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OCCASIONAL PAPERS

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Dynamics of Interaction between Government Deficit and Domestic Debt in India

By
C. Rangarajan, Anupam Basu and Narendra Jadhav*

"National Debt is like a toothache; it is best not to have one, but if you have got one it is next best to get rid of it as soon as you can".

E.H. Young
The System of National Finance (1915)

"There is nothing worse than a moderate evil! If wasps and rats were hornets and tigers we should have exterminated them before now. So with Great Britain's obligations to her rentiers arising out of the war".

J.M. Keynes
A Treatise of Money (1929)

Introduction

SEVERAL significant changes have taken place in the dimension as well as the financing pattern of government deficits in India since

the early 1980s. Government deficit as a ratio of GDP has in-creased markedly and the bulk of the deficit is being financed by government's domestic borrowings. Heavy reliance on domestic borrowings has naturally led to a sharp increase in domestic debt of the government held within as well as outside the RBI. As a result, concerns are being voiced about the prudence of large government deficits and sustainability of the growing domestic debt of the government.

Implications of widening government deficits have received con-siderable attention among economists in leading industrial countries[1]. In the Indian context, however, these issues have not been adequately and rigorously investigated. Seshan (1987) was probably the first study to draw pointed attention to the possibility of domestic debt in India reaching unacceptably high level in the none too distant future. Subsequently, the Report of the Comptrol-ler General of India (1988) also warned against the alarming growth in domestic debt.

These prognoses are being seriously questioned on methodological grounds. For example, Rakshit (1989), finds that "the major part of the on-going debate (on the problem of domestic debt is) somewhat heavy going" and that he "could not make much sense of the analytical constructs behind the discussions"[2]. Rak-shit's skepticism regarding the available predictions is understanda-ble since they are based on simple trend analyses.

As a matter of fact, this subject calls for a comprehensive and much deeper analysis. First of all, the data-base has to be reconstructed. Available measures of government deficit and domestic debt are accounting measures rather than proper economic aggregates. These need to be replaced by analytically meaningful measures. Secondly, in the Indian context, widening government deficits have been financed primarily by resorting to net RBI credit to government and by accumulating domestic debt out-side the RBI, which have different macroeconomic implications and

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1. See for example, Giavazzi & Spaventa (Eds.) (1988) & Boskin. Flemming and Gorini (Eds.) (1987).

2. Rakshit (1989), p. 1.

therefore, should be treated separately. Finally, the methodological basis of the currently available studies also needs to be made more rigorous. Rather than using the simple trend analysis, a sound analytical framework must be developed, so that the dynamic nexus between government deficits and different modes of financing them can be systematically explored. The present study makes an effort in these directions.

The main text of the study is organised as follows: Section I presents dimensions of fiscal imbalances in India. Alternate estimates of government deficit in India corresponding to different analytical measures suggested in the fiscal literature are presented. The issue of appropriate measurement of domestic debt in the Indian context is also discussed. Trends in these aggregates are examined with a view to providing an assessment of the emerging fiscal situation. Section II provides a brief survey of literature relating to perceived macroeconomic implications of domestic debt accumulation. Section III deals with the "debt-financing scenario"[3], wherein the focus is on the domestic debt held outside the RBI. An analytical framework is developed for projecting the debt-GDP ratio and is applied to the Indian data so as to make appropriate quantitative assessment. Section IV is then devoted to the "monetary financing scenario" wherein the focus is on the net RBI credit to government. This section presents a suitable analytical framework for capturing quantitative implications of resorting to the RBI financing of government deficits and applies it to the Indian data. Finally, Section V presents conclusions.

At the very outset, some caveats and clarifications are in order. Among other things, it is assumed throughout the study that the authorities maintain a constant real GDP growth; also, while developing the debt-financing scenario, inflation rate is assumed to remain unchanged, as though, these were independent of fiscal policy actions. In reality, growing debt-GDP ratio and concomitant debt-service burden may stifle the economic growth and aggravate inflation. These feedback effects are ignored in the debt-financing scenario and attention is focussed only on the first round effects in

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3. For the sake of brevity, domestic borrowings other than net RBI credit to government is referred to as "debt-financing" in this study.

order to keep the analysis uncluttered. Actual outcomes. therefore. are likely to be worse than those predicted in that scenario. On the other hand, in the "monetary-financing scenario". feedback effects on inflation have been duly incorporated.

Throughout the study, attention is focussed on the Central government. Accordingly, measurement of government deficits. and the different means of financing them. as well as the measurement of domestic debt is with reference to the Central Government only.

I. Dimensions of Fiscal Imbalances in India

Fiscal imbalance in any economy is measured. typically. by the government deficit. Conceptually, government deficit is simply the difference between aggregate disbursements and aggregate receipts. In practice. however. different measures of government deficit are possible depending upon what items are deemed to comprise aggregate disbursements and aggregate receipts.

(A) Government Deficits : Taxonomy of Concepts and Measures

Measurement of government deficit has received considerable attention in public finance literature with a resurgence of interest in the subject in recent years. A wide spectrum of different concepts of government deficit have been developed. World Development Report (1988) published by the World Bank has emphasised that the "correct" way to measure the government deficit depends on the purpose of analysis. In the present context, therefore, it is necessary to choose the concept which can fully capture the impact of fiscal operations on the indebtedness of the government.

In order to clarify the precise differences among different concepts of government deficit, it may be useful to begin with a simple analytical classification of the Central Government transactions in India. Exhibit 1 presents a fiscal balance sheet based on terminology used in the Indian budget documents.

Like any other balance sheet, by definition, the fiscal balance

Exhibit 1: Fiscal Balance Sheet

Receipts		Disbursements	
A. Revenue Receipts		A. Revenue Expenditure	
1. Tax Receipts	(R1)	1. Interest Expenditure	(E1)
2. Non-tax		2. Non-interest	
Receipts		Expenditure	(E2)
a) Interest Earning	(R2)		
b) Non-interest			
Earnings	(R3)		
B. Financing Items		B. Capital Disbursements	
1. Grants	(R4)	1. Capital Expenditure	(E3)
2. Borrowings		2. Net Domestic Lendings	(E4)
i) Foreign			
Borrowings	(R5)		
ii) Domestic			
Borrowings			
a) Other than	(R6)		
91-day TBs*			
b) 91-day TBs	(R7)		
iii) Change in Cash			
Balance	(R8)		

Aggregate Receipts (R)	Aggregate Disbursements (E)
= (R1 + R2 + R3) + (R4) +	= (E1 + E2 + E3 + E4)
(R5 + R6 + R7 + R8)	

* Represent both "internal debt" liabilities like current market loans, special securities issued to the RBI, 182-day treasury bills, as well as "other liabilities" like small savings, provident funds etc.

sheet must always be in balance. In other words, the total resource-gap arising out of government transactions, i.e., the difference between aggregate disbursements (revenue expenditure, capital expenditure and net domestic lendings) and revenue receipts, must necessarily be matched by the sum total of all financing items. The financing items include grants, foreign borrowings, domestic borrowings (net RBI credit to government, current market loans, and other liabilities such as small savings, provident funds etc.) and change in cash balances.

1. Traditional Budget Deficit

In the Indian budgetary practice, traditionally, while the aggregate disbursements cover revenue expenditure, capital expenditure and net domestic lendings, receipts are *not* confined to revenue receipts alone. Grants, foreign borrowings and domestic borrowings (excluding 91-day treasury bills) are also included in aggregate receipts.

In terms of the fiscal balance sheet presented in Exhibit 1, thus, the traditional deficit[4]

= (revenue expenditure + capital expenditure + net domestic lendings)
- (revenue receipts + grants + foreign borrowings + domestic borrowings excluding 91-day TBs)
= (E1 + E2 + E3 + E4) - [(R1 + R2 + R3) + (R4 + R5 + R6)]
= (R7 + R8)

In other words, the traditional budget deficit depicts only a part of the resource gap in current fiscal operations that is expected to be financed by (a) issuing 91-day treasury bills and (b) running down on the Government's cash balances with treasuries and the RBI.

This concept of government deficit is extremely narrow. Evidently current fiscal operations lead to increases in several other

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4. All government deficit measures have been so defined here as to have positive values, i.e. expenditure minus receipts rather than the other way round.

liabilities of the government. For example, besides foreign borrowings, there are internal debt liabilities like current market loans, special securities issued to the RBI and "other liabilities" such as small savings, provident funds etc. which in recent years have been absorbing significant fractions of resource gap in the government operations. In the budget documents, these are, however, treated in the *same* way as revenue receipts are and, hence, the traditional budget deficit does *not* reflect the full magnitude of resource gap and relevant financing or borrowing requirements.

2. Monetary Concept of Government Deficit

Limitations of the traditional budget deficit were also emphasised by the Chakravarty Committee Report (1985). The Report observed that the traditional measure of budget deficit does not reveal the full extent of the government's reliance on Reserve Bank credit. A part of new issues of government securities is taken up by the Reserve Bank when response from the public and financial institutions is inadequate. As a matter of fact, additions to Reserve Bank's holding of government securities contribute to an increase in the reserve money, much the same way as new issues of treasury bills taken over by the Reserve Bank. The exclusion of additions to Reserve Bank's holding of government securities in the traditional measures of budget deficit, therefore, may severely understate the monetary impact of fiscal operations. Also, to the extent treasury bills are held outside the Reserve Bank, the traditional budget deficit may overstate the monetary impact. The Report, therefore, argued that "An unambiguous and economically meaningful measure of the monetary impact of fiscal operations is provided by the change in Reserve Bank credit to government"[5].

The monetary concept of government deficit is somewhat broader than the traditional measure, but is suitable only for analysing the monetary impact of fiscal operations. In other words, the expanded coverage under the monetary concept of government deficit still falls considerably short of the coverage needed to capture the full impact of current fiscal stance on the overall indebtedness of the government.

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5. Chakravarty Committee Report (1985). p. 153.

3. Fiscal Deficit

As noted before, the total resource gap or the overall financing requirement in government's fiscal operations is given by the excess of revenue expenditure, capital expenditure and net domestic lendings over revenue receipts. When grants are deducted from the overall financing requirement, the *residual* which represents the overall borrowing requirement may be called the gross fiscal deficit.

Thus, gross fiscal deficit

= (revenue expenditure + capital expenditure + net domestic lendings)

− (revenue receipts + grants)
which in terms of the fiscal balance sheet

= (R5 + R6 + R7 + R8)

Shortcomings of the traditional measure of budget deficit are evident when it is compared with the gross fiscal deficit. While the gross fiscal deficit captures the *entire* shortfall in government's fiscal operations that is expected to be covered by undertaking *all* borrowing operations (domestic and foreign) and/or running down on its cash holdings, the traditional measure is confined besides the deplition of liquidity holdings, only to *one* particular form of domestic borrowings i.e., 91-day treasury bills, thus ignoring other domestic borrowings such as current market loans, small savings, provident funds etc. as well as foreign borrowings.

In the context of developing countries, a sizeable part of central government borrowings is on-lent to other sectors – state and local governments, public sector enterprises and the like. Such lendings are undertaken not to acquire a profitable financial asset but are actuated by motives of public policy such as provision of resources where private capital may not be available. When net domestic lendings (lendings minus repayments) are deducted from the gross fiscal deficit the residual may be called the net fiscal deficit.

Thus, net fiscal deficit

= gross fiscal deficit – net domestic lendings
= (revenue expenditure + capital expenditure)
– (revenue receipts + grants)

When the Central Government is the focal point of analysis, as is the case with the present study, the net fiscal deficit is, perhaps, more meaningful than the gross fiscal deficit[6].

4. Primary Deficit

One important limitation of the fiscal deficits is that they do not necessarily reflect the extent to which the *current* discretionary fiscal actions improve or worsen the government's net indebtedness. In particular, interest payments in the current period are obligatory, but reflect *past* budgets.

Corresponding to the two concepts of fiscal deficit, i.e., gross and net, two measures of primary deficits could be constructed. Thus,
gross primary deficit[7]

= (gross fiscal deficit) – (interest payments – interest earnings)

= (revenue expenditure + capital expenditure + net domestic lendings) – (revenue receipts + grants) – (interest payments – interest earnings)

= (non-interest revenue expenditure + capital expenditure + net domestic lendings) – (non-interest revenue receipts + grants) which, in terms of the fiscal balance sheet

= (E2 + E3 + E4) – (R1 + R3 + R4)

And, net primary deficit
= (non-interest revenue expenditure + capital expenditure) – (non-interest revenue receipts + grants)
= (E2 + E3) – (R1 + R3 + R4)

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6. The concept of fiscal deficit is widely used by the IMF. No distinction, however, is made between gross and net deficit. In the IMF terminology, the fiscal deficit refers to gross fiscal deficit.

7. Coincides with the IMF's definition of primary deficit.

Primary deficit concepts, thus defined, indicate the precise extent to which current fiscal actions affect the indebtedness of the Central Government and is. therefore, most suitable for the present study. Accordingly, the analytical framework developed in subsequent sections is based on these measures.

Before proceeding further, it may be worthwhile to apply the measures discussed above to derive different government deficit estimates for India, to which we turn next.

(B) Government Deficit in India : Alternate Estimates

Data series relating to various components of the fiscal balance sheet covering the period 1970-71 through 1990-91 are presented in the Statistical Statements (1 to 10) in the data appendix. Statistical derivation of different measures of government deficit is indicated in these statements. Evolution of the traditional deficit, gross primary deficit and gross fiscal deficit is also illustrated in Exhibits 2 and 3.

Table 1 presents a summary of different government deficit estimates in India for 1970-71 and for the 1980's. For any meaningful analysis, relevant absolute values must be normalised. Following the common practice, relevant magnitudes have also been expressed as ratios of GDP at current market prices. Based on Table 1, several observations can be made:

1. Government deficit in India (as a ratio of GDP) has widened significantly during the 1980's. This fact is brought out uniformly by different measures of government deficit discussed above. As one would expect, for each year, the traditional budget deficit is generally the smallest, whereas, the gross fiscal deficit is the largest one in magnitude. The other measures lie in these two extrema.

2. The differences in the relative magnitudes of the traditional deficit and the gross fiscal deficit are quite striking. Indeed, the traditional deficit has generally been placed between one-fifth and one-third of the gross fiscal deficit for the relevant year. It is

EXHIBIT 2: ALTERNATE DEFICIT MEASURES
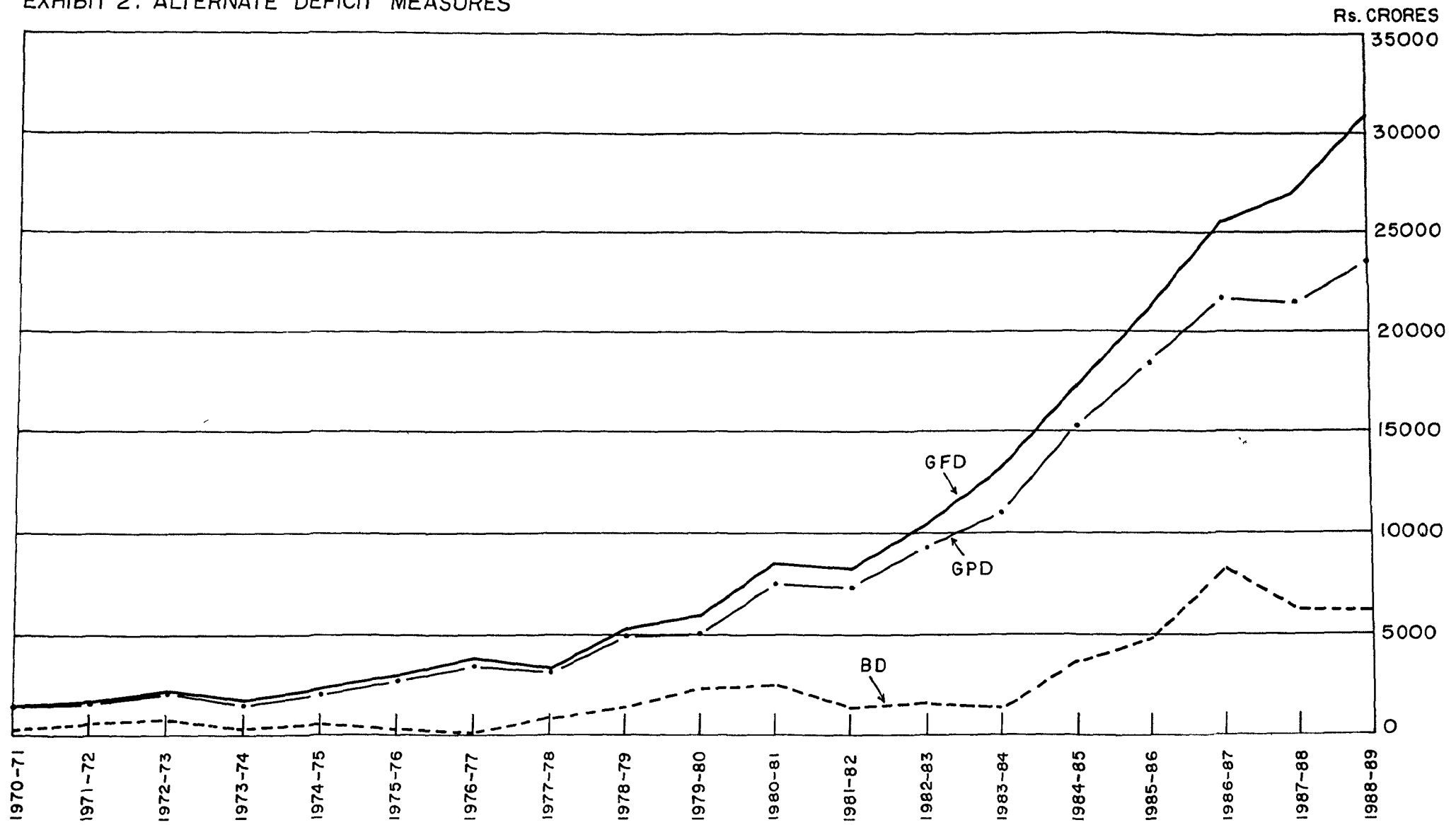
Rs. CRORES

BD = TRADITIONAL BUDGET DEFICIT
GPD = GROSS PRIMARY DEFICIT
GFD = GROSS FISCAL DEFICIT

EXHIBIT 2: ALTERNATE DEFICIT MEASURES
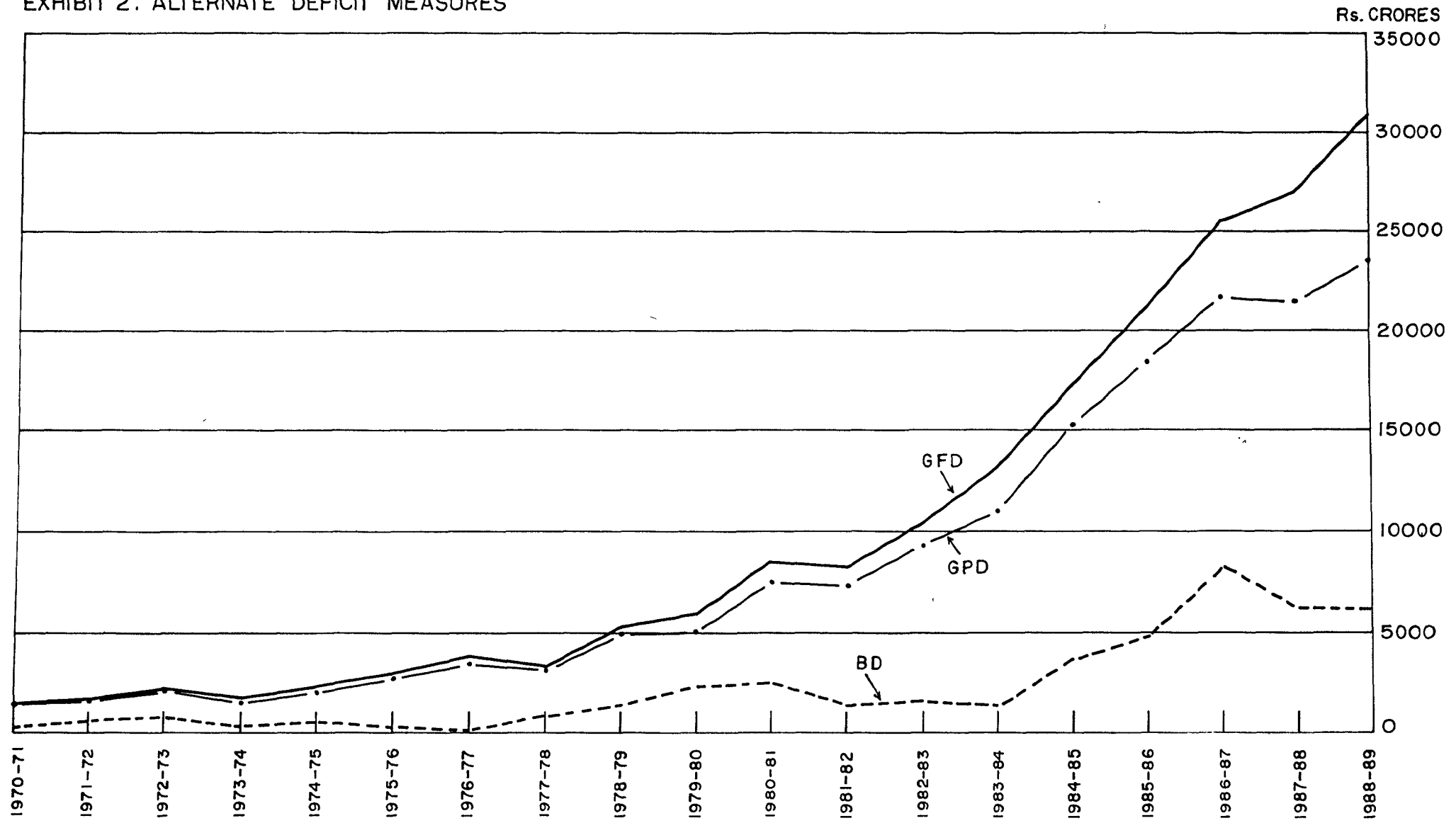
Rs. CRORES

