1. The lag length used to whiten the residuals for the augmented Dickey-Fuller test, is chosen on the basis of the Schwarz Bayesian information criterion (BIC). The regression features a constant term and a linear trend. For both revenue and expenditure, the ADF tests are consistent with the existence of a unit root. This result is confirmed by the KPSS tests. Two sets of KPSS test statistics are shown, one featuring only a constant term in the deterministic component (μ), the other augmenting this with a linear trend (τ). The tests statistics are shown for four alternative lag lengths used in the window to estimate the long-run variance. In all cases, the KPSS test statistics exceed the respective critical values, thus rejecting stationarity. Table 1 also reports the results from the Zivot-Andrews tests. Three alternative Zivot-Andrews tests statistics are shown; model (A) allows for an exogenous change in the level of the series, model (B) allows for an exogenous change in the growth rate and model (C) allows there to be an exogenous change in both the level and the rate of growth. In no case is there a test statistic that is less

[7] The gross fiscal deficit of the central government is calculated as the excess of expenditure over receipts (as defined above) - see Appendix I for details.

than the critical value. Therefore, we conclude that both the expenditure and revenue data exhibit behaviour consistent with unit root non-stationarity. As a result, it is possible that the series are cointegrated, as would be required for sustainability.

The results from the cointegration tests are shown in table 2. The results from the Engle-Granger two-step procedure shows that the residuals from equation (5) are not consistent with expenditure and revenue forming a cointegrating relation. As discussed in section 2, this implies non-sustainability in the sense that equation (3) will not hold. The failure to find cointegration is confirmed by the results from the Gregory-Hansen procedure. Three different Gregory-Hansen test statistics are shown. Model (A) allows there to have been a level shift in the cointegrating relation, Model (B) augments model (A) with a trend in the cointegrating relation while model (C) allows for a regime shift (i.e., for the value of the cointegrating parameter to have changed). All three test results fail to reject the no cointegration null. We conclude, therefore, that an unchanged pattern of conduct of Indian fiscal policy is not sustainable, even when allowing for the possibility of a change in the relationship between revenue and expenditure over time.[8]

[8]This result is consistent with previous work which has examined the sustainability of India's fiscal imbalances, finding that India's discounted debt is a nonstationary series (Buiter and Patel 1992).

6 Conclusion

The results in this paper support the proposition that the indefinite continuation of the current stance of Indian fiscal policy is unsustainable, and needs to be altered to prevent an adverse response from lenders. This conclusion is based on a time series analysis of the behaviour of Indian government revenue and expenditure data which indicates that adherence to the intertemporal budget constraint (in the absence of Ponzi financing) has not characterised Indian fiscal policy. These results provide support for the moves towards fiscal consolidation which occurred since the early 1990s. However, it is important to note that the reforms are unlikely to have led to a sustainable path for the debt stock. This is despite the fact that the size of the budget deficit as a proportion of GDP has fallen since 1991. Following the reforms, deficits have been financed through borrowings in a relatively less regulated financial market. As domestic markets have been liberalised, the cost of domestic borrowing has increased and concessional external financing has become a smaller proportion of total borrowing. This has led to a major increase in interest liabilities and to an increase in the debt-to-GDP ratio. Further fiscal consolidation may well be required if Indian public finances are to be consistent with debt sustainability.

APPENDIX I

All data have been derived from official sources, and are annual in frequency. It should be noted that they are for financial years ending March 31; for example, 1994-95 refers to the year ending March 31, 1995.

Central Government's Revenue (CENREV): the sum of revenue receipts (including external grants) plus nondebt capital receipts of the central government (Government of India, GOI), in billions of rupees (Rs. crore), taken from Budgetary Position of GOI, Revenue Receipts of GOI and Capital Receipts of GOI tables of the Reserve Bank of India (1998) and International Monetary Fund (1998).

Central Government Expenditure (CENEXP): aggregate disbursements (revenue expenditure, capital outlays and loans and advances), net of recovery of loans and advances of the central government, in billions of rupees (Rs. crore), taken from Budgetary Position of GOI, Revenue Receipts of GOI and Capital Receipts of GOI tables of the Reserve Bank of India (1998) and International Monetary Fund (1998).

Central Government's Gross Fiscal Deficit (CENGFD): gross fiscal deficit of the central government, and is calculated as the excess of CENEXP over CENREV. It is financed by external borrowing and domestic borrowing, where the latter comprises market borrowing (chiefly from publicly-owned financial institutions), treasury bills, changes in cash balances with the Reserve Bank of India, small savings schemes, and state provident funds.