BD = TRADITIONAL BUDGET DEFICIT
GPD = GROSS PRIMARY DEFICIT
GFD = GROSS FISCAL DEFICIT

EXHIBIT 3: ALTERNATE DEFICIT MEASURES AS RATIOS OF GDP
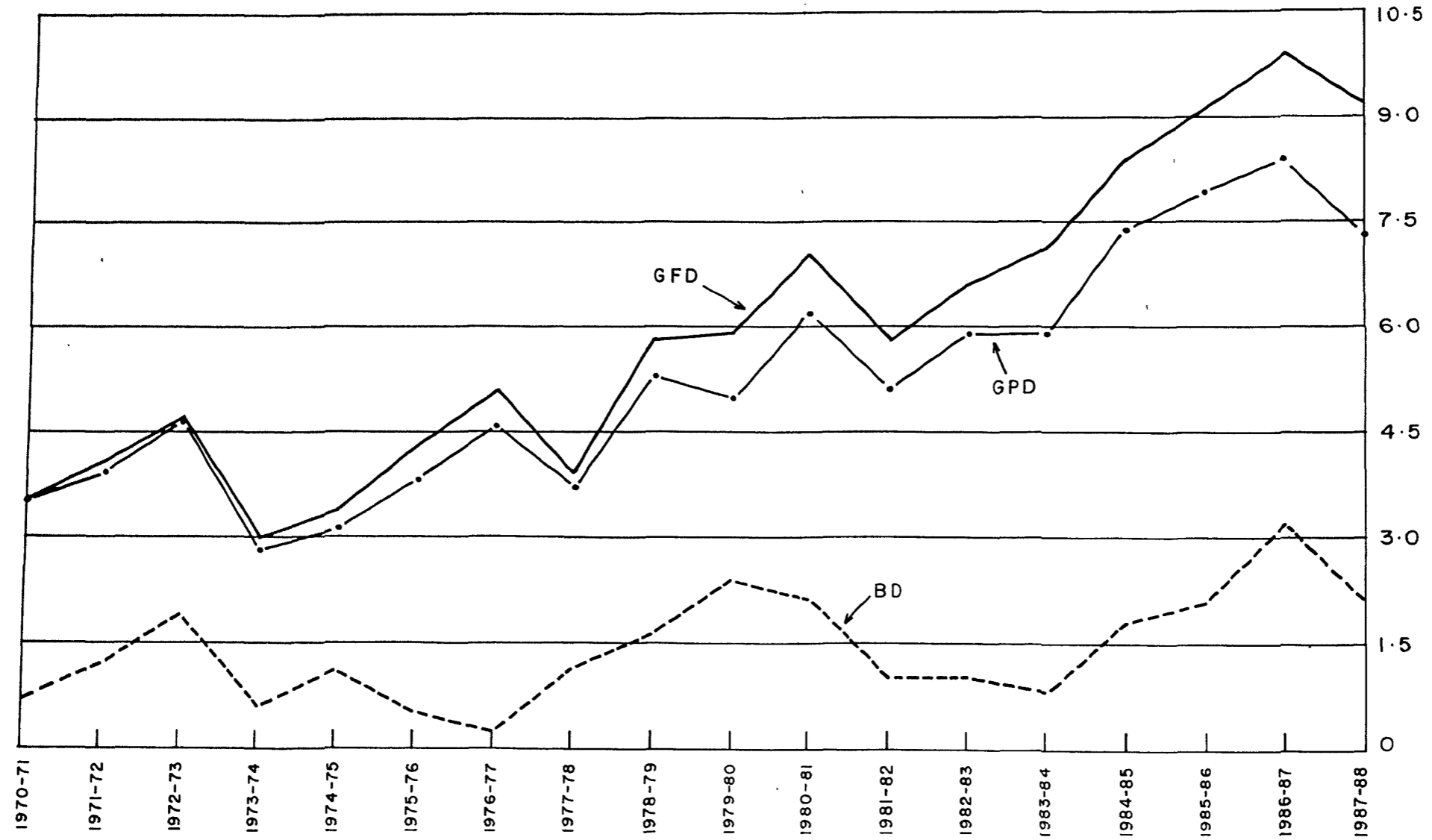
LEGEND: BD = = TRADITIONAL BUDGET DEFICIT
        GPD= GROSS PRIMARY DEFICIT
        GFD= GROSS FISCAL DEFICIT
(FIGURES OF DEFICIT ARE EXPRESSED AS RATIOS OF GDP)

Table 1: Estimates of Government Deficit in India

(Rs . Crores)

Year	Tradi-tional Deficit	Monetary Deficit	Gross Fiscal Deficit	Net Fiscal Deficit	Gross Primary Deficit	Net Primary Deficit
1970-71	285	223	1,409	779	1,378	748
	(0.7)	(0.6)	(3.5)	(2.0)	(3.5)	(1.9)
1980-81	2,578	3,551	8,514	5,325	7,613	4,424
	(2.1)	(2.9)	(7.0)	(4.4)	(6.2)	(3.6)
1981-82	1,392	3,207	8,348	4,273	7,303	3,228
	(1.0)	(2.2)	(5.8)	(3.0)	(5.1)	(2.3)
1982-83	1,657	3,368	10.470	5,817	9,314	4,661
	(1.0)	(2.1)	(6.6)	(3.7)	(5.9)	(2 9)
1983-84	1,417	3,949	13.252	8.392	11,052	6.192
	(0.8)	(2.1)	(7.1)	(4.5)	(5.9)	(3.3)
1984-85	3,745	6,055	17,390	10.946	15,303	8,859
	(1.8)	(2.9)	(8.4)	(5.3)	(7.4)	(4.3)
1985-86	4,937	6,190	21,368	13.054	18,451	10,137
	(2.1)	(2.6)	(9.1)	(5.6)	(7.9)	(4.3)
1986-87	8,261	7,090	25,656	16,350	21,759	12,453
	(3.2)	(2.7)	(9.9)	(6.3)	(8.4)	(4.8)
1987-88	6,308	6,559	27,044	18,717	21,563	13,236
	(2.1)	(2.2)	(9.2)	(6.4)	(7.3)	(4.5)
1988-89	6,242	6,503	30,846	20,777	23,558	13,489
	(1.8)	(1.9)	(8.8)	(6.0)	(6.8)	(3.9)
1989-90 (RE)	12,663	14,300	36,274	23,998	27,229	14,953

(Figures in brackets indicate deficit as ratio of GDP at factor cost, current prices. 1989-90 GDP figure is CSO's quick estimate).

Source: Col. (1) : Statement 3, Col. (3);   Col. (4) : Statement 7, Col. (5);
     Col. (2) : RBI Reports on Currency   Col. (5) : Statement 9, Col. (5);
       & Finance, end-year data.   Col. (6) : Statement 10, Col. (5);
    Col. (3) : Statement 6, Col. (5);

evident, therefore, that the traditional budget deficit has been grossly understating the overall borrowing need arising out of the fiscal operations of the Government throughout the 1980s consistently.

3. Ignoring year to year variations, it can be seen that the traditional deficit expanded from 0.7 per cent of GDP in 1970-71 to the average of 1.3 per cent in the first half of the 1980's and to the average of 2.3 per cent in the next four years. During the comparable period, the gross primary deficit widened from 3.5 per cent to 6.1 per cent of GDP whereas, the gross fiscal deficit worsened from 3.5 per cent to 9.3 per cent of GDP.

4. The gross fiscal deficit in India is large compared to other developing countries. According to the World Development Report (1988), weighted average of fiscal deficits in 1986 for low-income developing countries (excluding India and China) was placed at 5.1 per cent of GNP and for the middle-income developing countries it was estimated to be around 5.8 per cent of GNP, as against the comparable figure of about 8.8 per cent in India (in fiscal year 1986-87).

5. The overall borrowing requirement (as reflected in the gross fiscal deficit) can be readily decomposed into analytically meaningful components. In particular, the difference between fiscal and primary deficits gives the interest burden, whereas, the difference between gross and net primary (or fiscal) deficits gives the extent of net domestic lendings. During the four year period ended 1988-89, the gross borrowing requirement (as a ratio of GDP), on an average, was 5.8 points percentage higher than in 1970-71. Of this increase, less than one-third was due to the enhanced interest burden and rest due to the increase in *gross* primary deficit. Of the increase in gross primary deficit, little over one-third was on account of rise in net domestic lendings and the balance due to higher *net* primary deficit.

6. As far as the sources of financing are concerned, net RBI credit to government and domestic debt held outside the RBI together cover the bulk of the overall borrowing requirement. In fact, in 1970-71, less than 16 per cent of the overall borrowing

need was financed by RBI credit which rose to about one-third on an average during the four year period ended 1988-89. Evidently, thus, proportionate reliance on the net RBI credit for financing government deficits appears to have remained high during the 1980's.

(C) Measurement of Domestic Debt

In the Indian budgetary practice, there are two sets of liabilities which comprise domestic debt:

(A) "Internal debt" which consists of current market loans, treasury bills, special securities issued to RBI and the like, and,

(B) "Other liabilities" which consist of small savings, provident funds etc. These liabilities are also classified as the debt because they involve servicing through interest payments and redemption.

The question of the appropriate measure of domestic debt boils down basically to the selection of relevant constituents under these two broad categories of domestic debt[8].

1. In the category of "internal debt" there is an item entitled, "special floating and other loans" which comprises non-negotiable, non-interest bearing securities issued to international financial institutions like World Bank, IMF etc. These are merely accounting contra entries and, therefore, ought to be excluded.

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8. It may be noted that in this study, the term "domestic debt" is used rather than "public debt" or "internal debt" or "internal liabilities" presently used in the literature. The term "public" is avoided because it may have a broader connotation covering the entire public sector whereas the focus here is only on the Central Government. The term "internal debt" is discarded because in the Indian budget documents it refers only to a part of the debt, not covering small savings, etc. Finally, the term "internal liabilities" is not considered suitable because one rupee coins or notes also constitute an internal liability of the government, but it does not qualify for being internal debt.

2. In the traditional method of compiling domestic debt statistics under the heading of the "other liabilities", an item entitled "reserve funds" which comprises depreciation and reserve funds of Railways, Posts and Department of Telecommunication etc. is included as an item of debt. These are, however, intra-governmental liabilities and should therefore be excluded.

3. In the same category, there is an item entitled "deposits" which is included as a debt item in the traditional method. This however is a grey area. This particular item comprises dozens of diverse items such as civil deposits, judicial deposits, deposits of Local Funds etc. Ideally, one ought to distinguish between "intra governmental" and "non-intra governmental" deposits and only include the latter as a constituent of the domestic debt. Such information, however, is not available. Prima facie, however, almost all of them appear to be "intra-governmental" in nature, and may, therefore, be excluded.

With these adjustments, an analytical measure of the gross domestic debt (GDD) can be derived. The corresponding net concept. i.e., net domestic debt (NDD) can then be obtained in a straightforward manner. For this purpose, debt obligations of others to the Central Government such as Central Government's loans to the States, Union Territories and public enterprises, have to be netted out from the gross domestic debt.

Table 2 presents data on the gross and net domestic debt of the Central Government for some benchmark years using the revised method. As a memorandum item, gross domestic debt figures based on the traditional method are also presented. Here again, for meaningful comparison, absolute values have been normalised using GDP at current market prices. Based on Table 2, several observations can be made:

(i) The domestic debt in India has increased very rapidly in the present decade. Since 1980-81, the gross domestic debt (GDD) has increased nearly two and half times whereas the net domestic debt (NDD) has increased as much as four times. It may be also noted that for any given year, the method proposed here gives a

Table 2: Evolution of Gross and Net Domestic Debt in India

(Rs. Crores)

Year	Gross Domestic Debt (GDD)			Net Domestic Debt (NDD)	Memo Item
	Net RBI Credit (Out- standing) to the govern- ment	Domestic debt held outside RBI	Gross domestic debt (GDD)		Gross Domestic Debt by the Tradi- tional Method
(1)	(2)	(3)	(4)	(5)	(6)
1970–71	3.843	7.074	10.917	1.664	13.079
% of GDD	(35.2)	(64.8)	(100.0)		
% of GDP	(9.5)	(17.6)	(27.1)	(4.1)	(32.5)
1980–81	15.853	27.174	42.977	13.626	48.151
% of GDD	(36.9)	(63.1)	(100.0)		
% of GDP	(11.7)	(19.9)	(31.6)	(10.0)	(35.5)
1987–88	52.793	94.680	1.47.473	68.638	1.72.038
% of GDD	(35.8)	(64.2)	(100.0)		
% of GDP	(16.0)	(28.6)	(44.6)	(20.8)	(52.1)

smaller level of debt compared with the traditional method in view of the exclusions discussed above.

(ii) The gross domastic debt to GDP ratio of 44.6 per cent for India in 1987–88 appears to be high in comparison with other developing countries. Indeed. it is broadly in line with the ratios recently estimated for selected industrial countries. Spaventa (1988), for example, has estimated that in 1986. four major industrial countries, viz., Germany, France, U.K. and U.S.A. had their debt–GDP ratio in the range 36 per cent (for France) to 54 per cent (for U.K.).

(iii) As far as the distribution of gross domestic debt holdings is concerned, about 36 per cent is held by the RBI, all others together accounting for the rest. Indeed, the RBI's share in the gross domestic debt (GDD) has remained remarkably stable around 36 per cent since 1970-71 which suggests that net RBI credit to government has grown in tandem with the enlargement of other domestic borrowings of the government.

(iv) The net outstanding RBI credit to government as a ratio of *net* domestic debt (NDD) in 1987-88 was placed at about 77 per cent. Even when the traditional measure of domestic debt is used, the ratio works out to be around 57 per cent. These relatively large holdings of net domestic debt by the RBI reflect the inadequate development of secondary markets for government securities in India.

II. Macroeconomic Implications of Domestic Debt

A Review of Literature

"The debate shows little signs of being resolved, although essentially the same arguments have been advanced for two centuries. For those who remain skeptical about the progress of economic science, the debt theory controversy provides ample corroboration"

– James Buchanan (1968)

Macroeconomic implications of domestic debt has been a subject of a long standing controversy in the fiscal literature. In fact, two distinct phases in the controversy are clearly discernible with the changing perceptions regarding the domestic debt. In the old tradition, domestic debts were created during wars or national emergencies and retired during peacetime. Correspondingly, theoretical discussions of domestic debt revolved around a narrow set of well-defined propositions. In the recent past, however, there is a break in this tradition, in that. many industrial countries have experienced a substantial *peacetime* accumulation of domestic debt. Accordingly, with the growing realisation that domestic debt accumulation is not necessarily transitory. theoretical treatments are increasingly becoming wider in their range.

(a) Traditional Controversies

It may be worthwhile to review some propositions from the traditional debate which have contemporary relevance. At least two such propositions can be identified; one relates to the impact of domestic debt and the other one concerns its incidence.

1. Way back in 1817, Ricardo enunciated a theorem which has been called the "Ricardian Equivalence Theorem". The theorem put forth a proposition that domestic debt and a lump sum tax of equiv- alent amount exert identical effects on the individual.

This theorem, to an extent, has been misinterpreted, partly because the underlying assumptions are not given due considera- tion. The theorem was derived under the conditions of perfect cer- tainty, perfect capital markets and on the assumption that in- dividuals act 'as if' they will live forever. Within these restrictive premises, the contention of the theorem is simply that for the in- dividual each of the two alternatives (i.e., current taxation and domestic debt issue) impose a burden that in a present value sense is substantially the same. As clarified by Buchanan, "This Ricar- dian equivalence does not suggest, however, that the objective pattern of cost payments remains the same over the two alterna- tives. Taxation and debt issue remain different, not similar, financing institutions. . . . . for the simple reason that taxes require a transfer of resource services from the individual to the fisc during the initial period, whereas debt issue postpones such transfer until later periods"[9] .

Recently, Barrow and other Rational Expectation theorists have revived the Ricardian Equivalence Theorem. Their contention is that domestic debt does *not* have any adverse wealth effect on private savings. According to this school, when government accumulates large domestic debt in relation to GDP, "rational" households an- ticipate higher taxes in the future. Because of this expectation, their "permanent" income is reduced. As a result, the impact of ac- cumulated domestic debt falls on consumption rather than on savings, thereby avoiding the dampening effect on the saving rate.

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9. Buchanan (1968), p. 32.

2. Another widely discussed and recurring proposition in the traditional controversies is: "We owe it to ourselves". The essence of the argument here is that the interest payments arising out of domestic debt represent nothing more than transfers from taxpayers to bondholders and so long as both groups are members of the same polity, no macroeconomic cost is involved. On the basis of this proposition, domestic debt is often dismissed as of no macroeconomic consequence.

Fallacious nature of this proposition is increasingly being realised. As observed by Buchanan (1968), "This conception of national debt contains a fundamental flaw in its failure to translate opportunity cost or burden from aggregative components into something that is meaningful to individual members"[10]. According to him, "The core of the fallacy lies in equating of the community as a unit, in some aggregated national accounting sense, with the individuals-in-the-community, in some political sense as participants, direct or indirect, in collective decision making"[11]. Accordingly, the belief that domestic debt is of no macroeconomic consequence is, therefore, illusory.

In the more recent literature, emphasis has shifted from issues such as whether or not the domestic debt matters towards those relating to how and where does it matter. This change of the focus is symptomatic of the recognition that the domestic debt does really matter. In fact, the fiscal literature which was overwhelmingly oriented towards "micro" aspects, is now increasingly dealing with "macro" aspects related mostly to the accumulation of domestic debt. Some of these emerging strands are reviewed next.

(b) Emerging Strands in Debt Literature

1. In the recent fiscal literature, considerable research effort is directed towards the so called "sustainability" aspect of domestic debt. It must be emphasised, however, that the underlying notion actually relates to economic "stability" rather than "sustainability".

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10. Buchanan (1968), p 4.

11. Buchanan (1968), p. 63.

This is evident from the fact that debt-financing of government deficits is deemed to be "sustainable" when the resultant debt-GDP ratio is converging to an asymptotic upper bound and is considered explosive otherwise.

It was Domar who pointed out, way back in 1944 that if the rate of interest is higher than the growth rate of the economy, any primary deficit will lead eventually to an explosive rise in the debt-GDP ratio. Recently, Bispham (1987) and Mason (1987) among others, have derived similar results more rigorously, based on intertemporal budget constraint. Basic algebra has been worked out and relevant stability conditions have been derived. Furthermore, formulae have been developed for quantifying the asymptotic upper bound when the debt-GDP ratio is non-explosive. This kind of analytical framework is very useful for deriving rigorous projections of the debt-GDP ratio for any economy.

2. Another important strand in recent fiscal literature relates to the impact of domestic debt on private savings. Boskin (1987) and Bagella (1987) for example, provide detailed analysis of the issue in the context of the US economy, where the saving rate has declined substantially in the recent years.

Of the four avenues by which national fiscal policies can affect private savings (i.e., the structure of taxation, redistribution from rich to poor, differential public and private propensities to consume and the growth of domestic debt) Boskin finds that the growth of implicit and explicit domestic debt may be the major cause of the decline in the US saving rate.

3. Besides the potential impact of domestic debt on the overall saving rate, several specific issues are also being addressed. For example, in the Italian context, impact of domestic debt on financial markets has been explored by Pagano (1988), impact on households demand for monetary assets has been analysed by Bollino and Rossi (1988) and the relationship between debt accumulation and capital controls has been investigated by Giovannini (1988).

4. Implications of rising domestic debt for the conduct of macro-economic policies has also been attempted. For example, issues relating to monetary and fiscal policy coordination with a high domestic debt have been discussed in the context of Italy by Tabel-lini (1988). Similarly, issues relevant for supply side policies in the context of the US economy have been examined by Paganetto (1987) and Eltis (1987).

(c) Relevance for Developing Countries

It is evident from the review of fiscal literature presented above that the available theoretical analyses as well as empirical applications have been designed specifically for dealing with debt accumulation in industrial economies. Corresponding literature in the context of developing countries is quite thin. In this regard, some broad observations may be made:

1. In developing countries like India, the rational expectation theoretic view that domestic debt accumulation does not affect private savings appears to have little practical relevance. The reasons are not far to seek. As Rakshit has observed, "(i) individual economic units can hardly be as rational or have as much information as is presumed . . . . , (ii) the distribution of tax burden is not closely linked with the pattern of holding of public debt . . . ."[12]. It follows, therefore, that the possibility of households responding to debt accumulation by anticipating higher taxes in the future and, consequently, with the reduced "permanent" income, lowering consumption rather than savings, is, farfetched in the context of developing economies.

2. In developing countries like India, the potential deleterious impact of "high" domestic debt is likely to emanate from inter-play of a different set of factors. High debt-GDP ratio implies large interest payments, which, in view of the constraints on raising direct taxes and the limited scope for lowering current outlays, may cause current budgetary savings and budgetary capital outlays to be squeezed. On the other hand, recourse to indirect taxes, especially those levied on intermediate inputs would reduce the net value

12. Rakshit (1989). p.4.

added in production to the extent that the incidence is not passed on to the consumers, thus adversely affecting productive efficiency. In sum, high debt-GDP ratio may result in lowering saving ratio and budgetary capital outlays and/or productive efficiency, thereby impeding economic growth.

In order to analyse diverse ramifications of the domestic debt accumulation, it is necessary, as the first step, to make rigorous forecasts of the debt-GDP ratio and the resultant interest burden, which is taken up in the next section.

III. Debt-Financing Scenario

(A) Analytical Framework

A convenient starting point for developing an analytical framework systematically linking government deficit with different modes of financing is provided by simple government budget constraint:

Eq. (1) $[(G(t)-T(t)] + i\,B(t-1) + i^* RG(t-1) = [B(t)-B(t-1)]$
$$+ [RG(t) - RG(t-1)]$$

where

G(t) =	government expenditure in period t, (non-interest revenue expenditure plus capital expenditure)
T(t) =	government revenue receipts in period t, (non-interest revenue receipts plus grants)
G(t)-T(t) =	primary deficit in period t,
B(t), B(t-1) =	gross domestic debt of the government held outside the RBI ("debt-financing") for the periods t and t-1 respectively,
RG(t), RG(t-1) =	net outstanding RBI credit to government in period t and t-1 respectively, and
i =	average interest rate on domestic debt outside the RBI
i* =	average interest rate on net outstanding RBI credit to government

The budget constraint given in Equation (1) simply states that the government deficit is wholly financed by "debt-financing" or by additional RBI credit to the government. In other words, it is a closed economy government budget constraint in which, additionally, government's lending to other sectors is implicitly assumed to be zero. These simplifying assumptions are relaxed below.

The following additional notations may be introduced here for expositional convenience :

Y(t), Y(t-1) =   GDP at current market prices in period t and t-1 respectively:

p =   inflation rate:

n =   real GDP growth:

k = (n+p) =   growth rate of nominal GDP.

As elaborated in Technical Appendix, with simple manipulations of the budget constraint, it can be shown that :

$$\text{Eq. (2)}\quad \frac{B(t)}{Y(t)} = \left[\frac{G(t)-T(t)}{Y(t)}\right] - \left[\frac{RG(t)-RG(t-1)}{Y(t)}\right] + \left(\frac{i^*}{i+k}\right)\frac{RG(t-1)}{Y(t-1)}$$

$$+\quad \frac{1+i}{1+k}\left(\frac{B(t-1)}{Y(t-1)}\right)$$

The equation (2) is easy to interpret[13]. The first term on the right hand side of equation (2) suggests that the ratio of "debt financing" to GDP tends to rise when the "primary deficit" increases in relation to GDP. The second term on the right hand side of equation (2) indicates that the ratio of "debt financing" to GDP tends to fall when change in outstanding net RBI credit to government rises as a proportion of GDP. It is essential to note that the secular trend in the "debt-financing to GDP ratio will be affected directly by these first two terms, namely, the primary deficit as a ratio of GDP and

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13. Eq.(2) is a first order difference equation of the form Y(t) - a Y (t-1) = f(t) which is linear with constant coefficients. For such equations, convergence to a stationary value requires o<a<1. see R.G.D Allen (1973). p. 185.

   This equation is essentially a discrete time version of a differential equation developed by Spaventa (1987).

the recourse to RBI financing as a ratio of GDP. The last terms in equation (2) are also important; even abstracting from the secular impact of the first two terms, it suggests the conditions under which the "debt-financing" to GDP ratio would grow at a declining rate and converge to a stationary value, as well as the condition under which the growth rate of the ratio would be rising continuously. For convergence, the so called stability condition is that the nominal rate of interest (i) must be less than the growth of nominal GDP (k), that is, $i < k$: this same condition can be stated alternatively as $(i-p) < n$, that is, the real growth rate of GDP should be higher than the real interest rate. If this condition does not hold, equation (2) implies an explosive (or unbounded) growth of the ratio, even if the underlying trend components do not lead to a secular rise.

The exposition so far has not explicitly dealt with official foreign borrowing and *net* domestic lendings and effects of these operations on the government's budget constraint. To deal with these aspects as well as maintain the focus on the problems of domestic debt accumulation, a few simplifying assumptions are made as follows:

(i) The official inflow of foreign resources denoted as [NF (t)-NF (t-1)] is exogenously determined and interest payments constitute a fraction (w) of the outstanding one-year lagged stock of official foreign debt [that is, equal to w . NF (t-1)]:

(ii) The level of *net* domestic lendings denoted by (L (t) – L(t-1)) is a proportion (h) of the change in the domestic debt held outside the RBI, (B (t) - B(t-1)), i.e, a fixed proportion of domestic borrowings excluding RBI credit is always on-lent to the non-Central government sectors: and

(iii) The interest rate on the outstanding stock of loans advanced by the government is fixed at (e).

With the above assumptions, the government budget constraint (eq. 1) can be reformulated as follows :

Eq. (3) $\left[\ G(t)\text{-}T(t)\ \right]\ +\ \ \left[\ iB(t\text{-}1)\quad +\quad i^* \ RG(t\text{-}1)\ +\ w\ NF(t\text{-}1)\ \right]$

$+\left[\ L(t)\ \text{-}\ L(t\text{-}1)\quad\text{-}\quad eL(t\text{-}1)\ \right]$

$=\left[\ B(t)\text{-}B(t\text{-}1)\ \right]\quad +\quad \left[\ RG(t)\text{-}RG(t\text{-}1)\ \right]\ +\ NF(t)\ \text{-}\ NF(t\text{-}1)$

The above equation states that the net primary deficit, interest payments on domestic and foreign debt and the government's net lending in excess of interest earnings on its previous lendings must be financed by enlarging the domestic "debt financing" or by additional money creation or else by resorting to foreign borrowings.

Using the notations in assumptions (i) above, the net external resource inflow is defined as follows :

Eq. (4) $F(t) = NF(t)\ \text{-}\ NF(t\text{-}1)\ \text{-}\ w\ NF\ (t\text{-}1)$

Using assumptions (ii) and (iii), it is seen that

Eq. (5) $L(t)\ \text{-}\ L(t\text{-}1)\ =\ h\ \ [B(t)\text{-}B(t\text{-}1)]$
Eq. (6) $L\ (t\text{-}1)\qquad =\ h\ B(t\text{-}1)$

Substituting eq. (4), (5), and (6) in eq. (3) and on rearrangement of terms, we get :

Eq. (7) $\dfrac{B(t)}{Y(t)} = \left(\dfrac{1}{1\text{-}h}\right)\left[\dfrac{G(t)}{Y(t)} - \dfrac{T(t)}{Y(t)} - \dfrac{[RG(t)\text{-}RG(t\text{-}1)]}{Y(t)} - \dfrac{F(t)}{Y(t)}\right]$

$+\left[\dfrac{i^*}{(1\text{-}h)\ (1+k)}\right]\dfrac{RG(t\text{-}1)}{Y(t\text{-}1)} + \left[\dfrac{1 +\left[\dfrac{i\text{-}eh}{i\text{-}h}\right]}{1+k}\right]\dfrac{B(t\text{-}1)}{Y(t\text{-}1)}$

The eq. (7) has the same first order difference equation formulation as the earlier eq. (2)[14]. Moreover, if one assumes h=o, the coefficient of the lagged variable $\dfrac{B(t\text{-}1)}{Y(t\text{-}1)}$ in eq. (7) becomes $\dfrac{1+i}{1+k}$ which is the same as the coefficient of $\dfrac{B(t\text{-}1)}{Y(t\text{-}1)}$ in eq. (2).

14. Details of the derivation are in the Technical Appendix.

The condition for stability of the domestic debt ratio in equation

(7) is $\left[1 + \dfrac{i\text{-}eh}{(1\text{-}h)} \right] < 1\text{+}k$

which after some manipulation yields the stability condition

[he + (1-h). k]> i

The weighted average of the interest rate on domestic lending (e) and the nominal GDP growth rate (k), using the ratio (h) of net lending to the net domestic borrowing as the weight, must exceed the interest rate on the government's domestic borrowing. If h=o, one has the already familiar condition k ≽i. Moreover, the condition has the interpretation that stability of the "debt financing" to GDP ratio can be achieved by appropriately raising the interest rate on domestic lending (e) and/or the nominal GDP growth rate (k) above the nominal cost of "debt financing" (i). It may be noted that artificially lowering the borrowing rate (i) is not a solution to the debt problem because at the limit it implies an unviable financial system. Depressing i would imply raising funds from captive financial institutions at a lower cost and an increasingly lower volume of directly mobilised household savings. In an inflationary environment, the captive financial institutions could not continue to operate profitably with lower interest earnings on government lending without raising their lending rates (or other service charges) to the non–government sectors and/or lowering deposit rates: one would then be either "crowding out" other borrowers or pushing savings out of the financial sectors into inflation hedges.

The equation (7) captures the dynamic relationship between primary deficit (as a ratio of GDP) and different modes of financing it. Accordingly, it forms the basis for projections under the assumed conditions.

The debt–financing scenario developed below addresses the following question: what would be the future time profile of "debt–financing" to GDP ratio if the government deficit is allowed to evolve passively and domestic borrowings (other than those from the RBI) are used for financing it while the other modes of financing, such as, net RBI credit to government and external financing are main-

tained at their current ratios of GDP.

In order to conduct this thought experiment, the basic dynamic relationship (eq.7) needs to be suitably modified. As detailed in the Technical Appendix, the following form could be derived:

$$\text{Eq. (8)} \quad \frac{B(t)}{Y(t)} = \frac{1}{1-h} \left[\frac{G(t)}{Y(t)} - \frac{T(t)}{Y(t)} - \frac{F(t)}{Y(t)} \right]$$

$$- \left[\frac{k-i^*}{(1-h)(1+k)} \right] \frac{RG(t-1)}{Y(t-1)} + \left[\frac{1 + \frac{i \cdot eh}{(i-h)}}{1+k} \right] \frac{B(t-1)}{Y(t-1)}$$

which forms the basis for the "debt-financing" scenario.

(B) Projections for Debt-GDP Ratio

In order to project the debt-GDP ratio under the "debt-financing" scenario, eq. (8) was used with the following numerical values assigned to selected parameters:

n = real GDP growth   = 5 per cent
p = inflation rate   = 7 per cent
i = nominal interest rate on domestic debt held outside the RBI
    = 10.2 per cent
i^* = nominal interest rate on domestic debt held by the RBI
    = 5.3 per cent
e = nominal interest rate on government's domestic lending
    = 7.4 per cent[15]
h = fraction of domestic borrowings on-lent by the government
    = 0.4

The ratio of net outstanding RBI credit to government to GDP and the ratio of net foreign inflow of official resources were held constant at their 1987-88 levels of 16 per cent and 0.87 per cent respectively. On the other hand, expenditure - GDP ratio and receipts - GDP ratio were allowed to evolve endogenously.

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15. As quoted by Seshan (1987), Table 9.

Time profile for government expenditure[16] and receipts[16] and hence, the net primary deficit (all expressed as ratio to GDP) were derived using :

$$\text{Eq. (9)} \quad \frac{G(t)}{Y(t)} = \left[\frac{1 + (u1)\ (n) + (v1)\ (p)}{1 + n + p} \right] \frac{G(t-1)}{Y(t-1)} \quad \text{and}$$

$$\text{Eq. (10)} \quad \frac{T(t)}{Y(t)} = \left[\frac{1 + (u2)\ (n) + (v2)\ (p)}{1 + n + p} \right] \frac{T(t-1)}{Y(t-1)}$$

where n = assumed real GDP growth:

    p = assumed inflation rate;

    u1 = real income elasticity of nominal expenditure;

    u2 = real income elasticity of nominal receipts;

    v1 = price elasticity of nominal expenditure;

    v2 = price elasticity of nominal receipts;

Regression Equations

$$\log (G) = -8.2 + 2.395 \log (Y/P) + 0.647 \log (P)$$
$$\quad\quad\quad (4.57) \quad (6.58) \quad\quad\quad\quad (3.47)$$

$$R^{-2} = 0.994,\ DW = 2.21\ SEE = 0.0259$$
(sample period 1970–71 to 1987–88)

$$\log (T) = -14.76 + 2.0730 \log (Y/P) + 0.5623 \log (P)$$
$$\quad\quad\quad (3.04) \quad\quad (5.01) \quad\quad\quad\quad (2.60)$$

$$R^{-2} = 0.99,\ DW = 1.60,\ SEE = 0.0473$$
(Sample period 1975–76 to 1986–87)

(Figures in brackets indicate respective 't' values)

These regressions, which are satisfactory in their statistical properties, indicate that the real income elasticity of nominal government expenditure (u1) (i.e.. 2.395) exceeds the corresponding elasticity of nominal revenue receipts (u2) (i.e. 2.073). Similarly, price elasticity of nominal expenditure

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16. G and T are defined as non-interest revenue expenditure plus capital expenditure and non-interest revenue receipts plus grants respectively, so that the difference equal the net primary deficit

Table 3: Projections of Debt – GDP Ratio

(1988-89 to 1999-2000)

Year	Ratios to Y(t)				B(t)/Y(t)	Over-all Debt-GDP Ratio
	G(t)	T(t)	F(t)	RG(t)		
	(1)	(2)	(3)	(4)	(5)	(6)
1987-88*	17.10	12.60	0.87	16.00	28.60	44.60
1988-89	17.77	12.86	0.87	16.00	33.24	49.24
1989-90	18.47	13.12	0.87	16.00	38.53	54.53
1990-91	19.20	13.39	0.87	16.00	44.50	60.50
1991-92	19.96	13.66	0.87	16.00	51.18	67.18
1992-93	20.75	13.94	0.87	16.00	58.59	74.59
1993-94	21.57	14.22	0.87	16.00	66.78	82.78
1994-95	22.42	14.51	0.87	16.00	75.76	91.76
1995-96	23.30	14.81	0.87	16.00	85.55	101.55
1996-97	24.22	15.11	0.87	16.00	96.20	112.20
1997-98	25.17	15.42	0.87	16.00	107.74	123.74
1998-99	26.16	15.73	0.87	16.00	120.21	136.21
1999-2000	27.19	16.05	0.87	16.00	133.65	149.65

* : Actuals

Notes: 1. Col.(1) is based on the formula : $\left[\dfrac{1 + u1\,(n) + v1\,(p)}{i + n + p}\right] \dfrac{G\,(t-1)}{y\,(t-1)}$

2. Col.(2) is based on the formula : $\left[\dfrac{1 + u2\,(n) + v2\,(p)}{1 + n + P}\right] \dfrac{T(t-1)}{y\,(t-1)}$

3. Col.(5) = 1.6666 [Col.(1) – Col.(2) – Col.(3)]

$- 0.0997 \left[\dfrac{(RG(t)}{y\,(t)}\right] + 0.9827 \left[\dfrac{B\,(t)}{y\,(t)}\right]_{-1}$

4. Col.(6) = Col.(4) + Col.(5).

(i.e. v1 = 0.647) exceeds the corresponding elasticity of nominal receipts (i.e. v2 = 0.562). These phenomena, widely observed in developing countries, confirm the hypothesis that the primary deficit tends to widen with a passive fiscal policy stance.

Having obtained the elasticity estimates, equations (9) and (10) were used for deriving projections of the net primary deficit as a ratio of GDP under the assumed real GDP growth and inflation rate. Given the time profile for the net primary deficit (as a ratio of GDP) and the assumptions regarding the other parameters, dynamic evolution of the debt-GDP ratio was derived as detailed in Table 3.

As indicated in Table 3, a passive fiscal stance is likely to result in enlargement of the net primary deficit to GDP ratio from 4.5 per cent in 1987-88 to as much as 11.1 per cent by the year 1999-2000. The corresponding gross primary deficit could easily be of the order of 19-20 per cent of GDP. Contemporaneously, the "debt-financing" to GDP ratio would increase very rapidly; from 28.6 per cent in 1987-88 to as much as 133.7 per cent and the overall debt-GDP ratio would shoot up from 44.6 per cent in 1987-88 and crossing the 100 per cent mark in 1995-96, would reach nearly 150 per cent by the turn of the century. Such a rapid escalation of debt-GDP ratio naturally raises the question of its sustainability.

(C) Sustainability of Domestic Debt

In the recent fiscal literature, domestic debt accumulation is regarded 'sustainable' as long as the resultant debt – GDP ratio is converging to an asymptotic upper bound and is deemed to be explosive otherwise. This connotation of sustainability appears to be less meaningful for developing countries. In the context of developing countries, sustainability ought to be seen in terms of sustaining rapid economic growth. In this regard, the pre-emptive impact of mounting interest burden emanating from rising debt – GDP ratio on the revenue receipts assumes crucial importance.

Gross interest burden of domestic debt can simply be defined as the ratio of gross domestic interest payments (GDIP) to government's revenue receipts (T). The level of gross domestic interest

payments (GDIP), in turn can be derived as the product of interest rate and the stock of *overall* outstanding domestic debt at the end of the previous year. Thus,

Gross Interest Burden (GIB)

$$= \frac{\text{Gross Domestic Interest Payments (GDIP)}}{\text{government receipts (T)}}$$

which can be written as

$$\text{GIB} = \frac{r\ D\ (t-1)}{T(t)}$$

$$= \frac{r\ D(t-1)}{(1+u_2 n+v_2 p)\ T(t-1)}$$

where

D = overall domestic debt;
r = average interest rate on *overall* domestic debt;
u_2 = real income elasticity of nominal receipts:
v_2 = price elasticity of nominal receipts:

$$= \frac{r}{1+u_2 n+v_2 p} \left[\frac{D(t-1)}{T(t-1)} \right] \quad \text{Thus,}$$

Eq. (11) GIB $= \left[\dfrac{r}{1+u_2 n+v_2 p} \right] \left[\dfrac{D(t-1)/Y(t-1)}{T(t-1)/Y(t-1)} \right]$

Since the projections for debt–GDP ratio and receipts–GDP ratio have already been derived, eq. (11) can be readily used for obtaining corresponding projections of the gross interest burden (GIB). It may be noted, however, that for policy purposes what is more relevant is the net interest burden (NIB) rather than the gross burden, i.e., domestic interest receipts arising from the loans and advances of the government should be netted out. A simple way to derive the net interest burden (NIB) is to assume that the ratio of net to gross domestic interest payments remains unchanged at the base year level throughout the projection period. Relevant projections of gross and net interest burden for the period 1988–89

Table 4: Interest Burden of Domestic Debt

(Gross & Net)

Year	Debt–GDP Ratio	T(t)/Y(t)	Gross Interest Burden GDIP/$_T$	Net Interest Burdeu NDIP/$_T$
	1	2	3	4
1987–88*	44.60	12.60	26.16	11.43
1988–89	49.24	12.86	28.30	12.36
1989–90	54.53	13.12	30.71	13.42
1990–91	60.50	13.39	33.39	14.59
1991–92	67.18	13.66	36.34	15.88
1992–93	74.59	13.94	39.54	17.28
1993–94	82.78	14.22	43.02	18.80
1994–95	91.76	14.51	46.73	20.42
1995–96	101.55	14.81	50.67	22.14
1996–97	112.20	15.11	54.87	23.97
1997–98	123.74	15.42	59.30	25.91
1998–99	136.21	15.73	63.99	27.96
1999–2000	149.65	16.05	68.90	30.10

* Actuals

Notes: Col.(1) = Col.(6) of Table 3.

Col.(2) = Col.(2) of Table 3.

Col.(3) = 0.0739 $\left[\dfrac{Col.(1)}{Col.(2)} \right]$ × 100

Col.(4) = 0.4369 [Col.(3)]

through 1999-2000 are presented in Table 4.

It is evident from Table 4 that with the rapid increase in the debt-GDP ratio, corresponding net interest burden (NIB) is also likely to go up substantially from about 11.4 per cent of receipts in 1987-88 to as much as 30.1 per cent of projected receipts by the turn of the century.

The enormity of this potential situation can be appreciated with a historical perspective. The net interest burden was actually negative until 1973-74. It was as low as 1 per cent of receipts in 1974-75 and increased to about 5.1 per cent of receipts in 1980-81. With the acceleration of domestic debt accumulation during the 1980's, it rose to about 12 per cent of receipts in 1987-88. And now, if the government receipts and expenditure are allowed to evolve passively while relying on 'debt financing' of the resultant deficits, the net interest burden would shoot up to as much as 30 per cent of projected receipts by the year 1999-2000.

Implications of such a large increase in the net interest burden are fairly obvious. In a developing economy like India, raising direct taxes is subject to serious socio-economic constraints. Alternatively, recourse to indirect taxes, especially those levied on intermediate inputs, is likely to hurt productive efficiency by reducing the net value added in production (to the extent that the incidence is not passed on to the consumers). On the other hand, on the expenditure side, current outlays tend to be sticky downwards. In such a fiscal environment, higher net interest burden may invariably lead to a squeeze on budgetary capital outlays, thereby stifling economic growth.

IV. Monetary Financing Scenario

Section III has demonstrated what lies at the end of the rainbow, if the burgeoning government deficit is not arrested in time and "debt-financing" is used for financing the emerging deficit passively while maintaining the other modes of financing at their current ratios to GDP. Given the potential adverse implications of domestic debt accumulation, policy makers may be inclined to rely on some other way of financing the deficit rather than checking its expan-

sion. In the Indian context, resorting to net RBI credit on a larger scale may, especially, be tempting.

This section accordingly develops a monetary financing scenario. The thought experiment here addresses the following question: If government deficit is allowed to evolve passively and is financed by resorting to additional net RBI credit while maintaining the domestic "debt-financing" and foreign financing at their current ratios to GDP, what would be macroeconomic consequences for the economy?

(A) Analytical Framework

As detailed in the Technical Appendix, the dynamic relationship between debt-GDP ratio and different modes of financing govern- ment deficit (i.e. eq. 7) can be suitably modified for deriving the monetary financing scenario. The relevant difference equation takes the form :

$$\text{Eq. (12)} \quad \left[\frac{RG(t) - RG(t-1)}{Y(t)} \right]$$

$$= \left[\frac{G(t)}{Y(t)} - \frac{T(t)}{Y(t)} - \frac{F(t)}{Y(t)} \right] + \left(\frac{i^*}{i+k} \right) \frac{RG(t-1)}{Y(t-1)}$$

$$+ \left[\frac{h(k-e) - (k-i)}{1+k} \right] \frac{B(t-1)}{Y(t-1)}$$

This equation forms the basis of our monetary financing scenario.

In order to make eq. (12) operational, evolution of each of the terms on the right hand side must be traced. In this regard, several adjustments are needed:

1. The inflation rate must be allowed to adjust upwards in response to rising ratio of pure monetary financing to GDP. For this purpose, the following simple formulation is proposed:

$$\text{Eq. (13)} \quad \Delta P = \beta_0 + \beta_1 (MFR)_{-1} + \beta_2 = (\Delta P)_{-1}$$

$$\text{where MFR} = \left[\frac{RG(t) - RG(t-1)}{Y(t)} \right]$$

In this formulation, change in the price level (Δp) in the current period is posited as a function of the lagged monetary financing ratio to GDP and the own lagged value[18]

Capturing the nexus between monetary financing and inflation, admittedly, requires a more elaborate model with due allowance made for appropriate real sector variables. The emphasis here, however, is on a thought experiment, which is adequately served by this simple specification.

2. When inflation rate is allowed to adjust upwards in response to rising monetary financing ratio, corresponding provision is also needed for revision of nominal interest rate on domestic debt. The indexation of interest rate on domestic debt held outside the RBI is assumed to take the following form:

Eq. (14) $i_t = p_t + 0.03$

On the other hand, interest rate on domestic debt held by the RBI is expected to take the form:

Eq. (15) $i^*_t = p_t - 0.02$

In other words, the nominal interest rate on domestic debt held outside the RBI is assumed to be maintained 3 percentage points *above* the inflation rate whereas the nominal interest rate on debt held by the RBI is assumed to remain 2 percentage points below the inflation. This corresponds roughly to the actual interest rate differentials in the base year.

(B) Application to Indian Data

In order to apply the framework developed above to Indian data, the following numerical values were assigned to relevant parameters:

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18. Equivalently, the equation can also be interpreted as a relationship between price level (P) in the current period on the one hand and the lagged monetary financing to GDP ratio and the own lagged values for two periods on the other.

1. n = real GDP growth rate = 5 per cent per annum[19]
2. h = fraction of domestic borrowings on-lent by the government
      = 0.5
3. The domestic debt outside the RBI and foreign financing, both as ratios to GDP are maintained at their respective 1986-87 levels.

The relationship between price level and the monetary financing ratio, (i.e., eq. 13) was estimated using Indian data for the period 1970-71 to 1986-87 and the following regression equation was obtained:

$$\Delta P = 0.075 + 13.68 \ (MFR)_{-1} - 0.7 \ (\Delta P)_{-1}$$
$$\quad (2.59) \quad (5.04) \quad\quad\quad (-2.81)$$

$$\bar{R}^2 = 0.71 \quad DW = 2.04$$

The price level was measured by the GDP (at factor cost) deflator and the net outstanding RBI credit to government for the period t was measured as the average of the end-period values for periods t-1 and t.

Based on the estimated relationships and the assumed values of relevant parameters, monetary financing scenario was derived recursively as follows:

The monetary financing ratio in the base year (1987-88), using the above mentioned regression equation, yields change in the price level and hence the inflation rate (p) in the next year. The inflation rate along with the assumed real GDP growth rate and the relevant estimated elasticities determine expenditure-GDP (G/Y) ratio and receipts - GDP (T/Y) ratio. The inflation rate also deter-

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19. In terms of the sustainability condition derived in Section II. the assumption of five
    per cent real GDP growth and three per cent real interest rate on domestic debt held
    outside the RBI implies that explosive evolution of debt-GDP ratio is ruled out by con-
    struction. This has been done with a view to demonstrate the potential adverse im-
    pact of monetary financing *even* under a relatively favourable set of circumstances.
    The outcome could only be worse in less suitable environment.

mines nominal interest rate (i) on debt held outside the RBI and nominal interest rate (i*) on debt held by the RBI. The values of (p), (i), and (i*) along with other parameters (h), (k) and (e) determine the coefficients for (RG/Y) and (B/Y) in the basic difference equation (eq. 12). Relevant substitutions then yield the pure monetary financing – GDP ratio in that year, which determines inflation rate in the next year and the whole process is repeated again.

Results of this scenario are presented in Table 5. As is evident from the table, resorting to monetary financing is likely to set in motion a vicious circle of large deficit, higher monetary financing, more inflation leading again to a larger deficit and so on. Indeed, reliance on net RBI credit is likely to raise the monetary financing ratio from 2.4 per cent of GDP in the base year to 17.3 per cent of GDP and consequently the inflation rate is likely to shoot up from under 7 per cent in the base year to as much as 20 per cent within five years.