GDP Deflator (GDPDEF) : the GDP deflator (base 1990-91=100), taken from the International Monetary Fund (1998) and the Central Statistical Organization (1996)."

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Table 1

Unit Root and Stationarity Tests

	R_t	G_t^*
ADF	-0.410	-0.274
$\text{KPSS}_1(\mu)$	2.262	2.260
$\text{KPSS}_2(\mu)$	1.559	1.553
$\text{KPSS}_3(\mu)$	1.205	1.196
$\text{KPSS}_4(\mu)$	0.993	0.982
$\text{KPSS}_1(\tau)$	0.536	0.570
$\text{KPSS}_2(\tau)$	0.385	0.399
$\text{KPSS}_3(\tau)$	0.308	0.311
$\text{KPSS}_4(\tau)$	0.262	0.258
ZA_A	-1.726	-2.712
ZA_B	-2.020	-2.102
ZA_C	-2.471	-2.732

Note: ADF is the augmented Dickey-Fuller (1981) test for the null hypothesis of a unit root, with the lag length chosen according to the BIC criterion. The 5% critical value is -3.450. $\text{KPSS}_i(\mu)$ is the Kwiatowski et. al. (1992) test for stationarity around a level where the lag length is set equal to i. The 5% critical value is 0.463. $\text{KPSS}_i(\tau)$ is the Kwiatowski et. al.(1992) test for trend stationarity where the lag length is set equal to i. The 5% critical value is 0.146. $ZA_j,\ \ j = A, B, C$ are the Zivot-Andrews (1992) tests for the null hypothesis of a unit root conditional on (A) an exogenous change in the level of the series, (B) an exogenous change in the rate of growth and (C), exogenous changes in both the level and the rate of growth. The 5% critical values are, respectively, -4.80, -4.42 and -5.08.

Table 2

Cointegration Tests

Test	**Statistic**
EG	-1.825
$\mathbf{GH}_A$	-2.820
$\mathbf{GH}_B$	-3.603
$\mathbf{GH}_C$	-3.122

Note: EG is the Engle-Granger (1987) test of the null hypothesis of no cointegration. The 5% critical value is –3.34. GH_i, $i = A, B, C$ are the Gregory-Hansen (1996) tests for no cointegration conditional on (A) a level shift in the cointegrating relation, (B) a level shift with trend and (C) a regime shift. The 5% critical values are, respectively, -4.61, -4.99 and -4.95.

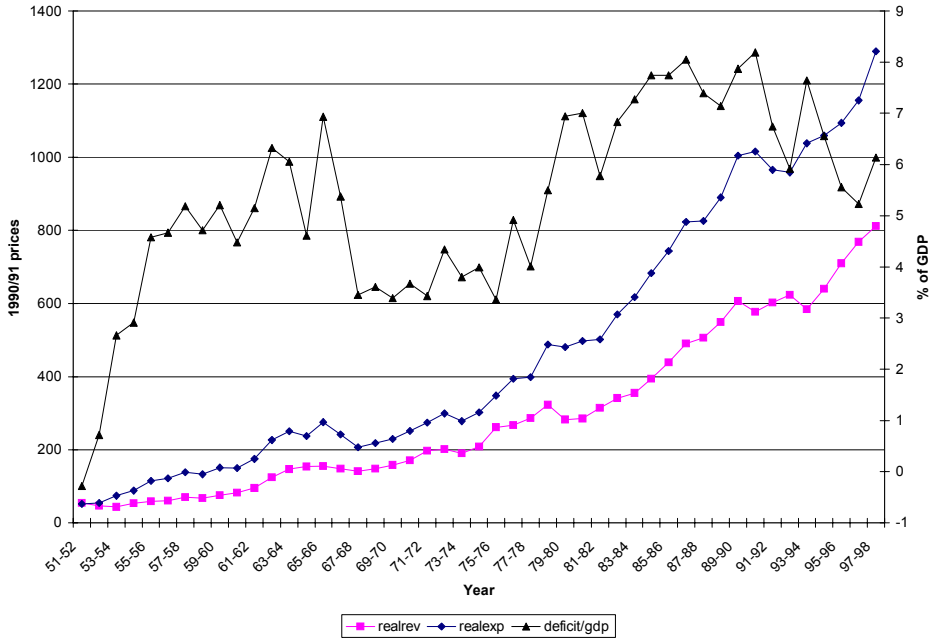

Figure 1: Central Government's Expenditure, Revenue (in 1990/91 billion * 100 rupees) and the Budget Deficit (% of GDP)

Source: Reserve Bank of India (1998).