This order of acceleration of inflation emanating from monetary financing *alone* is very serious, given the most favourable conditions assumed. If the real GDP growth falters from the assumed 5 per cent rate, say due to supply side shocks such as adverse weather conditions etc., the inflation rate may easily flare up even beyond 20 per cent per annum in a matter of only five years.

Summary and Conclusions

1. Concerns are being voiced about the growing government deficits and the resultant rapid expansion of domestic debt in India and yet, relevant issues have not been adequately and rigorously investigated. The subject calls for a comprehensive and much deeper analysis than the treatments presently available. What is needed is a systematic analysis of the dynamic nexus between widening government deficits and different modes of financing them in the framework of inter-temporal budget constraint. This study makes an effort in that direction.

2. For a comprehensive analysis, first of all, the data base has to be reconstructed. Available measures of government deficit and domestic debt are accounting figures rather than proper economic

Table 5: Monetary Financing Scenario

Year	P	$\Delta\bar{P}$	p	$\dfrac{G(t)}{y(t)}$	$\dfrac{T(t)}{y(t)}$	[Coefficient] $\times\left[\dfrac{RG(t-1)}{y(t-1)}\right]$	[Coefficient] $\times\left[\dfrac{B(t-1)}{y(t-1)}\right]$	$\dfrac{\Delta RG}{y}$ (= MFR)
	1	2	3	4	5	6	7	8
1986-87	3.62@							
1987-88	3.9282@	0.308@	0.085@	0.171@	0.126@			0.024@
1988-89	4.1162	0.188	0.048	0.182	0.130	0.005	-0.001	0.047
1989-90	4.7022	0.586	0.142	0.193	0.129	0.021	0.010	0.086
1990-91	5.5432	0.841	0.179	0.204	0.126	0.034	0.014	0.117
1991-92	6.6302	1.087	0.196	0.215	0.123	0.047	0.016	0.146
1992-93	7.9422	1.312	0.198	0.227	0.120	0.059	0.016	0.173

@ denotes actuals.

aggregates. These need to be replaced by analytically meaningful measures.

Alternate government deficit estimates for 1970-71 and for the 1980's have been derived, which indicate that government deficit in India as a ratio of GDP has significantly widened during the 1980's. The traditional budget deficit increased from 0.7 per cent of GDP in 1970-71 to the average of 1.3 per cent in the first half of the 1980's and to the average of 2.3 per cent.in the next four years ending 1988-89. The traditional budget deficit, however, has been grossly underestimating the overall borrowing need arising out of the fiscal operations of the government. Indeed, the traditional budget deficit has been roughly between one-fifth and one-third of relevant gross fiscal deficit, which correctly reflects the overall borrowing need. The gross fiscal deficit expanded from 3.5 per cent of GDP in 1970-71 to the average of 7.0 per cent of GDP in the first half of the 1980's and further to the average of 9.3 per cent in the four year period ended in 1988-89. Contemporaneously the gross primary deficit worsened from 3.5 per cent of GDP to as much as 7.6 per cent of GDP during same period.

An attempt has also been made to derive analytically more meaningful measures of domestic debt. The rapid increase in domestic debt in India is evident from the estimates obtained. According to the method proposed in the study, gross domestic debt expanded from 27.1 per cent of GDP in 1970-71 to 31.6 per cent of GDP in 1980-81 which rose further to as much as 44.6 per cent of GDP in 1987-88.

3. Starting from the inter-temporal budget constraint, analytical expressions in the form of difference equations were derived so as to establish the dynamic inter-linkages between government deficits and different modes of financing them. This framework was used to conduct two thought experiments:

(a) In "debt-financing scenario", the question addressed is: what would be the future time profile of debt-GDP ratio if the government deficit is allowed to evolve passively and domestic borrowings excluding those from the RBI are used for financing it while maintaining the other modes of financing at their current ratios to GDP?

(b) In monetary-financing scenario, the question addressed is: what would be the projected impact on inflation if the government deficit is allowed to evolve passively, financed by resorting to additional net RBI credit while holding the domestic "debt financing" and foreign financing at their base year ratios to GDP?

4. Under the debt-financing scenario, the overall debt-GDP ratio is projected to increase very rapidly; rising from 44.6 per cent of GDP in 1987-88, the overall debt-GDP ratio would cross the 100 per cent mark in 1995-96, reaching as much as 150 per cent by the year 1999-2000.

With the rapid increase in the *overall* debt-GDP ratio, corresponding net interest burden (i.e., net domestic interest payments as ratio of projected receipts) would also rise substantially. The net interest burden was barely 1 per cent in 1974-75 and rose, to about 12 per cent in 1987-88. With the projected acceleration of debt accumulation, it would shoot up to as much as 30 per cent of projected receipts by the turn of the centrury. Given the limited scope for raising receipts - GDP ratio and the tendency for current outlays to be sticky downwards, the higher net interest burden may invariably lead to a squeeze on budgetary capital outlays, thereby stifling economic growth.

5. Resorting to larger recourse to RBI financing is not a panacea of the problem either. The monetary financing scenario has demonstrated that such an attempt would lead to a vicious circle of large deficit, higher monetary financing, more inflation leading again to a larger deficit and so on. Indeed, the inflation rate as measured by GDP deflator, which was under 7 per cent in the base year could, by this factor alone, be pushed to unacceptably high level of about 20 per cent within a five year priod. If the real GDP growth rate turns out to be less than 5 per cent per annum as assumed, say due to adverse weather conditions, the inflation rate may easily flare up even beyond 20 per cent per annum within a short span of time.

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Technical Appendix

The simple budget constraint is :

$$G(t) - T(t) + iB(t-1) + i^* RG(t-1)$$

$$= \left[B(t) - B(t-1) \right] + \left[RG(t) - RG(t-1) \right]$$

$$\therefore \frac{B(t) - B(t-1)}{Y(t)} = \frac{G(t) - T(t) + iB(t-1) + i^* RG(t-1) - [RG(t) - RG(t-1)]}{Y(t)}$$

Now,
$$\frac{B(t)}{Y(t)} - \frac{B(t-1)}{Y(t-1)} = \frac{B(t)}{Y(t)} - (1+k) \left[\frac{B(t-1)}{Y(t)} \right]$$

Since $Y(t) = (1+k) \, Y(t-1)$

$$\Rightarrow \frac{B(t)}{Y(t)} = \left[\frac{B(t) - B(t-1)}{Y(t)} \right] - k \left[\frac{B(t-1)}{Y(t)} \right] + \frac{B(t-1)}{Y(t-1)}$$

Combining the two results, we get,

$$\frac{B(t)}{Y(t)} = \left[\frac{G(t) - T(t)}{Y(t)} \right] - \left[\frac{RG(t) - RG(t-1)}{Y(t)} \right] + \frac{iB(t-1)}{Y(t)} + \frac{i^* RG(t-1)}{Y(t)}$$

$$- k \frac{B(t-1)}{Y(t)} + \frac{B(t-1)}{Y(t-1)}$$

$$= \left[\frac{G(t) - T(t)}{Y(t)} \right] - \left[\frac{RG(t) - RG(t-1)}{Y(t)} \right] + \frac{i^* RG(t-1)}{Y(t)}$$

$$+ (i-k) \left[\frac{B(t-1)}{Y(t)} \right] + \frac{B(t-1)}{Y(t-1)}$$

Which using $Y(t) = (1+k) \, Y(t-1)$ simplifies to

$$(A.1) \quad \frac{B(t)}{Y(t)} = \left[\frac{G(t) - T(t)}{Y(t)} \right] - \left[\frac{RG(t) - RG(t-1)}{Y(t)} \right] + \frac{(i^*)}{(1+k)} \left[\frac{RG(t-1)}{Y(t-1)} \right]$$

$$+ \left(\frac{1+i}{1+k} \right) \frac{B(t-1)}{Y(t-1)} .$$

which is the equation (2) in the text.

In the general case, the intertemporal budget constraint is :

$$\left[\ G(t) - T(t)\ \right] \quad + \quad \left[\ iB(t\text{-}1) + i^* \ RG(t\text{-}1) + w \ NF(t\text{-}1)\ \right]$$

$$+ \quad \left[\ L(t) - L(t\text{-}1) \quad - \quad eL(t\text{-}1)\ \right]$$

$$= \quad \left[\ B(t) - B(t\text{-}1)\ \right] \quad + \quad \left[RG(t) - RG(t\text{-}1)\right] \quad + \quad \left[\ NF(t) - NF(t\text{-}1)\ \right]$$

In view of the assumptions, we have

$$F(t) \ = \ NF(t) \ - \ NF(t\text{-}1) \ - \ w \ NF(t\text{-}1)$$

$$L(t) - L(t\text{-}1) \quad = \quad h \ \left[B(t) - B(t\text{-}1) \right]$$

$$L(t\text{-}1) \quad = \quad h \ B(t\text{-}1)$$

On substitution in the budget constraint, we get

$$\left[\ G(t) - T(t)\ \right] + \left[\ iB(t\text{-}1) + i^* \ RG(t\text{-}1)\right] \ + \ h \ \left[B(t) - B(t\text{-}1)\right] - eh \ B(t\text{-}1)$$

$$= \left[\ B(t) - B(t\text{-}1)\ \right] \quad + \quad \left[\ RG(t) - RG(t\text{-}1)\right] \ + \ F(t)$$

$$\Rightarrow \ (1\text{-}h) \qquad \left[\ B(t) - B(t\text{-}1)\ \right] \qquad =$$

$$\left[\ G(t) - T(t)\ \right] \quad + \left[\ iB(t\text{-}1) + i^* \ RG(t\text{-}1)\ \right] \ - eh \ B(t\text{-}1)$$

$$- \left[\ RG(t) \ - \ RG(t\text{-}1)\ \right] - F(t)$$

$$\Rightarrow \ \left[\ B(t) - B(t\text{-}1)\right] \quad =$$

$$\left(\frac{1}{1\text{-}h}\right) \ \left[G(t) - T(t) \ - \ [\ RG(t) - RG(t\text{-}1)\ ] \ - F(t) \right]$$

$$+ \left[\frac{i^*}{(1\text{-}h)}\right] \ RG(t\text{-}1) + \left[\frac{i\text{-}eh}{1\text{-}h}\right] \ B(t\text{-}1)$$

$$\Rightarrow B(t) \ = \left(\frac{1}{1\text{-}h}\right) \ \left[G(t) - T(t) \ - \ [\ RG(t) - RG(t\text{-}1)\ ] - F(t) \right]$$

$$+ \left(\frac{i^*}{1\text{-}h}\right) \ RG(t\text{-}1) \ + \ \left[1 \ + \left(\frac{i\text{-}eh}{1\text{-}h}\right) \right] \ B(t\text{-}1)$$

$$\Rightarrow \quad \frac{B(t)}{Y(t)} = \left(\frac{1}{1\text{-}h}\right) \left[\frac{G(t)}{Y(t)} - \frac{T(t)}{Y(t)} - \frac{RG(t) - RG(t\text{-}1)}{Y(t)} - \frac{F(t)}{Y(t)} \right]$$

$$+ \left(\frac{i^*}{1\text{-}h}\right) \frac{RG(t\text{-}1)}{Y(t)} + \left[1 + \left(\frac{i\text{-}eh}{1\text{-}h}\right) \right] \frac{B(t\text{-}1)}{Y(t)}$$

which using $Y(t) = (1 + k) \quad Y(t\text{-}1)$ yields

$$(A.2) \quad \frac{B(t)}{Y(t)} = \left(\frac{1}{1\text{-}h}\right) \left[\frac{G(t)}{Y(t)} - \frac{T(t)}{Y(t)} - \frac{RG(t) - RG(t\text{-}1)}{Y(t)} - \frac{F(t)}{Y(t)} \right]$$

$$+ \left[\frac{i^*}{(1\text{-}h)(1+k)} \right] \frac{RG(t\text{-}1)}{Y(t\text{-}1)} + \left[\frac{1 + \left(\frac{i - eh}{1 - h}\right)}{1+k} \right] \frac{B(t\text{-}1)}{Y(t\text{-}1)}$$

which is the basic difference equation [eq. (7)] in the text. If one assumes that there are no domestic lendings (i.e., h = 0) and no foreign financing, i.e., F(t) = 0, then eq. (A.2) reduces to eq. (A.1) as. in the simple case.

(a) **Difference Equation for "Debt-financing" Scenario**
Collecting the terms involving net RBI credit, we have

$$\left[\frac{i^*}{(1\text{-}h)(1+k)} \right] \frac{RG(t\text{-}1)}{Y(t\text{-}1)} - \left(\frac{1}{1\text{-}h}\right) \frac{RG(t)}{Y(t)} + \left(\frac{1}{1\text{-}h}\right) \frac{RG(t\text{-}1)}{Y(t)}$$

$$= \left[\frac{i^*}{(1\text{-}h)(1+k)} \right] \frac{RG(t\text{-}1)}{Y(t\text{-}1)} - \left[\frac{1}{(1\text{-}h)} \right] \frac{RG(t)}{Y(t)} + \left[\frac{1}{(1\text{-}h)(1+k)} \right] \frac{RG(t\text{-}1)}{Y(t\text{-}1)}$$

$$= \left[\frac{1+i^*}{(1-h)\,(1+k)} \right] \frac{RG(t-1)}{Y(t-1)} - \left[\frac{1}{(1-h)} \right] \frac{RG(t)}{Y(t)}$$

If the net RBI credit to government as a ratio of GDP is kept constant,

$$\frac{RG(t)}{Y(t)} = \frac{RG(t-1)}{Y(t-1)}$$

Accordingly, the expression becomes,

$$\left[\frac{1+i^*}{(1-h)\,(1+k)} \right] \frac{RG(t-1)}{Y(t-1)} - \left(\frac{1}{1-h} \right) \frac{RG(t-1)}{Y(t-1)}$$

$$= \left[\frac{i^* - k}{(1-h)\,(1+k)} \right] \frac{RG(t-1)}{Y(t-1)}$$

which on substitution in (A.2) yields

(A.3) $\quad \dfrac{B(t)}{Y(t)} = \left(\dfrac{1}{1-h} \right) \left[\dfrac{G(t)}{Y(t)} - \dfrac{T(t)}{Y(t)} - \dfrac{F(t)}{Y(t)} \right]$

$$- \left[\frac{k - i^*}{(1-h)\,(1+k)} \right] \frac{RG(t-1)}{Y(t-1)} + \left[\frac{1 + \left(\frac{i - eh}{1 - h} \right)}{1+k} \right] \frac{B(t-1)}{Y(t-1)}$$

which is the eq. (8) in the text, used for the "debt-financing" scenario.

(b) **Difference Equation for Monetary Financing Scenario**
The last term on the RHS of eq. (A.2) can be simplified to

$$\left(\frac{1}{1+k} \right) \frac{B(t-1)}{Y(t-1)} + \left[\frac{(i-eh)}{(1-h)\,(1+k)} \right] \frac{B(t-1)}{Y(t-1)}$$

$$= \left(1 - \frac{k}{1+k} \right) \frac{B(t-1)}{Y(t-1)} + \left[\frac{(i-eh)}{(1-h)\,(1+k)} \right] \frac{B(t-1)}{Y(t-1)}$$

$$= \frac{B(t\text{-}1)}{Y(t\text{-}1)} - \left(\frac{k}{1+k}\right) \frac{B(t\text{-}1)}{Y(t\text{-}1)} + \left[\frac{(i\text{-}eh)}{(1\text{-}h)\,(1+k)}\right] \frac{B(t\text{-}1)}{Y(t\text{-}1)}$$

On substitution in eq. (A,2), we get

$$\frac{B(t)}{Y(t)} = \frac{1}{(1\text{-}h)} \left[\frac{G(t)}{Y(t)} - \frac{T(t)}{Y(t)} - \frac{RG(t) - RG(t\text{-}1)}{Y(t)} - \frac{F(t)}{Y(t)} \right]$$

$$+ \left[\frac{i^*}{(1\text{-}h)\,(1+k)}\right] \frac{RG(t\text{-}1)}{Y(t\text{-}1)} + \frac{B(t\text{-}1)}{Y(t\text{-}1)} - \left(\frac{k}{1+k}\right) \frac{B(t\text{-}1)}{Y(t\text{-}1)}$$

$$+ \left[\frac{i\text{-}eh}{(1\text{-}h)\,(1+k)}\right] \frac{B(t\text{-}1)}{Y(t\text{-}1)}$$

If the "debt-financing" to GDP ratio is held at a constant level,

$$\frac{B(t)}{Y(t)} - \frac{B(t\text{-}1)}{Y(t\text{-}1)} = 0$$

$$\Rightarrow \left(\frac{1}{1\text{-}h}\right) \left[\frac{G(t)}{Y(t)} - \frac{T(t)}{Y(t)} - \frac{RG(t) - RG(t\text{-}1)}{Y(t)} - \frac{F(t)}{Y(t)} \right]$$

$$+ \left[\frac{i^*}{(1\text{-}h)\,(1+k)}\right] \frac{RG((t\text{-}1)}{Y(t\text{-}1)} + \left[\frac{(i\text{-}eh)}{(1\text{-}h)\,(1+k)} - \frac{k}{1+k}\right] \frac{B(t\text{-}1)}{Y(t\text{-}1)}$$

$$= 0 \quad \text{Thus,}$$

$$\text{(A.4)} \left[\frac{RG(t) - RG(t\text{-}1)}{Y(t)}\right] = \left[\frac{G(t)}{Y(t)} - \frac{T(t)}{Y(t)} - \frac{F(t)}{Y(t)} \right] + \left(\frac{i^*}{1+k}\right) \frac{RG(t\text{-}1)}{Y(t\text{-}1)}$$

$$+ \left[\frac{h(k\text{-}e) - (k\text{-}i)}{1+k}\right] \frac{B(t\text{-}1)}{Y(t\text{-}1)}$$

which is eq. (12) in the text and forms the basis for the monetary financing scenario.

Data Appendix

Statement 1: Budgetary Operations of the Government of India:
Revenue Account (1970-71 to 1989-90)[1]

(Rs. Crores)

Year	Revenue Receipts[2]	Revenue Expenditure	Balance on Revenue Account Surplus (+) Deficit (−)
	(1)	(2)	(3) = (1) − (2)
1970-71	3,342	3,179	+ 163
1971-72	4,028	4,128	− 100
1972-73	4,578	4,593	− 15
1973-74	5,073	4,836	+ 237
1974-75	6,558	5,793	+ 765
1975-76	8,075	7,189	+ 886
1976-77	8,739	8,441	+ 298
1977-78	9,792	9,362	+ 430
1978-79	11,240	10,948	+ 292
1979-80	11,340	12,034	− 694
1980-81	12,829	14,544	− 1,715
1981-82	15,574	15,868	− 294
1982-83	18,091	19,346	− 1,255
1983-84	20,493	22,890	− 2,397
1984-85	24,384	27,881	− 3,497
1985-86	29,206	34,771	− 5,565
1986-87	34,768	42,544	− 7,776
1987-88	36,545	46,174	− 9,629
1988-89	42,991	54,106	− 11,115
1989-90 (RE)	51,341	64,690	− 13,349

Sources : (1) Articles on Finances of the Government of India PB' Bulletin, various issues for the years 1970-71 to 1986-87.

(2) Government of India, Budget Documents for the years 1987-88 to 1990-91.

Note : 1. Data in respect of revenue receipts, revenue expenditure and balance on revenue account for the years 1970-71 to 1986-87 are as per old budgetary classification and therefore do not tally with the figures given in the recent budget documents.

2. Net of grants. 1989-90(RE) include transfer of Rs. 2300 crores of OCC surplus from Public Account.

Statement 2: Budgetary Operations of the Government of India:
Capital Account (1970-71 to 1989-90)

(Rs . Crores)

Year	Capital Receipts*	Capital Disbursements£	Balance on Capital Account Surplus (+) Deficit (−)
	(1)	(2)	(3) = (1) − (2)
1970-71	2,524	2,972	− 448
1971-72	3,031	3,450	− 419
1972-73	2,974	3,829	− 855
1973-74	3,646	4,211	− 565
1974-75	3,297	4,782	− 1,485
1975-76	4,697	5,950	− 1,253
1976-77	5,607	6,036	− 429
1977-78	5,589	6,951	− 1,362
1978-79	6,938	8,736	− 1,798
1979-80	6,125	7,864	− 1 739
1980-81	9,432	10,295	− 863
1981-82	10,156	11,254	− 1,098
1982-83	13,286	13,688	− 402
1983-84	15,861	14,881	+ 980
1984-85	17,768	18,016	− 248
1985-86	16,763	16,135	+ 628
1986-87	18,529	19,014	− 485
1987-88	22,026	18,705	+ 3,321
1988-89	25,673	20,800	+ 4,873
1989-90(RE)	23,692	23,006	+ 686

Sources :   (1) Articles on Finances of the Government of India. RBI Bulletin. various issues for 1970-71 to 1986-87 .

(2) Government of India, Budget Documents for 1987-88 to 1990-91 .

Notes :   * Includes foreign grants, foreign borrowings, domestic borrowings. excluding new 90-day TBs and recovery of loans and advances .

£ *As defined in the Budget Documents* which includes capital expenditure, loans and advances to States. Union Territories and public sector enterprises, and the discharge of internal and external debt . However, beginning from 1982-83. discharge of debt obligations are netted out both from receipts and expenditure side . Also the States' share of Small Savings are netted out from the year 1985-86 onwards .

Statement 3: Budgetary Operations of the Government of India:
Traditional Deficit (1970-71 to 1989-90)

(Rs . Crores)

Year	Balance on Revenue Account Surplus (+) Deficit (−)	Balance on Capital Account Surplus (+) Deficit (−)	Traditional Deficit[1] Surplus (+) Deficit (−)
	(1)	(2)	(3) = (1) + (2)
1970-71	+ 163	− 448	− 285
1971-72	− 100	− 419	− 519
1972-73	− 15	− 855	− 870
1973-74	+ 237	− 565	− 328
1974-75	+ 765	− 1.485	− 720
1975-76	+ 886	− 1.253	− 367
1976-77	+ 298	− 429	− 131
1977-78	+ 430	− 1.362	− 932
1978-79	+ 292	− 1.798	− 1.506
1979-80	− 694	− 1.739	− 2.433
1980-81	− 1.715	− 863	− 2.578
1981-82	− 294	− 1.098	− 1.392
1982-83	− 1.255	− 402	− 1.657
1983-84	− 2.397	+ 980	− 1.417
1984-85	− 3.497	− 248	− 3.745
1985-86	− 5.565	+ 628	− 4.937
1986-87	− 7.776	− 485	− 8.261
1987-88	− 9.629	+ 3.321	− 6.308
1988-89	− 11.115	+ 4.873	− 6.242
1989-90 (RE)	− 13.349	+ 686	− 12.663

Sources :   Col. (1) from Statement 1. Col. (3)
            Col. (2) from Statement 2. Col. (3)

Note :   1.   Since the revenue receipts are net of grants. the estimates exceed
              the corresponding budget figures to that extent. For grants. see
              col.(4). Table 6.

Statement 4: Net Domestic Lending of the Government of India
(1970-71 to 1989-90)

(Rs. Crores)

Year	Loans and Advances$	Recovery of Loans and Advances (gross)	Net Domestic Lendings
	(1)	(2)	(3) = (1) – (2)
1970-71	1,553	923	630
1971-72	1,807	1,297	510
1972-73	2,345	1,155	1,190
1973-74	2,432	1,471	961
1974-75	2,629	1,192	1,437
1975-76	3,151	1,486	1,665
1976-77	3,517	1,287	2,230
1977-78	4,155	2,288	1,867
1978-79	5,666	2,082	3,5º4
1979-80	4,720	1,461	3,259
1980-81	5,651	2,462	3,189
1981-82	6,248	2,173	4,075
1982-83	8,026£	3,373	4,653
1983-84	8,605@	3,745	4,860
1984-85	10,173	3,729	6,444
1985-86	12,179*	3,865	8,314
1986-87	13,431	4,125	9,306
1987-88	13,508	5,181	8,327
1988-89	15,129	5,053	10,076
1989-90 (RE)	17,806	5,530	12,276

Sources : (1) Articles on Finances of the Government of India, RBI Bulletin, various issues for the years 1970-71 to 1986-87.

(2) Government of India, Budget Documents for the years 1987-88 to 1990-91.

Note :   @ Excludes Rs. 400 crores of special loans to State Governments to clear their overdrafts as on March 1983.

* Excludes Rs. 1,628 crores of Medium Term loans given to State Governments to clear their overdrafts.

£ Excludes Rs. 1,743.4 crores of special loans to State Governments to clear their deficits as on March 1983.

$ Including loans to Small Savings and Short term Ways and Means advances

Statement 5: Capital Disbursements of the Government of India
(1970-71 to 1989-90)

(Rs. Crores)

Year	Capital Expenditure	Net Domestic Lendings	Capital * Disbursements
	(1)	(2)	(3) = (1) + (2)
1970-71	942	630	1,572
1971-72	1,117	510	1,627
1972-73	975	1,190	2,165
1973-74	1,009	961	1,970
1974-75	1,630	1,437	3,067
1975-76	2,250	1,665	3,915
1976-77	2,148	2,230	4,378
1977-78	2,243	·1,867	4,110
1978-79	2,418	3,584	6,002
1979-80	2,439	3,259	5,698
1980-81	3,983	3,189	7,172
1981-82	4,299	4,075	8,374
1982-83	4,859	4,653	9,512
1983-84	6,276	4,860	11,136
1984-85	7,843	6,444	14,287
1985-86	7,973	8,314	16,287
1986-87	9,010	9,306	18,316
1987-88	9,580	8,327	17,907
1988-89	10,255	10,076	20,331
1989-90 (RE)	11,562	12,276	23,838

Sources :   Col. (1) = Capital disbursements (Col.[2]), Statement 2 *minus* (loans & advances and discharge of internal & external debt.)

Col. (2) = Col.(3), Statement 4.

Note :   * As defined in the fiscal balance sheet of the text, which represents the sum total of capital expenditure and *net domestic lendings*.

Statement 6: Gross Fiscal Deficit of the Government of India
(1970-71 to 1989-90)

(Rs. Crores)

Year	Revenue Expenditure	Capital Disbursements	Revenue Receipts	Grants	Net Fiscal Deficit
	(1)	(2)	(3)	(4)	(5) =(1)+(2) -(3)-(4)
1970-71	3,179	1,572	3,342	—	1,409
1971-72	4,128	1,627	4,028	—	1,727
1972-73	4,593	2,165	4,578	—	2,180
1973-74	4,836	1,970	5,073	—	1,733
1974-75	5,793	3,067	6,558	—	2,302
1975-76	7,189	3,915	8,075	—	3,029
1976-77	8,441	4,378	8,739	195	3,885
1977-78	9,362	4,110	9,792	240	3,440
1978-79	10,948	6,002	11,240	223	5,487
1979-80	12,034	5,698	11,340	313	6,079
1980-81	14,544	7,172	12,829	373	8,514
1981-82	15,868	8,374	15,574	320	8,348
1982-83	19,346	9,512	18,091	297	10,470
1983-84	22,890	11,136	20,493	281	13,252
1984-85	27,881	14,287	24,384	394	17,390
1985-86	34,771	16,287	29,206	484	21,368
1986-87	42,544	18,316	34,768	436	25,656
1987-88	46,174	17,907	36,545	492	27,044
1988-89	54,106	20,331	42,991	600	30,846
1989-90 (RE)	64,690	23,838	51,341	913	36,274

Sources :   Col.(1) =   Col.(2), Statement 1.
Col.(2) =   Col.(3), Statement 5.
Col.(3) =   Col.(1), Statement 1.
Col.(4) =   From Budget Documents.

Note : * As defined in the fiscal balance sheet of the text, which represents the sum total of capital expenditure and *net* domestic lendings.

Statement 7: Net Fiscal Deficit of the Government of India
(1970-71 to 1989-90)

(Rs. Crores)

Year	Revenue Expen- diture	Capital Expen- diture	Revenue Receipts	Grants	Net Fiscal Deficit
	(1)	(2)	(3)	(4)	(5) =(1)+(2) -(3)-(4)
1970-71	3.179	942	3.342	-	779
1971-72	4.128	1.117	4.028	-	1.217
1972-73	4,593	975	4,578	-	990
1973-74	4.836	1 009	5.073	-	772
1974-75	5.793	1.630	6.558	-	865
1975-76	7.189	2,250	8.075	-	1.364
1976-77	8.441	2,148	8.739	195	1.655
1977-78	9.362	2,243	9.792	240	1.573
1978-79	10.948	2,418	11.240	223	1.903
1979-80	12.034	2,439	11,340	313	2.820
1980-81	14.544	3,983	12.829	373	5 325
1981-82	15.868	4.299	15.574	320	4.273
1982-83	19.346	4.859	18.091	297	5.817
1983-84	22.890	6.276	20.493	281	8.392
1984-85	27.881	7.843	24.384	394	10.946
1985-86	34,771	7.973	29.206	484	13.054
1986-87	42.544	9.010	34.768	436	16.350
1987-88	46.174	9.580	36.545	492	18.717
1988-89	54.106	10.255	42.991	600	20.770
1989-90 (RE)	64.690	11.562	51.341	913	23 998

Sources :   Col.(1) =   Col.(2). Statement 1.
              Col.(2) =   Col.(1). Statement 5.
              Col.(3) =   Col.(1). Statement 1.
              Col.(4) =   From Budget Documents.

Statement 8: Net Interest Expenditure of the Government of India
(1970-71 to 1989-90)

(Rs. Crores)

Year	Interest Expen- diture (Domes- tic)	Interest Expen- diture (Exter- nal)	Interest Receipts (Domes- tic)	Interest Receipts (Exter- nal)	Net In- terest Expen- diture
	(1)	(2)	(3)	(4)	(5) =(1)+(2) -(3)-(4)
1970-71	444	161	572	2	31
1971-72	503	167	597	2	71
1972-73	589	187	712	1	63
1973-74	690	192	735	1	146
1974-75	840	161	771	4	226
1975-76	1,038	190	930	3	295
1976-77	1,280	208	1,102	3	383
1977-78	1,437	209	1,428	12	206
1978-79	1,758	226	1,414	13	557
1979-80	2,057	235	1,351	9	932
1980-81	2,465	231	1,790	5	901
1981-82	3,002	258	2,209	6	1,045
1982-83	3,703	304	2,827$	24	1,156
1983-84	4,513	356	2,644	25	2,200
1984-85	5,590	460	3,954	9	2,087
1985-86	6,965	538	4,579	7	2,917
1986-87	8,470	766	5,330	9	3,897
1987-88	10,202	1,034£	5,755	$	5,481
1988-89	13,002	1,259£	6,973	$	7,288
1989-90 (RE)	16,227	1,483	8,665	$	9,045

Sources :   Government of India, Budget documents.
Notes·   £   Revised Estimates
            $ Figures in respect of interest receipts (External) are not available
                separately, but are included in domestic interest receipts

Statement 9: Gross Primary Deficit of the Government of India
(1970–71 to 1989–90)

(Rs. Crores)

Year	Gross Fiscal Deficit	Net Interest Expenditure	Gross Primary Deficit
	(1)	(2)[1]	(3) = (1) – (2)
1970-71	1,409	31	1,378
1971-72	1,727	71	1,656
1972-73	2,180	63	2,117
1973-74	1,733	146	1,587
1974-75	2,302	226	2,076
1975-76	3,029	295	2,734
1976-77	3,885	383	3,502
1977-78	3,440	206	3,234
1978-79	5,487	557	4,930
1979-80	6,079	932	5,147
1980-81	8,514	901	7,613
1981-82	8,348	1,045	7,303
1982-83	10,470	1,156	9,314
1983-84	13,252	2,200	11,052
1984-85	17,390	2,087	15,303
1985-86	21,368	2,917	18,451
1986-87	25,656	3,897	21,759
1987-88	27,044	5,481	21,563
1988-89	30,846	7,288	23,558
1989-90 (RE)	36,274	9,045	27,229

Sources : Col. (1) : Statement 6. Col. (5).
Col. (2) : Statement 8. Col. (5).

Statement 10: Net Primary Deficit of the Government of India
(1970-71 to 1989-90)

(Rs. Crores)

Year	Net Fiscal Deficit	Net Interest Expenditure	Net Primary Deficit
	(1)	(2)	(3)=(1)-(2)
1970-71	779	31	748
1971-72	1,217	71	1,146
1972-73	990	63	927
1973-74	772	146	626
1974-75	865	226	639
1975-76	1,364	295	1,069
1976-77	1,655	383	1,272
1977-78	1,573.	206	1,367
1978-79	1,903	557	1,346
1979-80	2,820	932	1,888
1980-81	5,325	901	4,424
1981-82	4,273	1,045	3,228
1982-83	5,817	1,156	4,661
1983-84	8,392	2,200	6,192
1984-85	10,946	2,087	8,859
1985-86	13,054	2,917	10,137
1986-87	16,350	3,897	12,453
1987-88	18,717	5,481	13,236
1988-89	20,770	7,288	13,482
1989-90 (RE)	23,998	9,045	14,953

Sources : Col. (1): Statement 7. Col. (5).
          Col. (2): Statement 8, Col. (5).

Recent Trends in the Flow-of-Funds Accounts : 1980-81 to 1985-86

D. K. Bhatia & Deepak Mohanty*

RECENTLY the Reserve Bank of India released the Flow-of-Funds Accounts of the Indian economy for the period 1976-77 to 1980-81 along with the detailed methodology for compilation of these accounts. The present paper attempts to extend the analysis of these accounts beyond 1980-81 on the basis of the provisional data published annually in the Reports on Currency and Finance. The note is divided in four sections: the first highlights the limitation of these accounts, the second highlights changes in the financial structure through different financial ratios. Section-III discusses the draft by the public and private corporate sectors on the household sector's surplus, whereas in Section-IV, the financial transaction matrices developed for two periods (1980-81 to 1982-83 and 1983-84 to 1985-86) are compared.

SECTION I
Flow-of-Funds Accounts : An Overview

Flow-of-funds accounts are essentially designed to study changes in financial activities in the economy. The financial flow account is an extended account of capital finance account to describe lending and borrowing transactions of different sectors in the economy. Sectors borrow by issuing claims on themselves or lend to other sectors by accepting claims on them. A sector may carry out both these activities concurrently. A sector is classified

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* Dr. D. K. Bhatia is Adviser and Shri Deepak Mohanty, an Assistant Adviser, in the Department of Economic Analysis and Policy. This is a revised version of the paper presented at the 17th Conference of Indian Association for Research in National Income and Wealth held during February 8-10. 1990 at Calcutta.

as a deficit sector, when the claims issued are more than the claims accepted. Net lending to other sectors is an indication that the lending sector is a surplus sector.

The economy has been divided into six sectors (i) Banking (includes Reserve Bank), (ii) Other Financial Institutions (mainly Term-Lending Institutions), (iii) Private Corporate Business, (iv) Government, (v) Households and, finally (vi) Rest of the World. Of these, Private Corporate and Government sectors generally remain in deficit, whereas the Household sector is a surplus sector. The Rest of the World (ROW) sector could emerge either surplus or deficit depending upon the performance of the economy especially in relation to its balance of payments position. Of late, the Rest of the World sector in the case of Indian economy has recorded surplus since there have been net inflows of foreign capital to meet the deficit on current account.

Generally, the surplus of the Household sector is transferred to the Private Corporate and Government sectors through financial intermediation of the Banking and Other Financial Institutions sectors; the important instruments through which the intermediation is effected are: (i) currency, (ii) deposits, (iii) investments, (iv) loans and advances, (v) small savings, (vi) life funds, (vii) provident fund, (viii) trade debt/credit, (ix) other financial items not elsewhere classified.

The difference between total financial sources of funds and total financial uses of funds in the case of a particular sector indicates the surplus/deficit of that sector in terms of its savings-investment gap. However, summed over all the sectors, the total financial sources in the economy should match with the total financial uses. Despite best of efforts in the compilation of sector-wise accounts, the statistical discrepancies arise due to different basis in the accounts of different sectors. The data on the volume of financial transaction through various financial instruments are drawn from the balance sheets of the institutions. But the necessary sectoral classifications under each instrument are not always available in the balance sheets of the institutions. In such cases, special information is either collected from concerned institutions or structural ratios obtained from various surveys are applied to generate

estimated sectoral break-ups under each instrument. For example, in the case of loans and advances from commercial banks, even though the information on loans outstanding is available as on 31st March for allocation among different sectors, reliance is placed on the information available in BSR returns which give information for last Friday of June and December. In some cases a part of the instrument remains unclassified in the sense that it becomes difficult to allocate it to any sector. Balance sheets of the institutions also show large entries under other assets/liabilities which are difficult to classify.

The flow-of-funds accounts are drawn for the financial year (April-March) but the accounting years of the institutions the data of which form inputs in the compilation of accounts does not always correspond to the period April-March. The annual accounts of financial institutions are drawn at three different points of time (December, March, June) during a year. The Company Finance Studies which form the basis of the estimates of the private corporate sector includes companies closing their accounts at any point of time during a financial year. To the extent feasible, adjustments are made in respect of major instruments so that the annual accounts of the institutions correspond to their activities during a financial year, this gives rise to intra-sectoral discrepancies which are much larger in magnitude as compared with the discrepancies arising at aggregate level. Thus, even if the aggregate financial sources/uses may correctly represent the volume of financial transactions during a year, the intra-sectoral discrepancies would still remain. Another reason for intra-sectoral discrepancies is the time lag in the availability of data. For example, in the case of banking sector the major balance sheet items such as deposits, loans and advances are available for the latest year but the results of various surveys used in deriving sectoral estimates are not contemporaneous. Further, the latest data on flow-of-funds may not adequately capture the sudden directional changes in the movement of funds induced by external shocks.

Another area of difficulty is to ensure the comparability of flow-of-funds statistics with National Accounts Statistics (NAS). The saving-investment gap in respect of various sectors as obtained from NAS should ideally match with net borrowings (sources *minus*

uses) of the sectors derived from the flow-of-funds accounts. This matching is difficult partly due to differences in classification of sectors. The Issue Department of the Reserve Bank of India (RBI) is treated under the Government Administration in NAS whereas in the flow-of-funds accounts the entire RBI is treated under the Banking Sector. Further the scope and coverage of the Government sector is different in the flow-of-funds (FOF) accounts from that in the National Accounts Statistics (NAS). Under FOF accounts Local Authorities other than Port Trusts are not being covered due to lack of details. State Road Transport Corporations (SRTCs) are also not being covered under non-departmental enterprises. The coverage of State Government enterprises is not very satisfactory. In the absence of a consolidated Balance Sheet of the Government Administration various data are pieced together from budget documents and other sources for compilation of the FOF accounts. Large losses of public sector undertakings are written off which are not fully captured in the FOF due to non-availability of details and different accounting practices.

Flow-of-funds accounts are derived from balance sheet items. The changes in total sources (liabilities) and total uses (assets) of funds of an institution will appear as follows :

$$\Delta W + \Delta FL + NCT = \Delta K + \Delta FA \quad \ldots\ldots \quad (1)$$
$$\text{(Total Sources)} \qquad \text{(Total Uses)}$$

Where :

ΔW = Changes in reserves
ΔK = Capital formation during the year
ΔFL = Changes in financial liabilities
ΔFA = Changes in financial assets
NCT = Net Capital Transfers.

Alternatively,

$$\Delta K - \Delta W - NCT = \Delta FL - \Delta FA \quad \ldots\ldots \quad (2).$$

In the National Accounts Statistics (NAS) savings of an institution are estimated as total current operating income *minus* total current expenditure. In the FOF accounting, savings of an institution is taken as changes in reserves (ΔW) because of the derivation of

statistics through the balance sheet items. The two may·not tally on account of the fact that the reserves may include certain non-current income. Further, the reserves and variation therein would be affected by the valuation changes, if any, effected during the year. Thus, the financial gap (Sources *minus* Uses) of a sector in the flow-of-funds accounts may not be the same as the financial gap (investment *minus* savings) derived on the basis of NAS. Despite these limitations, the flow-of-funds accounts provide an integrated view of the financial relationships with the real sector of the economy reflected by the NAS.

In the New Series on National Accounts Statistics, the basis of consumption of capital particularly in respect of the Government sector has been changed. Since the FOF accounts are compiled on the basis of published accounts, it is difficult to adjust the imputed amount of consumption of fixed capital in respect of each of the sub-sectors.

SECTION II
Trend in the Financial Flows

Notwithstanding the above limitations, the FOF accounts give a comprehensive picture of the financial structure of the economy and their changing inter-relationships. The pattern of financing capital formation in the deficit sectors of the economy can be brought out by the FOF accounts. The growth of financial activities in relation to the growth of 'real economic' activities can be analysed by comparing the major real economic indicators such as capital formation and national income with financial variables. A study of these flows reveals the direction and volume of financial flows that have been taking place in the economy, and thus enables an assessment of the changes in the financial flows in one sector and their effect on all other sectors. In particular, these accounts bring out the role played by financial intermediaries in financing capital formation and the resultant growth in the national income.

The total financial issues (i.e. increase in total financial liabilities) in the economy more than doubled from Rs. 34,213 crores in 1980-81 to Rs. 72,087 crores in 1985-86, with the exception of the year 1983-84 in which the total financial issues

declined to Rs. 45,462 crores from Rs. 56,361 crores in the preceding year. However, there was a general tendency for the issues to move up. The fall in the issues was due to the decline in the primary issues (i.e. securities issued by non-financial sectors). The financial development of the country can be assessed from the selected financial ratios which are given in Statement 1.

During the period under study (1980-81 to 1985-86) net capital formation increased from Rs. 18,780 crores in 1980-81 to Rs. 35,169 crores in 1985-86 whereas national income (net national product at factor cost at current prices) increased from Rs. 110,484 crores to Rs. 206,413 crores during the same period. The Investment Ratio (net capital formation as percentage to national income) showed a tendency to decline from 17.0 per cent in 1980-81 to 14.7 per cent in 1984-85 with exception of 1985-86 when it increased to 17.0 per cent. On the contrary, the finance ratio (total financial claims as a proportion of national income) moved up from 31.0 per cent in 1980-81 to 34.9 per cent in 1985-86, but it touched the high of 39.9 per cent in 1982-83. This implies that the growth in financial infrastructure has been relatively fast. The Financial Inter Relations ratio (ratio of financial issues to investment) fluctuated between 1.57 in 1980-81 and 2.77 in 1982-83; during 1985-86 it stood at 2.05. On an average, the increase in the ratio from 2.05 during 1980-81 to 1982-83 to 2.20 during 1983-84 to 1985-86 reflects the growing complexities of the financial infrastructure. The New Issue ratio (proportion of primary issues to capital formation) fluctuated between 0.89 in 1981-82 and 1.58 in 1982-83. This ratio rose from 1.18 during 1980-81 to 1982-83 to 1.24 during 1983-84 to 1985-86 reflecting the increasing reliance of the non-financial sectors on external sources of funds to finance physical investment, a fact corroborated by stagnation in private corporate sector's savings rate and decline in public sector's saving.

The comparative performance of financial and non-financial institutions in the financial development of the country can be assessed from the Intermediation Ratio calculated as proportion of secondary issues to primary issues. This ratio revealed that the proportion of claims issued by financial institutions as against those of the non-financial institutions rose from 0.70 in 1980-81 to

0.78 in 1981-82. It rose further to 0.88 in 1983-84 but fell to 0.76 in 1985-86. On an average, the intermediation ratio increased from 0.74 during 1980-83 to 0.79 during 1983-86. The data on sources of funds of various sectors for the period 1980-81 to 1985-86 presented in Statement-2 indicate that the share of the financial institutions in the total claims increased from 41.1 per cent in 1980-81 to 43.1 per cent in 1985-86; it reached the peak of 46.7 per cent in 1983-84. As a result, the share of the claims of the non-financial institutions in the total claims issued declined from 58.9 per cent in 1980-81 to 56.9 per cent in 1985-86.

The financial sources of the banking sector recorded an increase from Rs. 10,412 crores in 1980-81 to Rs. 21,149 crores in 1985-86 while those of the Other Financial Institutions (OFI) rose from Rs. 3,666 crores to Rs. 9,903 crores during the same priod. The decline in the share of the claims of the non-financial institutions and increase in the financial sources of the banking sector is an indication of the increasing importance of the financial sector in the economy, and banking sector in particular.

Among the issues of non-financial sectors, the issue of Private Corporate Business increased from Rs. 3.688 crores in 1980-81 to Rs. 5,625 crores in 1981-82 and further to Rs. 8,449 crores in 1985-86. However, its share in the total issues which had risen from 10.8 per cent in 1980-81 to 16.4 per cent in 1981-82 declined to 11.7 per cent in 1985-86. Even though the issues of the government sector increased from Rs. 13,960 crores in 1980-81 to Rs. 27,552 crores in 1985-86 its share declined from 40.8 per cent in 1980-81 to 38.2 per cent in 1985-86. The issues of the household sector which stood at Rs. 2,443 crores in 1980-81 steadily rose to Rs. 6,743 crores in 1985-86 taking its share in the total claims issued from 7.2 per cent to 9.4 per cent during the period.

SECTION III
Draft on Net Surplus of the Households

The mobilisation of resources for the Five Year Plans depends upon the extent to which the sectors which are net savers are able to augment their saving. As the household sector is a net saver,

the saving behaviour of the households becomes crucial in the mobilisation of resources. The government sector borrows directly from the household sector and indirectly through financial intermediaries, viz., Banking and Other Financial Institutions. The private corporate sector also relies heavily on the household sector. This section presents the extent of resources mobilised by the government and private corporate sectors directly and indirectly from the household sector during the period 1980-81 to 1984-85. The year 1985-86 being the first year of the Seventh Plan is shown separately. Of the net surplus of the household sector, direct financing to private corporate and the government sectors was 9.1 per cent and 22.2 per cent, respectively, during 1980-81 to 1984-85. The banking sector absorbed 44.9 per cent of the net surplus of household sector whereas the other financial institutions accounted for 23.8 per cent (Table 1).

Table 1: Net Lending of the Household Sector

(Amount in Rs. Crores)

Sector	1980-81 to 1984-85	1985-86
1. Banking	28145	6749
	(44.9)	(36.5)
2. Other Financial Institutions	14927	5083
	(23.8)	(27.5)
3. Private Corporate Business	5675	1415
	(9.1)	(7.7)
4. Government	13955	5227
	(22.2)	(28.3)
5. Rest of the World	–	–
6. Other items not elsewhere classified	–	–
Total (1 to 6)	62702	18474
	(100.0)	(100.0)

Viewed from the angle of resources of the financial inter-
mediaries, 69.5 per cent of the net borrowings of the banking
sector during 1980-81 to 1984-85 came from the household sec-
tor. Net financial sources of the other financial institutions as con-
tributed by the household sector were 84.9 per cent. In regard to
the utilisation of resources, 85.1 per cent of the banking sector's
net lendings went towards financing of government sector, and
12.0 per cent towards financing of private corporate sector. Role
of other financial institutions was considerably lower than that of the
banking sector in so far as the government sector is concerned;
64.5 per cent of their net lendings were absorbed by the Govern-
ment, whereas 31.5 per cent were absorbed by the private cor-
porate business sector (Table 2).

The total draft of the government and private corporate sectors
on the surplus of household sector has been worked out by combin-
ing the operations of the household sector and financial inter-
mediaries: these are presented in the Table 3 below :

It may be observed that during 1980-81 to 1984-85 direct
financing to the government and private corporate sectors was
22.2 per cent and 9.1 per cent respectively, of the surplus
resources of the household sector. The dependance of these sec-
tors on indirect financing by the household sector was 53.6 per
cent and 12.9 per cent. Taking direct and indirect financing
together the draft of the government and private corporate sectors
on the financial savings of the household sector was 75.8 per cent
and 21.9 per cent, respectively. Thus, during the Sixth Plan
period, absorption by the government sector of the household sec-
tor's financial savings was nearly three and a half time of the ab-
sorption by the private corporate sector. During 1985-86.
household sector's direct financing to private corporate sector
declined to 7.7 per cent. However, indirect financing both through
banking and other financial institutions showed an increase. As a
result the overall draft of the private corporate sector on the surplus
of the household sector increased to 24.1 per cent during 1985-
86.

Table 2 : Borrowing and Lending Operations of Financial Intermediaries

(Amount in Rs. Crores)

	Banking Sector				Other Financial Institutions			
	Net Borrowing		Net Lending		Net Borrowing		Net Lending	
	1980-81 to 1984-85	1985-86*	1980-81 to 1984-85	1985-86*	1980-81 to 1984-85	1985-86*	1980-81 to 1984-85	1985-86*
1. Banking	—	—	—	—	2328 (13.2)	1284 (19.1)	—	—
2. Other Financial Institutions	—	124 (1.0)	1204 (2.9)	—	—	—	—	—
3. Private Corporate Business	—	—	5060 (12.0)	3329 (19.7)	—	—	6318 (31.5)	2522 (33.4)
4. Government	—	—	35715 (85.1)	9502 (80.3)	—	—	12925 (64.5)	4759 (63.0)
5. Rest of the World	5966 (14.7)	944 (7.9)	—	—	333 (1.9)	357 (5.3)	—	—
6. Households	28146 (69.5)	6749 (56.3)	—	—	14927 (84.9)	5083 (75.6)	—	—
7. Other items n.e.c.	6389 (15.8)	4176 (34.8)	—	—	—	—	805 (4.0)	278 (3.6)
Total	40501 (100.0)	11993 (100.0)	41979 (100.0)	11831 (100.0)	17588 (100.0)	6724 (100.0)	20048 (100.0)	7559 (100.0)

* Being the first year of Seventh Five Year Plan, it has been shown separately.

Table 3: Draft of Financial Saving of the Household Sector

Item	Amount (Rs. Crores)		Percentage	
	1980-81 to 1984-85	1985-86*	1980-81 to 1984-85	1985-86*
1. Direct Financing				
a. Private Corporate Business	5675	1415	9.1	7.7
b. Government				
	13955	5227	22.2	28.3
2. Indirect Financing				
a) To Private Corporate Business through	8079	3028	12.9	16.3
i) Banking	3377	1330	5.4	7.2
ii) Other Financial Institutions	4702	1698	7.5	9.1
b) Government, through	33579	8621	53.6	46.6
i) Banking	23951	5419	38.2	29.3
ii) Other Financial Institutions	9628	3202	15.4	17.3
3. Total Financing	62702	18474	100.0	100.0
a. Private Corporate Business (1.a + 2.a)	13754	4443	21.9	24.1
b. Government (1.b + 2.b)	47534	13848	75.8	75.0
c. Others (including discrepancy)	1414	183	2.3	0.9

* Being the first year of the Seventh Five Year Plan, it has been shown separately.

SECTION IV
The Flow-of-Funds Matrices of the Indian Economy

Under planned economic development, the sectoral investments are often required to be projected. Given the savings of a sector, the financial deficit needs to be met from the resources of the surplus sector. The bulk of the capital formation in the private corporate sector and, of late, the entire capital formation in the government sector was largely financed through domestic borrowings from the households, and to a lesser extent from the net inflow of capital from abroad. Table 3 indicates that 22.2 per cent and 9.1 per cent of the financial requirement of the government sector and the private corporate sector respectively was met directly by the households during the period 1980-81 to 1984-85. This direct financing by the household sector increased to 28.3 per cent for the government sector whereas it declined 7.7 per cent for the private corporate sector during 1985-86. The decline in the direct financing of the private corporate sector by the households by 1.4 percentage points was more than compensated by the increase of 3.4 percentage points in indirect financing (through banking and other financial institutions) of the private corporate sector by the household. In the case of government, the rise in direct financing (from 22.2 per cent in 1980-81 to 1984-85 to 28.3 per cent in 1985-86) was more or less matched by the sharp decline in the indirect financing from 53.6 per cent during 1980-81 to 1984-85 to 46.6 per cent during 1985-86. Thus, the year 1985-86, the first year of the Seventh Plan recorded a shift in the financing pattern of both the private corporate and government sectors – greater mediation by the former and lesser mediation by the latter.

It is pertinent to note that a set of fiscal and monetary policies together with a concomitant yield of financial assets generate a unique set of financial flows which can be put together in a matrix form to have, in an integrated fashion, the relative importance of different sectors in the economy, both in respect of lendings and borrowings. Six major sectors were identified for the economy separately for borrowing (sources) and lending (uses). Matrices were developed for two periods of three years each 1980-81 to 1982-83 and 1983-84 to 1985-86. The items which could not be

allocated to any of the six sectors are shown as 'unidentified' under each sector.

The classification of the periods into three years each would indicate the extent of changes on the financial flows resulting from the operation of fiscal and monetary policies. Since the matrix is presented on gross basis there would be two elements (one from the borrowing sector and the other from the lending sector) depicting the same transaction. These two elements generally do not tally due to reasons outlined in Section I of the study. The matrices are indicated in Statement 3. Each element (aij) of the matrix indicates the borrowing/lending of the ith sector from/to j^{th} sector. Since the matrix is net of intra-sectoral transactions the diagonal elements are zeros.

It can be seen from the source (borrowing) matrices which are in gross terms that during 1980-81 to 1982-83 the government sector has been the largest borrower accounting for 38.07 per cent of the total funds followed by the banking (30.61 per cent), other financial institutions (12.02 per cent) and private corporate (11.90 per cent) sectors in that order. During the next period 1983-84 to 1985-86 there has been no change in the ranking in regard to sources (borrowing) of funds. The household sector's borrowing constituted 7.73 per cent of the total borrowing during 1980-81 to 1982-83 and this proportion rose to 9.07 per cent during 1983-84 to 1985-86. The 'rest of the world' as a sector did not reflect any borrowing in both the periods mainly because this sector has been lending to other sectors. In fact the source (borrowing) co-efficients for this sector were negative at 0.33 during the period 1980-81 to 1982-83 and 0.63 during the period 1984-85 to 1985-86 reflecting increase in the scale of lending by the 'rest of the world' to other sectors in the economy.

As mentioned above the government sector was the largest borrower. as much as 48.3 per cent of the Government borrowing came from the banking sector during 1980-81 to 1982-83. In the subsequent period 1983-84 to 1985-86 the government sector's borrowing from the banking sector as proportion of its total borrowings declined to 36.0 per cent notwithstanding the increase in the scale of government sector's borrowing. The fall in the proportion

of government sector's borrowing from the banking sector during the latter period was on account of sharp fluctuations in the Central Government's borrowing from the banking sector especially from the Reserve Bank of India. The borrowings by the Central Government through market loans and treasury bills registered precipitous fall to Rs. 2,474 crores in 1983-84 from Rs. 9,323 crores in 1982-83 but in the following years these rose to Rs. 8,163 crores in 1984-85 and further to Rs. 10,353 crores in 1985-86. Thus as far as Government borrowings are concerned, the year 1983-84 was an exceptional one.

The net borrowing (+)/lending (-) operations in the economy are set out in the Table 4. The sectoral summation of the flow-of-funds accounts for the economy as a whole, by its very nature should add up to zero, and this is done by taking the net surplus/deficit of each sector. On the question of netting Gowland (1985) has observed as follows:

"The value of flow-of-funds analysis lies in the consistency which is forced upon forecasters or other analysts and in the links between transactions which are highlighted, both within the financial sector and between the financial sectors. Examples of this using government finance and money supply identities are given later in this chapter but a very simple example reveals one of the many economic misjudgements of the 1970-74 Heath government. Using a three-sector model, Public Sector Financial Surplus + UK Private Sector Financial Surplus + Overseas Sector Financial Surplus $\cong$ 0. In the 1972 budget the government forecast a very large public sector deficit, about £4,000 m. They also forecast an economic boom that meant that investment would rise and that saving would fall. Thus, the private sector's financial surplus would not be very large: in fact, it was about £1,000 m. Necessarily, therefore, the forecasts implied an overseas sector financial surplus of £3,000 m. This is in effect, a balance of payments deficit of £3,000 m. Nevertheless, the government appeared to be amazed when a deficit of this magnitude, emerged in 1973. The authorities had apparently produced, and believed, an inconsistent forecast. Very elementary flow-of-funds analysis would have averted the error" (pp. 109-110).

(in percentage)

Table 4 : Net borrowing (+)/lending (–) as a percentage of total sources/uses of Funds

Sector	1980-81	1981-82	1982-83	1980-81 to 1982-83	1983-84	1984-85	1985-86	1983-84 to 1985-86
1. Banking	- 0.20	- 7.21	- 10.93	- 6.11	+ 2.23	- 6.12	- 6.49	- 3.46
2. Other Financial Institutions	- 1.40	+ 1.50	+ 2.23	+ 0.78	+ 2.98	- 1.12	+ 0.12	+ 0.66
3. Private Corporate Business	+ 7.77	+ 11.90	+ 10.01	+ 9.89	+ 7.93	+ 7.62	+ 9.94	+ 8.50
4. Government	+ 29.34	+ 31.94	+ 26.35	+ 29.21	+ 29.83	+ 31.92	+ 32.92	+ 31.55
5. Rest of the World	- 6.89	- 10.99	- 7.61	- 8.50	- 7.54	- 3.94	- 4.61	- 5.36
6. Households	- 25.41	- 27.54	- 19.07	- 24.01	- 31.82	- 25.63	- 25.16	- 27.54
7. Unidentified	- 3.21	+ 0.40	- 0.98	- 1.26	- 3.61	- 2.73	- 6.72	- 4.35

It can be seen that the government sector continued to be the largest borrower of the funds; its average share in the borrowings increased from 29.2 per cent during 1980-81 to 1982-83 to 31.6 per cent during 1983-84 to 1985-86.

The banking sector, household sector and rest of the world sector continued to be the net surplus sectors of the economy during the period 1980-81 to 1985-86 and provided resources to the other sectors in the economy. In fact, the surplus of the household sector has increased at a faster rate during the period 1983-84 to 1985-86 than during the period 1980-81 to 1982-83, whereas the share of surplus of the 'rest of the world' sector has shown a decline during 1983-84 to 1985-86 as compared to 1980-81 to 1982-83. The unidentified transactions have shown surplus and their contribution to the surplus has increased from only 1.3 per cent during 1980-81 to 1982-83 to 4.4 per cent during 1983-84 to 1985-86.

Conclusion

The study has revealed that the financial structure of the Indian economy has been undergoing slow but perceptible changes. As between the two periods 1980-81 to 1982-83 and 1983-84 to 1985-86 net borrowing (+)/net lending (-) has reflected distinct shifts.

The highlights of the study are as follows :

(i) Measured by the Financial Inter Relations ratio the growth in financial infrastructure has grown relatively fast as the ratio has tended to move upwards.

(ii) The new Issue ratio has also moved up indicating the increasing reliance of the non-financial sectors on sources of funds other than its own to finance its physical investment, a fact which is corroborated by the stagnation in private corporate sector's saving rate and decline in the public sector's saving.

(iii) During the Sixth Plan (1980-81 to 1984-85) the draft of the government and private corporate sectors on the financial savings of the household sector was 75.8 per cent and 21.9 per cent, respectively. During the first year (1985-86) of the Seventh Plan 24.1 per cent of households' financial surplus was absorbed by the private corporate sector and 75.0 per cent by the government sector, the former reflecting an increase and the latter decline from the shares recorded during the Sixth Plan.

(iv) As between the two periods of 3 years each the net lending by the household sector has increased from 24.0 percent of total sources/uses of funds during 1980-81 to 1982-83 to 27.5 per cent during 1983-84 to 1985-86. The 'rest of the world' sector has also lent to other sectors of the economy but its relative share has declined from 8.5 per cent in the earlier period to 5.4 per cent in the latter period. The private corporate sector has reduced its net borrowings from 9.9 per cent in the earlier period to 8.5 per cent in the latter period. The net lending by the banking and 'other financial institutions' sector declined from 5.3 per cent in the earlier period to only 2.8 per cent in the latter period.

(v) The increase in the net lending by the household sector by 3.5 percentage points was more than the decline by 2.5 percentage points in the net lending by the banking and other financial institutions sector. To some extent this reflects disintermediation in the sense that the recourse of other sectors for its net borrowing requirement from banking and other financial institutions sector has declined.

(vi) Sector-wise, the direct dependence of government sector on the household sector has shown an increase in recent years whereas the private corporate sector has relied more on the banking and other financial institutions sector. Thus, the private corporate sector has contributed to the intermediation process whereas the Government sector has contributed to disintermediation.

(vii) Situations in which disintermediation is carried out for too long a time would obviously be not in the interests of financial stability of the system, while intermediation done exclusively through the banking and financial institutions without regard to the criteria of efficiency is likely to result in inefficient use of the resources. In short, there is a need not only for greater intermediation but also for efficient inter-mediation on the one hand, and a proper balance between the direct financing of the net borrowing requirement of the sectors and indirect financing through the intermediation process on the other.

Statement 1 : Selected Indicators of Financial Development
1980-81 to 1985-86

(Amount in Rs. Crores)

Item	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86
1. Secondary Issues – Issues of Financial Institutions	14078	14980	24177	21238	29769	31052
2. Primary Issues – Issues of non-financial sectors	20135	19329	32184	24224	40913	41035
2.1 Domestic Sectors	20091	20777	31198	23953	40654	42744
2.2 Rest of the World	44	-1448	986	271	259	-1709
3. Total Issues (1+2)	34213	34309	56361	45462	70682	72087
4. Net Capital Formation£	18780	21820	20350	24329	26409	35169
5. National Income*	110484	128457	141331	165642	184273	206419
6. Finance Ratio (3 as a percentage of 5)	31.0	26.7	39.9	27.4	38.4	34.9
7. Rate of Capital Formation (4 as percentage of 5)	17.0	17.0	14.4	14.7	14.3	17.0
8. Financial Inter-relations Ratio (Ratio of 3 to 4)	1.82	1.57	2.77	1.87	2.68	2.05
9. New Issue Ratio (Ratio of 2 to 4)	1.07	0.89	1.58	1.00	1.55	1.17
10. Intermediation Ratio (IR) (Ratio of 1 to 2)	0.70	0.78	0.75	0.88	0.73	0.76

£ Adjusted for errors and omissions.
* NNP at factor cost – current prices.
Source : Compiled from 'Statements on Financial Flows', Report on Currency and Finance, Volume II, various issues.

Statement 2 : Financial Flows – Sector-wise

(Amount in Rs. Crores)

Sector	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86
1. Banking	10412 (30.4)	9775 (28.5)	18030 (32.0)	14107 (31.0)	21876 (30.9)	21149 (29.4)
2. Other Financial Institutions	3666 (10.7)	5205 (15.2)	6147 (10.9)	7131 (15.7)	7893 (11.2)	9903 (13.7)
3. All Financial Institutions (1+2)	14078 (41.1)	14980 (43.7)	24177 (42.9)	21238 (46.7)	29769 (42.1)	31052 (43.1)
4. Private Corporate Business	3688 (10.8)	5625 (16.4)	5550 (9.8)	3327 (7.3)	9512 (13.5)	8449 (11.7)
5. Government	13960 (40.8)	11565 (33.7)	22023 (39.1)	15777 (34.7)	25666 (36.3)	27552 (38.2)
6. Rest of the World	44 (0.1)	-1448 (-4.2)	986 (1.8)	271 (0.6)	259 (0.4)	-1709 (-2.4)
7. Households	2443 (7.2)	3587 (10.4)	3625 (6.4)	4849 (10.7)	5476 (7.7)	6743 (9.4)
8. All Non-Financial Institutions (4 to 7)	20135 (58.9)	19329 (56.3)	32184 (57.1)	24224 (53.3)	40913 (57.9)	41035 (56.9)
9. Total claims issued (3+8)	34213 (100.0)	34309 (100.0)	56361 (100.0)	45462 (100.0)	70682 (100.0)	72087 (100.0)

Source : Compiled from 'Statements on Financial Flows', Report on Currency and Finance, Volume II, various issues.

(Percent)

Statement 3.1 : Matrix of Financial Sources and Uses of Funds for the Indian Economy :
1980-81 to 1982-83

Lender \ Borrower	Sources (Borrowings)							Uses (Lendings) Borrower \ Lender						
	1.	2.	3.	4.	5.	6.	To-tal	1.	2.	3.	4.	5.	6.	To-tal
1. Banking	—	2.99	3.60	18.38	-0.85	6.06	30.18	—	2.34	1.09	-1.35	3.37	17.86	23.31
2. Other Financial Institutions	2.09	—	1.99	6.54	—	0.92	11.54	3.03	—	—	2.16	0.05	7.33	12.57
3. Private Corporate Business	0.78	0.06	—	0.19	-0.17	0.27	1.13	3.93	2.56	—	1.44	-0.09	3.24	11.08
4. Government	5.05	1.52	1.08	—	0.78	0.48	8.91	21.75	7.59	0.29	—	2.00	5.93	37.56
5. Rest of the World	3.53	0.16	0.04	4.21	—	—	7.94	-0.68	0.06	0.03	0.06	—	—	-0.53
6. Households	16.38	6.71	2.97	5.44	—	—	31.50	6.61	1.00	0.30	0.52	—	—	8.43
7. Unidentified	2.78	0.58	2.22	3.31	-0.09	—	8.80	0.41	0.62	1.46	5.09	0.00	—	7.58
Total	30.61	12.02	11.90	38.07	-0.33	7.73	100.00	35.05	14.17	3.17	7.92	5.33	34.36	100.00

Source : Compiled from 'Statements on Financial Flows'. Report on Currency and Finance, Volume II, various issues.

Statement 3.2 : Matrix of Financial Sources and Uses of Funds for the Indian Economy :
1983-84 to 1985-86

(Percent)

Lender \ Borrower	Sources (Borrowings)							Uses (Lendings)						
	1.	2.	3.	4.	5.	6.	To-tal	1.	2.	3.	4.	5.	6.	To-tal
1. Banking	—	3.38	3.28	13.20	0.57	7.77	28.20	—	2.13	0.98	1.49	1.98	20.38	23.98
2. Other Financial Institutions	1.57	—	2.34	6.09	—	0.76	10.76	1.76	—	—	-0.90	0.57	7.91	11.14
3. Private Corporate Business	0.72	0.31	—	0.00	-0.85	0.18	0.36	2.90	3.65	—	0.43	-0.29	2.26	8.95
4. Government	0.31	0.99	0.27	—	-0.35	0.36	1.58	15.15	7.10	0.41	—	3.02	7.61	33.29
5. Rest of the World	2.62	0.49	0.08	4.48	—	—	7.67	1.79	0.20	0.02	0.60	—	—	2.61
6. Households	19.46	7.55	2.15	7.26	—	—	36.42	8.14	0.80	0.18	0.38	—	—	9.50
7. Unidentified	5.67	0.52	3.19	5.63	—	—	15.01	1.73	1.16	2.26	5.38	—	—	10.53
Total	30.35	13.24	11.31	36.66	-0.63	9.07	100.00	31.47	15.04	3.85	6.20	5.28	38.16	100.00

Source : Compiled from 'Statements on Financial Flows'. Report on Currency and Finance, Volume II, various issues.

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Forecasting of Index Numbers of · Industrial Production through 'Combination of Forecasts'

P.C. Sarker*

Introduction

IN recent times, a number of sophisticated statistical techniques have been developed for generating forecasts of time series. The traditional approach to forecasting involves choosing a single most suitable forecasting technique which involves some statistical criteria associated with the specific technique and obtaining forecasts based on this technique. The choice of technique depends upon the characteristics of the series and the type of application best suited in the circumstances consistent with the availability of statistical packages to the users. However, the selected procedure may suffer from a number of limitations. such as, consistent underestimation or overestimation in relation to the actual series. Limitations of this type can be overcome by adopting the technique of 'combination of forecasts'. The procedures of 'combination of forecasts' have been extensively used by several research workers successfully in the past two decades such as Bates and Granger (1969), Newbold and Granger (1974), and

Winkler and Makridakis (1983). If the changes in the series are of heterogeneous nature and substantially volatile, these changes can be modelled more appropriately by 'combination of forecasts' rather than any single univariate model. In this study, an attempt is made to forecast the highly volatile series on Index Numbers of Industrial Production (IIP) by applying this combination procedure. That is, the main objective is to investigate the methodology of deriving combined forecasts using the most appropriate weights for individual forecasts so as to generate combined forecasts with maximum precision.

This study is divided into four Sections. Section I describes the background for selection of different individual forecasting models and Section II describes the models derived for generation of forecasts and comparison of individual forecasts. Section III presents the methodology chosen for combining the individual forecasts and the empirical analysis of different combination of forecasts. Section IV deals with the main findings of the study and conclusions emanating from the study.

I
Selection of Individual Forecasting Models

An extensive comparison of different methods of forecasting has been made by Reid (1969) in his study where forecasts were generated for 113 macroeconomic time series employing a number of models including Box-Jenkins and Borwn Models [see, Granger and Newbold (1986), pp. 181-185]. As per the results obtained by Reid, for one step ahead prediction, Box Jenkins' models outperformed Brown's models, Holt-Winters models and Harrison models on 88%, 70% and 77% of occasions, respectively. Reid also made similar comparisons for longer lead times and the results were found to be, more or less, similar with Box-Jenkins models proving to be superior to other models in terms of accuracy [Kendal (1973)]. Again, Newbold and Granger (1974) analysed a collection of 106 seasonal and nonseasonal macroeconomic series, of which 80 were monthly and 26 were quarterly. The Box-Jenkins, Holt-Winters, and Stepwise autoregression methods were applied to each of the series in this collection. Payne (1973) has reanalysed many series in this collection and showed that Box-

Jenkins' model again outperformed other models [see, Granger and Newbold (1986)]. In view of the superiority of the Box-Jenkins' models as per the available evidence, it was chosen as one of the types of individual forecasts used in this study.

The second type of forecasts used in this exercise relates to estimates based on regression model. It has been already shown in an earlier study on 'Performance of Infrastructure Industries' that there exists a reasonably strong linear relationship between the production of infrastructure industries and the overall industrial production [see, Sarker (1988)]. This relationship is important because the growth and development of the infrastructure industries set the trend of growth and development of the industrial sector as a whole. The indices of production of infrastructure industries and the index of industrial production were covered by several regression models. The extent of relationship and the lag effects of the production of infrastructural industries on overall industrial output were examined in the earlier study. The study conclusively proved that the instantaneous impact of these infrastructural industries was more pronounced than their lag effects on overall industrial production. The index of production of infrastructure industries (INFR) was compiled on the basis of the production data of six infrastructure industries (Coal, Saleable Steel, Crude Petroleum, Petroleum Products, Cement and Electricity) which accounted for 28.8 per cent of the weight in the total weighting diagram of the new series on IIP (Base : 1980-81=100). The study also showed that both the series had similar types of trend and seasonal components. Therefore, this linear relationship has been considered for the forecasting purpose in this study.

The third type of forecasts adopted in the study relates to estimates generated by the exponential model. It was observed that the IIP series was highly seasonal in character [see, Sarker (1988)] and the series could be adjusted for seasonality by using the X-11 Variant method developed by the Bureau of Census, U.S. Department of Commerce, Washington, D.C. The trend and cyclical components were assumed to be same and the adjusted series was assumed to follow exponential types of growth for a short period. The X-11 Variant method can also be used to generate the forecasts of seasonal factors for future periods which

could be used for readjustments of the adjusted forecasts generated by exponential model.

Thereafter, using these three individual forecasts based on 'Box-Jenkins' Model, Regression Model and Exponential Growth Rate Model, different type of 'combination of forecasts' were generated using different procedures mainly based on procedures developed by Newbold and Granger (1974 and 1986) and the experiences in application of Makridakis and Winkler (1983) in this study.

II
Generation of Forecasts through Box-Jenkins, Regression and Exponential Models

The forecasts of 'Index Numbers of Industrial Production (IIP)' have been generated using (i) Box-Jenkins' Model, (ii) Regression Model and (iii) Exponential Growth Rate Model. The data pertained to the new series on IIP with base 1980-81 = 100 (Statement I) and forecasts for the period April 1988 to September 1989 have been generated. The details of each of the models are furnished as under : -

i) *Box-Jenkins' Model*

A unified approach was devised by Box and Jenkins in a series of articles and a subsequent book (1970) to the fitting of linear models to a given time series data. Box-Jenkins models are one of the most powerful univariate models extensively used in forecasting. It is assumed that the time series under consideration could be represented by the autoregressive integrated moving average (ARIMA) process possibly after the removal of any deterministic components and/or application of some suitable transformation of the data.

The fitting procedures of the Box-Jenkins' model basically consists of an iterative cycle of identification, estimation, and diagnostic checking. Essentially a particular model is chosen from the general ARIMA Class, its coefficients estimated, and its adequacy of representation checked, possibly leading to the choice of an

alternative form and a repeat of the model building cycle' [Granger and Newbold (1986), p. 152]. As the IIP series is a seasonal time series, a multiplicative mixed autoregressive moving average model of the following type was considered.

$$a(B)\ a_s\ (B^s)\ (1-B)^d\ (1-B^s)^D\ X_t = b(B)\ b_s(B^s)\ e_t \quad \dots\dots\dots \quad (i)$$

where X_t represents the series (i.e. IIP), B is the back-shift operator, e_t represents white noise, s = 12 for monthly data, and the polynomial operators are

$$a(B) = 1-a_1 B-a_2 B^2 - \dots\dots\dots\dots\dots\dots\dots -a_p B^p$$
$$a_s (B^s) = 1-a_{1,s} B^s - a_{2,s} B^{2s} \dots\dots\dots\dots\dots\dots a_{p,s} B^{Ps}$$
$$b(B) = 1 + b_1 B + b_2 B^2 + \dots\dots\dots\dots\dots\dots + b_q B^q$$
$$b_s (B^s) = 1 + b_{1,s} B^s + b_{2,s} B^{2s} + \dots\dots\dots\dots\dots + b_{Q,s} B^{Qs}$$

For identifying a proper model it is required to choose suitable values for d, D, p, P, q and Q, the degrees of the polynomial operators in (i). The identification procedure was in two steps. At the first step, the degree of differencing required to make the series stationary. This was achieved by applying the two operators 1-B and $1-B^s$ until the sample autocorrelations of the differenced series die out quickly at high lags. At the second step, the sample autocorrelations and partial autocorrelations of the differenced series i.e.

$$Y_t = (1-B)^d\ (1-B^s)^D\ X_t$$

were employed to suggest appropriate degrees for the four polynomial operators a(B), $a_s (B^s)$, b(B) and $b_s (B^s)$.

The multiplicative mixed autoregressive moving average model for Y_t can be written as in order of (p, P, q, Q). The fitted model chosen after analysing sample autocorrelation and partial autocorrelation functions for the differenced series Y_t (taking d=1 and D=1) was the ARIMA process of order (2.0.0.1). The observed value of X^2 (Chi-square) obtained for testing the best form of model based on 25 autocorrelation coefficients which was insignificant both at 1% and 5% levels of significance. The Box-Jenkins' model obtained on these considerations taking data from April 1981 to

March 1988 was as follows:-

$$(1-0.34055B - 0.29715B^2)\ Y_t = (1+0.78254)e_t \quad \ldots\ldots\ldots \text{(ii)}$$

Based on this model, forecasts for twelve lead periods (April 1988 to March 1989) were generated. Again, adding one more observation, the model was updated and further twelve lead forecasts were generated and in total this procedure was repeated seven times.

ii) *Regression Model*

As the performance of infrastructural industries is critical to the performance of industrial production as a whole, it was expected that the industrial production ought to be closely related to the production of infrastructural industries comprising coal, cement, crude petroleum, petroleum products, saleable steel, and electricity. These being the vital inputs to almost all industries, the adequacy of the production of these industries would have a pronounced effect on the total industrial production. Accordingly, the relationship between the Index Numbers of Industrial Production (IIP) and the Indices of Production of Infrastructure Industries were studied by adopting various types of regression models. It was also observed that the lag effects of production of infrastructur industries on overall industrial output inherented in several models were much weaker than the instantaneous effect [see, Sarker (1988)]. A simple liner regression model taking Index Numbers of Production of Infrastructure Industries (INFR) as an explanatory variable yielded a decidedly better fit than other models. Both the series on IIP and INFR moved in the same direction as expected and have a similar seasonal pattern. The parameters were estimated using data for the period April 1981 to March 1988. The model adopted for forecasting was as under:

$$IIP = 0.562175 + 0.913275\ (INFR) \quad \ldots\ldots\ldots\ldots\ldots \text{(iii)}$$
$$t = 50.33$$
$$R^2 = 0.97$$
$$SEE = 4.0961$$

The forecasts were generated based on this model for twelve lead

periods. The procedures of estimating parameter, model building and forecasting were repeated seven times taking one additional observation into account every time.

iii) *Exponential Model*

The IIP Series was seasonally adjusted by using the X-11 Variant method developed by the US Bureau of Census. Though an attempt was made to fit a straight line (y = A+BT), the forecasts generated on exponential model were superior to simple linear model in respect of forecast-errors. The exponential model of type $Y = Ae^{BT}$ (where A and B are constants and T represents time component) was accordingly fitted to the seasonally adjusted series which only represented the trend component apart from irregular component for a short duration. The exponential model made use of seasonally adjusted observations (April 1981 to March 1988) and the model obtained was as under :-

$$IIP^* = (101.7995822)e^{0.006142T}$$

or

$$Log\ IIP^* = 4.623006 + 0.006142T \qquad \ldots\ldots\ldots (iv)$$
$$t = 52.05$$
$$R^2 = 0.97$$
$$SEE = 0.0263$$

The forecasts of seasonally adjusted IIP (i.e. IIP^*) were calculated on the basis of this model. Then forecasts were readjusted by using the forecasted seasonal factors generated by the X-11 Variant method to obtain the forecasts for original IIP series. The ultimate forecasts of IIP were generated like the previous two models. this procedure was also repeated seven times.

Comparison of Individual Forecasts

The twelve lead forecasts were generated for the period April 1988 to September 1989 using all the three individual models *repeating seven times in all* to test the relative superiority of each model in terms of percentage errors in estimates in comparison with

the actual data which were available for this period. The mean square percentage errors (MSPE) in forecasts were calculated for all individual forecasts and are presented in statement V. On the basis of this statistic, it was observed that forecasts generated through Exponential model were the best among them having the least mean square percentage errors for almost all lead periods. Exponential model outperformed Box–Jenkins' model in eleven lead periods out of twelve lead periods expect the first lead period and outperformed Regression model in all twelve lead periods. However, Box–Jenkins' model outperformed Regression model in the first six lead periods and reverse happened in the last six lead periods.

All the models had the limitations of underestimation or overestimation. Of course, the results could be different for other periods. In order to reduce the overestimation or underestimation of the actual values of IIP and hence to improve the efficiency in forecasting, the different methods of 'combination of forecasts' for these three forecasts were executed and these have been discussed in the following sections.

III
Combination of Forecasts

Methodology

The traditional approach to forecasting by any individual method suffers from the limitations that the selected method may constantly underestimate or overestimate the actuals despite its closeness to the actuals in the simulation experiments. In order to overcome this limitation, an alternative to the traditional approach is to estimate forecasts from different forecasting methods by aggregating forecasts in a specified manner. Aggregating information by combining forecasts from two or more forecasting methods is an alternative to using just a single method. The 'combination of forecasts' have been tried earlier with considerable success by several research workers. In an extensive study of the accuracy of forecasting methods. Winkler and Makridakis (1983) found that a simple average and a weighted average of forecasts outperformed virtually all individual methods.

The simple arithmetic mean of individual forecasts (say, Box-Jenkins', Regression and Exponential models) were calculated using the conventional method, in terms of notation, as

X_t = Actual t^{th} observation
$F_t^{(i)}$ = Forecast of tth observation by i^{th} model,
  $i = 1, \ldots\ldots\ldots\ldots p,$
  where p is the number of methods

and $F_t^{C}1$ = Combined forecast generated by simple arithmetic average for t^{th} observation, then the combined forecast is given by

$$F_t^{C}1 = \frac{1}{p}(F_t^{(1)} + \ldots + F_t^{(p)}) \ldots\ldots\ldots\ldots\ldots (v)$$

The combined forecasts thus generated and corresponding mean square percentage errors are presented in statement V.

Though the above mentioned combined forecasts formed by giving equal weights to each of the individual forecasts (i.e. simple average) can be considered for illustrative purposes, as evidence accumulates, one would wish to give larger weights to those forecasts which contain lower SEEs or mean square percentage errors. Methods for combining forecasts in terms of weighted averages were discussed by Bates and Granger (1969), Newbold and Granger (1986), and also by Winkler and Makridakis (1983).

At first, Bates and Granger (1969) have developed the methodology for combining two forecasts to generate weighted combined forecasts. Later on, it was extended to the combination of more than two forecasts as discussed by Reid (1969) and Newbold and Granger (1974). Winkler and Makridakis (1983) made a remarkable study on these procedures taking 1001 time series and generating as much as 13,816 forecasts. It was observed by them that, in general, the most accurate forecasts were provided by two procedures i.e. by Procedure-1 (with larger values of v) and Procedure-3 (which is relatively insensitive to the choice v and β). These procedures are as follows :-

$$\text{Procedure-1 : } W_i = \left(\sum_{s=t-v}^{t-1} e_s^{(i)^2} \right)^{-1} \bigg/ \sum_{j=1}^{p} \left(\sum_{s=t-v}^{t-1} e_s^{(i)^2} \right)^{-1} \ldots\ldots (vi)$$

Procedure-3 :

$$W_i = \beta W_{i,\,t-1} + (1-\beta) \left[\left(\sum_{s=t-v}^{t-1} e_s^{(i)^2} \right)^{-1} \bigg/ \sum_{j=1}^{p} \left(\sum_{s=t-v}^{t-1} e_s^{(i)^2} \right)^{-1} \right] \ldots (vii)$$

where, v = the number of times the forecasts are repeated in generating the weights.

Further, $e_s^{(i)} = (X_t - F_t^{(i)})/X_t$ and W_i is the weight assigned to forecast method (i). Also, β which is a proportion and hence $0 < \beta < 1$ and $W_{i, t-1}$ is the weight assigned to method (i) based on data for preceeding period t-1. Therefore, for developing a suitable combined forecast, these two procedures were considered in this study. Besides, after analysing results (section IV) of Winkler and Makridakis (1983), a limited number of combined forecasts were generated based on procedure-1 (for v=3,6,9,11) and for procedure-3 (v =3,6,9,11 & β = 0.5, 0.7, 0.9). The weights for these models under different schemes were calculated after generating one lead forecasts for the period April 1987 to March 1988 through developing respective models twelve times for each individual forecasting models. Though the weights were generated for one lead, they were applied for all twelve leads, may imply some sort of limitation. But considering the volume of computations involved and limited purpose of finding a suitable weighting pattern so as to generate more efficient forecasts, all together sixteen sets of weights (W_is) were generated (statement IV). For each set of weights 'combined forecasts' were generated and mean square percentage errors were calculated like earlier cases for individual forecasts (statement v).

Performance of Different Methods

Statement V shows the mean square percentage errors (MSPE) calculated for all combinations. The empirical work undertaken in this study has been rather limited. We have examined only the series on index numbers of industrial production and that too for a limited period only. However, after examining the behaviour of the errors, it was decided that only a limited number of forecasts be generated based on some particular values of 'v' and 'β'. The relative performance of the forecasts is to be judged based on MSPE only. It was observed that all the combined forecasts including 'simple average' outperformed all the three individual forecasts. Forecasts based on 'simple average' outperformed Box-Jenkins and Regression models in all twelve lead periods and Exponential model in nine out of twelve lead periods. An examination of the values of

MSPE indicated that combined forecasts obtained by adopting Procedure-1 for v=9 and Procedure-3 for v=9 were distinctly superior to the estimates given by Box–Jenkins' model. Again, it was observed that Procedure-3 was insensitive to the choice of ' β ' only but not to the choice of 'v' as claimed by Winkler and Makridakis (1983). Out of seventeen sets of combined forecasts, forecasts generated through Procedure-1 for v=9 were the best as they outperformed all other combined forecasts as well as individual forecasts. Procedure-1 for v=9 outperformed Box–Jenkins and Regression models in all lead periods and also outperformed Exponential and Average forecasts in eleven out of twelve lead periods. On the average, the mean square percentage errors for all lead periods were 8.6, 8.7 and 3.4 for Box–Jenkins, Regression and Exponential models respectively, whereas the same was 2.3 for Procedure-1 for v=9. Another important feature of the combined forecasts was that they were free from any type of systematic overestimation or underestimation as was observed in individual forecasts. Thus, the exercise has shown that if weights of 27.43 percent, 28.52 per cent and 44.05 per cent were allotted to forecasts based on Box-Jenkins' model, Regression model and Exponential model, respectively, the resultant 'combination of forecasts' could be deemed to be the best combined forecasts, free of systematic over or underestimation, and having errors in estimates much lower than those that could be obtained under individual models.

IV
Summary and Conclusions

This study has brought out some interesting results in the procedure for generation of forecasts of Index Numbers of Industrial Production. These forecasts are highly critical for short-term monitoring and policy formulation purposes. If the changes in the series are of heterogeneous nature and substantially volatile, it becomes difficult to capture the future changes appropriately by Box-Jenkins' model or any other univariate models, although the models are being continuously checked and modified regularly. An attempt has been made in this study to find out a suitable technique for forecasting of IIP with comparatively lower forecasting errors by adopting the procedure of 'combination of forecasts' as against

individual forecasts used so far.

The alternative forecasting procedure through regression technique also yields good results by regressing IIP over INFR. Similarly the exponential growth model fitted on seasonally adjusted IIP series also generates precise forecasts. The forecasts generated by Box–Jenkins' model and regression models have, more or less, equal precision (statement V). In this particular study, the Exponential model has generated superior forecasts compared to that of Box–Jenkins' model. In order to overcome these problems it was decided to examine whether 'combination of forecasts' could yield more precise estimates, and free of underestimation or overestimation aspects. Different methods have been developed by Bates and Granger, Newbold and Granger, and Winkler and Makridakis which have been extensively discussed in various publications.

Procedure-1 and Procedure-3 out of the total five procedures as discussed by Newbold and Granger (1974) were then applied to work out better combination of forecasts adopting different weighting procedures. Though the applications were on a limited scale, it was possible to arrive at better forecast through the procedure of 'combination of forecasts' in comparison to Box–Jenkins' model. The results have shown that Procedure-1 for v=9 yielded the best forecasts. The systematic overestimation or underestimation were not at all visualised in most of the forecasts generated by 'combination of forecasts'. This study reveals that if weights of 27.43 per cent, 28.52 per cent and 44.05 per cent could be allotted to forecast based on Box–Jenkins' model, Regression model and Exponential model, respectively, the resultant combined forecast could be deemed to be one of the best combined forecasts for generating forecasts of IIP.

Winkler and Makridakis (1983) quoted the statement of Newbold and Granger: "It does appear . . . . that Box–Jenkins' forecasts can frequently be improved upon by combination with either Holt-Winter or Stepwise autoregressive forecasts and we feel our results indicate that in any particular forecasting situation, combining is well worth trying, as it requires very little efforts". This study corroborates their observations, even though the combining procedure does not make use of Holt- Winter or Stepwise

autoregressive forecasts.

As the objective of the study was to find out an alternative method of forecasting of IIP with more accuracy than those witnessed in Box-Jenkins' model, the limited purpose was served by studying a fewer number of cases for combining procedure based on only three individual forecasts. The study has large implication for policy formulation constantly in search of better class of estimates with a higher degree of precision. It is hoped that the results of this study would stimulate further probe into the matter and would be more helpful to the policy makers to formulate their policies on the basis of the better class of advance estimates.

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Statement I : Index Numbers of Industrial Production (IIP) (Base: 1980-81=100)

Month / Year	April	May	June	July	August	September	October	November	December	January	February	March
1981-82	100.2	99.3	107.9	106.3	107.8	105.6	104.6	109.9	119.5	116.5	110.7	123.4
1982-83	106.8	108.2	106.5	107.8	108.2	108.7	107.1	111.6	122.6	117.4	114.0	134.9
1983-84	110.3	110.7	111.9	111.4	113.1	113.9	117.7	118.6	132.9	133.0	130.0	141.2
1984-85	117.3	120.2	124.1	124.6	125.9	126.1	123.6	129.2	142.4	143.3	138.8	153.4
1985-86	128.9	131.5	134.8	133.1	135.5	135.5	141.1	141.5	159.4	152.5	146.1	165.1
1986-87	137.5	139.9	141.8	144.0	144.7	149.7	152.8	152.4	166.2	174.1	169.4	188.6
1987-88	156.7	149.6	159.5	165.9	155.6	160.1	158.1	166.6	175.8	175.0	177.3	196.4

Source : CSO (IS-wing). Deptt. of Statistics, Ministry of Planning, Calcutta.

Statement II : Index Numbers of Production of Infrastructure Industries (INFR) (Base: 1980-81=100)

Month / Year	April	May	June	July	August	September	October	November	December	January	February	March
1981-82	108.09	112.11	111.51	113.51	113.80	112.48	118.14	119.02	128.76	123.78	116.15	132.59
1982-83	112.60	117.31	115.42	119.48	118.22	121.45	124.87	122.25	132.96	131.49	123.61	149.98
1983-84	111.97	118.52	118.56	124.91	127.93	124.08	130.07	133.92	146.86	148.78	141.47	158.41
1984-85	133.40	135.76	131.51	136.52	137.77	137.01	140.02	144.25	157.74	161.18	150.49	174.29
1985-86	138.71	142.86	141.16	148.11	149.97	150.84	154.81	156.26	168.81	172.56	163.51	193.34
1986-87	151.32	155.83	146.77	156.43	156.28	165.80	170.89	170.82	182.72	185.36	175.33	201.99
1987-88	166.91	166.68	161.75	170.97	172.55	171.03	175.34	175.94	191.39	191.66	187.75	206.13

Source : Indices were compiled based on the production data of six infrastructure industries supplied by the Office of the Economic Adviser, Ministry of Industry, New Delhi to the Department of Statistical Analysis & Computer Services, Reserve Bank of India.

Statement III : Seasonally Adjusted Series of IIP (Base: 1980-81=100)

Month / Year	April	May	June	July	August	September	October	November	December	January	February	March
1981-82	105.35	103.97	111.78	110.44	111.40	109.90	109.13	111.41	110.35	109.83	108.79	109.09
1982-83	112.43	113.30	110.22	112.04	111.85	113.15	111.54	113.18	113.22	110.62	111.97	119.16
1983-84	116.27	115.85	115.88	115.90	117.15	118.47	122.11	120.55	123.01	125.10	127.28	124.31
1984-85	123.87	126.10	128.57	129.69	130.92	131.08	127.66	131.54	132.45	134.87	135.44	134.96
1985-86	136.01	137.90	139.39	138.41	141.47	140.71	145.49	144.14	149.21	143.84	141.99	145.00
1986-87	144.80	146.76	146.18	149.61	151.62	155.44	157.32	154.79	156.14	164.66	164.54	165.78
1987-88	164.60	156.64	164.13	172.32	163.52	166.19	162.84	168.90	165.70	166.12	172.70	172.58

Source : Statement I.

Note : Seasonally adjusted series is obtained by using X-11 Variant Method of the Bureau of Census. U.S., Department of Commerce,
Washington D. C.

Statement IV : Weighting Diagrams under Procedure -1 and Procedure-3

A : Procedure-1

V	Weights		
	Box-Jenkins (W₁)	Regression(W₂)	Exponential (W₃)
	(W_1)	(W_2)	(W_3)
3	0.316619	0.149307	0.534072
6	0.151269	0.190292	0.658438
9	0.274317	0.285183	0.440498
11	0.228708	0.233265	0.538026

B : Procedure-3

β	V=3			V=6			V=9			V=11		
	Box-Jenkins (W_1)	Regression (W_2)	Exponential (W_3)	Box-Jenkins (W_1)	Regression (W_2)	Exponential (W_3)	Box-Jenkins (W_1)	Regression (W_2)	Exponential (W_3)	Box-Jenkins (W_1)	Regression (W_2)	Exponential (W_3)
0.5	0.2917	0.1618	0.5464	0.1621	0.1896	0.6482	0.2932	0.2434	0.4634	0.2308	0.2412	0.5280
0.7	0.2818	0.1669	0.5514	0.1665	0.1894	0.6442	0.3008	0.2267	0.4725	0.2316	0.2444	0.5240
0.9	0.2718	0.1719	0.5563	0.1708	0.1891	0.6401	0.3084	0.2099	0.4817	0.2324	0.2476	0.5200

Statement V : Mean Square Percentage Errors of Three Models and Different Combination Procedures

Lead	Box-Jenkins	Regression	Exponential	Average	Procedure-1			
					V=3	V=6	V=9	V=11
1	8.01	20.95	9.69	7.23	6.77	8.27	6.73	7.87
2	13.50	18.30	8.99	7.20	7.08	7.92	6.41	7.56
3	13.29	18.43	5.94	6.15	5.38	5.38	4.37	5.96
4	8.76	8.97	1.36	0.79	0.60	0.68	0.51	0.75
5	4.73	5.47	1.74	0.63	0.42	0.67	0.42	0.66
6	3.43	4.50	2.16	0.77	0.81	0.99	0.62	0.91
7	3.00	2.17	1.88	0.99	0.91	0.97	0.94	0.92
8	5.74	2.65	2.30	1.98	2.13	1.77	1.66	1.87
9	5.72	5.65	1.83	1.93	2.01	1.48	1.49	1.65
10	9.35	5.77	1.86	1.69	2.20	1.35	1.84	1.48
11	13.69	5.36	1.64	2.25	2.85	1.59	2.36	1.84
12	13.71	5.97	1.52	0.60	1.59	0.70	0.76	0.68

Statement V : Mean Square Percentage Errors of Three Models and Different Combination Procedures *(Concld.)*

Procedure-3

Lead	V=3			V=6			V=9			V=11		
	β=0.5	β=0.7	β=0.9	β=0.5	β=0.7	β=0.9	β=0.5	β=0.7	β=0.9	β=0.5	β=0.7	β=0.9
1	7.00	7.16	7.21	8.43	8.38	8.33	7.25	7.11	7.02	7.88	7.89	7.89
2	7.16	7.20	7.24	7.93	7.90	7.86	7.22	7.17	7.12	7.57	7.57	7.57
3	5.45	5.48	5.52	6.04	6.01	5.99	5.80	5.70	5.62	6.00	6.02	6.03
4	0.59	0.59	0.60	0.87	0.85	0.84	0.66	0.64	0.62	0.76	0.77	0.77
5	0.45	0.47	0.49	0.84	0.83	0.81	0.53	0.50	0.47	0.66	0.66	0.67
6	0.83	0.84	0.86	1.12	1.11	1.09	0.79	0.78	0.78	0.91	0.90	0.90
7	0.91	0.91	0.92	1.01	1.01	1.00	0.91	0.91	0.91	0.92	0.92	0.92
8	2.06	2.04	2.01	1.87	1.87	1.88	1.96	1.99	2.02	1.87	1.87	1.86
9	1.91	1.88	1.84	1.55	1.56	1.56	1.81	1.84	1.87	1.65	1.65	1.65
10	2.02	1.95	1.88	1.38	1.40	1.42	1.71	1.80	1.88	1.47	1.46	1.46
11	2.58	2.48	2.38	1.60	1.62	1.65	2.23	2.35	2.47	1.83	1.82	1.82
12	1.35	1.27	1.19	0.73	0.74	0.75	0.86	0.98	1.12	0.65	0.64	0.63

BOOK REVIEWS

On Ethics and Economics

by

Amartya Sen

(Basil Blackwell, Oxford, UK, First
Paperback 1988, Pp. xiii + 131)

Prof. Amartya Sen's work 'On Ethics and Economics', the
edited version of his Royer Lectures at the University of California
at Berkeley in April 1986, leaves one at the cross roads of awe-
inspired admiration and sceptical cross-questioning. This is not un-
usual as all path-breaking theoretical perspectives explore more
phenomena than what are explained by them and through debate
provoked by controversies, their impact on the related disciplines
or society becomes powerful.

Though historically belonging to the broad group of moral
sciences in quest for norms regarding 'how to live', mainstream
economics, as pointed out by Prof. Sen, has drawn its inspiration
and sustenance from both 'logistic or engineering' - based approach
and ethics–related issues. This dual origin has branched it off into
i) positive or predictive economics and ii) normative or welfare
economics, emphasising, respectively, human motives governing
mode of economic activity and its ends or objectives. The role of
economic logistics has expanded in the course of development of
modern economics and the author appreciates its contributions
towards understanding economic mechanism. But what is deeply
disturbing to him is the "directional asymmetry that has been ar-
bitrarily imposed between predictive economics and welfare
economics, with the former being taken into account in the latter,
but without any influence coming from the opposite direction"

(pp. 51-52), which makes welfare economics "something like an economic equivalent of the 'black hole'- things can get into it, but nothing can escape from it" (p. 29).

Denial of any role to welfare economic criteria in influencing predictive economics is traced to exclusion of all ethical considerations from what is termed as 'rationality' of human behaviour in the course of economic activity which has caused the distancing of economics from ethics. The rationality is defined either by conditions of internal consistency of choice and transitivity as per behaviourist model or by presuming self-interest maximisation as the only motive governing economic activity as per the introspective hypothesis eliminating all ethical considerations. The latter option being dominant economic thought responsible for present relationship of economics and ethics, has been subjected to critical examination in Prof. Sen's treatise.

Self-interest maximisation as the only motive governing economic activity is strictly a conclusion derived from following two propositions: (i) human behaviour in economic activity is governed by rationality; (ii) rationality is identified by the motive of self-interest maximisation. In his broadsides against the second proposition the author argues: "Indeed, it may not be quite as absurd to argue that people always *actually* do maximize their self-interest, as it is to argue that *rationality* must invariably demand maximization of self-interest. Universal selfishness as *actuality* may well be false, but universal selfishness as a requirement of *rationality* is patently absurd" (p. 16).

Secondly, the linkage of self-interest maximisation with economic efficiency is not borne out with universal experience. "Indeed, in the case of Japan, there is strong empirical evidence to suggest that systematic departures from self-interested behaviour in the direction of duty, loyalty and goodwill have played a substantial part in industrial success" (p. 18). Still self-interest motive is enshrined in economic theory as satisfaction or utility maximisation governing individual choice is also made a basis for optimisation of social welfare with the development of Pareto optimality as a scientific criterion (independent of interpersonal comparisons of utility) leading to general equilibrium under conditions of

perfect competition. Despite the elegance of this result and its importance for understanding the mechanism of working of the system, the author views that its practical utility is limited due to informational and political difficulties in the way of redistribution of initial endowment to suit the norms of perfect competition.

At this stage the analysis is directed towards closer scrutiny of utilitarianism, hallowed doctrinaire base of welfare economics consisting of following assumptions:

i)   Individual welfare is a function of utility maximisation,
ii) Social welfare is a sum of individual utilities, and
iii) Determination of human choice by preference for consequential result.

Prof. Sen logically refutes the first assumption and substitutes it by broader behavioural complex inclusive of ethical considerations. He rejects the second assumption in its simplistic form by pointing to areas of conflict and contradictions among individual goals and between individual goals and public policy but he indicates procedure for resolving them. Regarding the third, he modifies it by supplementing instrumental considerations of consequentialism by intrinsic values of freedom in choice.

Utility as an index of individual welfare excludes from individual advantage goals other than happiness or mere fulfilment of desires which can contribute to well-being. Secondly, it ignores agency aspect of individual personality representing causes external to self-interest like class, community, party, country, etc., though success in terms of these causes also contributes to individual happiness. Finally, individual advantage in terms of fulfilment of choice either related to well-being or as aspirations of agency are judged only by consequential achievement and not by freedom of choice which takes us in the direction of rights, liberties and real opportunities. Information required to construct individual welfare function should cover well-being achievement, and well-being freedom (i.e., information regarding achievement as well as freedom of choice in terms of well-being) and agency achievement and agency freedom (corresponding information in terms of choices on account of agency).

A complete ordering of mutually consistent choices is almost an impossible task when even individual welfare function is to be founded on information from such divergent sources. Hence, incomplete ordering (partial solution) or overcomplete ordering (more than one solution) are also distinct possibilities. When micro basis of choice itself is shaky, the corresponding macro equilibrium with Pareto optimality is bound to be illusory. Social choice theory formulated by galaxy of eminent economists (including Prof. Sen) thus demolishes the utilitarian edifice by bringing about plurality of human motivation into welfare economics. Appreciation and accounting of plurality may not lead to complete ordering which is a requirement for framing a public policy. But it can provide better insight into real life economic problems like labour and industrial relations and productivity, etc. The author advocates that even policy decisions which take into account the plurality of divergent factors are superior to simplistic acceptance of non-applicable social optimum (such as Pareto optimality) supposed to be arrived through narrow self-interest maximisation even when such policy decisions are based on incomplete ordering.

An interesting case based on game theory has been quoted popularly known as 'Prisoners' Dilemma' to reveal the contradiction between individual self-interest and social welfare which in turn can serve individual interest better if given a chance. "In the Prisoners' Dilemma each person has a 'strictly dominant' individual strategy, in the sense that no matter what others do, each person's own goals are better served by following that dominant (and 'self-goal') strategy. At the same time, everyone's goals would have been respectively better served had they followed a different (and more co-operative) strategy. Given 'self-goal' choice, it is clear that each person will indeed follow the non-co-operative strategy, and thereby everyone will end up in a situation inferior to following the co-operative strategy. There are real-life analogies of this kind of problem in many areas of real importance in economics e.g. achieving high industrial productivity, which may depend on the efforts of all, even though each person may be able to serve his or her own goals better by abstaining from intense application (while enjoying the fruits of other people's work)" (pp. 82-83).

With the due acknowledgement of the seminal contribution of social choice theorists, including Prof. Sen, to welfare economics, it is pertinent to point out that the pluralist welfare criteria, which they seek to substitute for utilitarian criterion, are more introspective and not less and to that extent the measurability problems in application of these criteria to economic logistics are increased and not diminished. The applicability of the monistic self-interest maximisation criterion is limited to proving downward sloping demand curve in a single perishable commodity market where diminishing marginal preference for successive units in consumption, though measured cardinally or compared ordinally in hypothetical terms, is conceptually logical. But the logic of measurability breaks down when applied to heterogeneous categories of consumption and theory of exchange is reduced to the theory of market behaviour in a single isolated transaction, when a buyer and a seller as economic agents seek the lowest and the highest price for commodity demanded and supplied, respectively. Thus, link between self-interest maximisation as a utilitarian norm of welfare economics and economic logistics is limited to single market transaction, a basic unit of economic logistics. But there is no such parallel link in the context of new welfare economics of social choice theorists as the exploratory horizons of the pluralist welfare criteria cannot furnish explanatory variables for economic logistics in the absence of measurability. The meeting points in their welfare norms and economic logistics are tangential and do not cover the crucial areas such as factor price relationships and their institutional patterns. This seriously limits the author's objective of bringing predictive economics increasingly under the influence of welfare economics.

Alternatively, it can be argued that the present utilitarian criterion in economic theory is not positive or objective enough as compared to their counterpart in natural sciences. Unlike the measurability of consumer's choice properties in physics like heat, electricity and atmospheric pressure are measured in terms of their operative impact on objective phenomenon or medium with which they are associated. For example, the movement of mercury owing to heat or atmospheric pressure in thermometer or barometer provides their respective index of measurability. Identifying similar objective phenomenon commonly associated with human choice in

consumption can facilitate ordering among its heterogeneous categories. When such ordering is achieved it will logically prove (which is obvious to common sense) that maximisation of well being even in a single income cycle is governed by consumption choice comprising entire life span. Rationality of consumer at this stage also takes into account that his or her well-being comprising entire life span is a function of social organisation, the warps and woofs of which consist of exchanges and institutions governed by motives far transcending the self-interest. Given time dimension even exchanges in market based on long term contracts take into account commonality of interests of opposite parties. The relationship between personal well being and agency aspect as pointed out by the author is analogous to one between 'base' and the 'superstructure' in Marxist terminology which only objective criterion can explain.

The author's criticism of behaviourist model stating that the two conditions of internal consistency and transitivity fall short of rationality in choice fails to cover the third assumption of income effect without which the law of demand cannot be proved. Similarly, in his comments on Pareto optimality, Prof. Sen does not appear to be too certain regarding its distributional impact. At one place he states "A social state is described as Pareto optimal if and only if no-one's utility can be raised without reducing the utility of someone else . . . . . . A state can be Pareto optimal with some people in extreme misery and others rolling in luxury, so long as the miserable cannot be made better off without cutting into luxury of the rich. Pareto optimality can, like 'Caesar's spirit', 'come hot from hell" (pp. 31-32). This portion indicates that the Pareto optimality facilitates or atleast co-exists with extreme inequality and concentration of economic power in the hands of a few. But at another place he contradicts it when he states that "every Pareto optimal social state is also a perfectly competitive equilibrium, with respect to some set of prices (and for some initial distribution of people's endowments)" (p. 34). He even maintains that the result of Pareto optimality can be of real use only "as a part of some 'revolutionary's handbook', transforming the ownership of means of production before getting the market to do the rest" (p.38). It is really puzzling that criterion like Pareto optimality can be at the same time umbrella for societies resembling Latin American banana republics and inspiration for 'revolutionary redguards on long march.'

One of the most interesting aspects of this book is the insights it provides on historical background of mainstream economics such as Aristotelian foundation of welfare economics and contribution of Kautilya's *Arthasastra* to 'economic logistics'. But its refutation of popular misconception that Adam Smith introduced self-interest maximisation criterion is the most relevant in view of Smith's position as founder of classical economics. Authorship of this approach popularly attributed to the father of the classical school has been parodied in the Stephen Leacock's limmeric.

"Adam, Adam, Adam Smith
Listen what I charge you with !
Didn't you say
In the class one day
That selfishness was bound to pay ?
Of all doctrines that was the Pith
Wasn't it, wasn't it, wasn't it, Smith" ?
(Stephen Leacock, 'Hellements of Hickonomics', p. 21).

The oft quoted passage from 'Wealth of Nations' in support of the popular belief is as follows: "It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest. We address ourselves, not to their humanity but to their self-love, and never talk to them of our own necessities but of their advantages" (p. 23). But according to Prof. Sen "a reading of even this passage would indicate that what Smith is doing here is to specify why and how normal transactions in the market are carried out, and why and how division of labour works, which is the subject of the chapter in which the quoted passage occurs. But the fact that Smith noted that mutually advantageous trades are very common does not indicate at all that he thought self-love alone, or indeed prudence broadly construed, could be adequate for a good society" (p. 23). The author conclusively proves by references to Adam Smith's philosophical writings and his comments on contemporary policies that he didn't subscribe to the one-sided, unadulterated, self-interest maximisation criterion, immune from ethical considerations.

Notwithstanding one's conformity or otherwise with the author's views, comprehending the brief power-packed 89 pages is a

rewarding but not easy an exercise. Being an essay in condensa-
tion and synthesis, the book covers almost encyclopedic material
(references constitute one-third of the text) in economics, ethics
and other social sciences and compels the reader to turn back
again and again to keep pace with the author's eagle-sweep of
ever-expanding academic horizons and his extraordinary capacity
for marshalling voluminous evidence to present a compact and
rigorous logical exposition.

D. U. Shirali*

* Shri D.U. Shirali is Director, Division of National Income, Savings & Flow of
Funds in the Department of Economic Analysis & Policy.

Boone

by

T. Boone Pickens Jr.

(Houghton Mifflin Company, First Published in 1987,
Paperback 1988, Price $4.95, pp. 335)

BOONE Pickens tells an interesting story well. Belonging to the first generation of entrepreneurs who revolutionized American business by the method of corporate take overs, he sets out in this book very powerfully, the case in support of Leveraged Buy Outs.

The son of a fun loving "Land man" and a disciplinarian, upright and no nonsense mother, Boone Pickens writes that the values imbibed at youth (only reinforced by the fact that his grandmother and aunt, who stayed next door, shared these same old fashioned values – of hardwork, thrift, forthrightness and competition) had a very strong bearing on his personality. These values found expression in his wanting to avoid the excesses of other Chief Executive Officers (C.E.O), not being able to let people down and sticking by his word.

The book which is divided into five sections is full of those catchy one liners which Texans are famous for. The first section covers his childhood till the time he finally leaves Phillips to go it alone. The second section shows how Petroleum Exploration Inc. turns public and becomes the raiding Mesa Petroleum. It brings out how he raises money for his capital starved company to get on to big things and it records his first takeover victory – Hugoton Production Company in 1969. By 1971 he had four children, a broken marriage and over a million US dollars to his name. The third section shows his attempt at diversification into cattle and the discovery of his biggest oilfield. But most importantly, it gives an insight into the life of the top CEO's in the U.S.A. By and large, he finds them an inefficient, insular, arrogant lot of bureaucrats

who don't know the first thing about making money. They are in love with the massive power they wield and allow their giant size egos to be satiated (if that is possible) by a string of aircrafts, yachts and executive holiday homes. They are completely self centered and greedy and only interested in carrying on as CEO's. Interestingly, most own very little stock in the companies they manage. For those of the CEO's heading oil companies (and those with whom Boone has the greatest interaction) the energy crisis which came with the fall of the Shah of Iran in 1979 and saw oil prices climb from $13 per barrel to $40 per barrel, the crisis came opportunely. Thus, the oil companies really reaped it in and this hid their inefficiencies. The high oil prices saw a quicker run down of oil reserves. Mesa, as Pickens saw it, should not hang around with a depleting reserve base of its primary product. He said to a group of analysts in 1979 in New York, that "if we fail to replace our reserves two years in a row, we'll either figure out something else to do or we'll get out of the business. I consider two years a trend, and I promise you, we won't be around for the third year". The same year he figured, by making Mesa smaller by spinning of some of the reserves directly to the shareholders he could get around the problem of depleting reserves and prohibitive costs of reserve replacement. He thus distributed half of Mesa's gas reserves directly to the shareholders by what he decided to call 'Royalty Trusts'. The stockholders would receive 90% of the profits directly, in quarterly cash distributions. Mesa retained the working interests which allowed it to manage the properties and didn't require any reduction in personnel. With a smaller reserve base, replacement was much easier and they are still around ! However, exploration was very expensive and when they ran out of luck (didn't make discoveries) they had fallen into the same trap as everybody else in oil, of being dependent on continued OPEC supported prices. High prices saw a handsome cash flow generated by the old reserves but the industry was kidding itself, it wasn't a boom, it was a disaster and Pickens saw it as such. There had to be a better way and Pickens found his answer by restructuring Mesa into a trimmer organisation and by what was to soon make him famous the world over – corporate take overs!

Section IV is appropriately dubbed the "big cat walks" as it describes   his big take over   attempts – Cities Service. Gulf,

Unocal, & Phillips. The share prices of these big bumbling ineffi-
cient companies were trading at levels much below their underlying
value. In his first acquisition attempt - Cities Service - his objective
was to acquire the company as it complimented Mesa. Later with
Gulf his objective was to ask management to restructure on the
lines of Mesa and give stockholders value for money. As it hap-
pened his bid on these big companies was unsuccessful. However,
he sold out to the management at share prices much higher than at
the time of acquisition, allowing him a big return.

This frankly takes us to the basic issue raised in the book - how
do we evaluate Leveraged Buy Outs (LBOs)? Baumol in his theory
of Contestable Markets argues that even Monopolies would function
close to the efficiency frontier (if there were no sunk costs) due to
the threat of Viking raids. Can Corporate raiding then be supported
on grounds of efficiency? In the U.S.A., LBOs are supported by
an additional factor, that, while debt is tax deductible, equity is
double taxed. This gives an incentive to LBOs, but more basi-
cally, any move to restructure and move to a more optimal
resource allocation is always sensible by way of economics. LBOs
by taking on debt to acquire the undervalued shares of companies
which are subsequently restructured on a more efficient basis (by
closing down losing units, cutting back on excess staff, selling of
certain incompatible activity fields etc.) can thus, be considered
generally beneficial.

But this is only half the story. Due to the "big bucks" that the in-
termediaries make - Bankers, Lawyers, Accountants - often
times the cash flows are made to fit the deal rather than suggest
the actual underlying value of the share. This together with the
giant size egos at stake lead to an RJR Nabisco type deal, where a
company whose stock was trading at $53.50 after competitive
bids was bought over for $109 a share. The company was bought
for $25 billion and is now in trouble trying to service its huge debt.
Trading values of the share, both before and after takeover. were
unrealistic. This infact is the cutting edge - the need to find the
correct underlying value. Often though, the price is fixed by the
greed of intermediaries and the ego of raiders and management,
with no thought to the stockholder. Where an unrealistically high
price is fixed the company gets hit. The mountain of debt requires

crisis management for the new management (or old) which leads to a cutback on costs related to growth (R&D) or necessitates raising more debt (through junk bonds) which cut the company's long run competitive ability and viability.

Where a company is made to submit to "greenmail" (allow a single body to sell out its large position in a company's stock back to the management at a sharp profit i.e. Sir James Goldsmith's whopping $40 million from Warner) the shareholders get very adversely hit, as their dividend goes to pay off the raider and protect an effete management. It is to Boone Pickens credit that he fights for all the shareholders and does not go in for greenmail.

This takes us back to the primary issue of whether LBOs are good or bad. Like with most things, 'only if the price is right' (and with a rider - 'and the new management is bright'!).

In the final section, Boone Pickens talks on Money, Leadership and the emerging new breed of entrepreneurs. Expectedly the tone is self-satisfied and slightly pedantic, perhaps the weakest part of the book and a let down from the earlier high drama. Pickens would like to believe (and like us to believe as well) that he hasn't changed much with his riches. He still drives an 8 year old Mercedes and uses the company jet for deals and not dogs! His views on Leadership are most interesting. They are instructive, as well as, widely known, though admittedly rarely found! And finally, he has hope for the future. He expects the new breed of entrepreneurs will abound in the leadership qualities he values. And so they might, but, one is still left with a sneaking suspicion that his views on CEO's are a bit of a caricature. It is hard to believe that giant conglomerate CEO's would go off partridge shooting when their companies were being bid for. Certainly the "Nero was fiddling when Rome was burning" syndrome helps further strengthen his case against hedonistic CEO's. but a little more must surely be in people, to be able to ascend the rickety corporate ladder.

His views on merchant bankers appear to be much closer to the truth. The way Morgan Stanley is shown to change their views (a complete *volte face*) to suit the side they are on is a warning every CEO must heed. The experts on LBO's are experts on making

money for themselves much more than securing their clients interests. The deal has to be made at any cost. Infact the lure of fat fees has induced some banks to push for takeovers giving bridge loans they have later had to rue (CSFB – to Ohio mattresses). Boone Pickens, warning to investors to do their own numbers surely makes a lot of sense, especially in the current state of the world junk bond markets.

Thomas Boone Pickens is considered the archetypal corporate raider and his name is synonymous with LBOs the world over (today even in Japan). He is no apologist and sets out a forthright case in support of LBOs and for management accountability to their owners (the stockholders). The book is well written, racy and for a Texan terribly restrained (despite Section V) and hardly pompous. As autobiographies go, it's a good one.

Janmejaya K. Sinha*

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*   Shri J.K. Sinha is an Investment Officer in the Department of External Investments and Operations.