Financial Projections for Indian Economy – Another Look at the Eighth Plan

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Abstract

The objectives of the paper are to estimate sectoral investment and financial transactions matrix for the Eighth Plan period (1992-97) consistent with the envisaged sectoral savings for the Plan, and to examine the behavioural relations for the supply of (demand for) funds by different sectors to (from) others based on data for the period 1970-71 to 1987-88. The projections of sectoral investment and inter-sectoral transactions are based on Stone's procedure which assumes stability of the pattern of supply of (demand for) funds by different sectors. It has however been observed that the patterns of supply of and demand for funds change over time, and therefore the coefficients have been estimated by regressing the cell elements of the transactions matrix on total uses of funds of the concerned sector and made use of for financial projections.

From the Granger causality test and decomposition of forecasted error variance, investment targets are found to be better determined, given the envisaged saving. It is projected that the proportion of households' saving in physical assets to its total uses of funds would decrease to 39 per cent during the Eighth Plan from the average share of 45 per cent during 1980-81 to 1987-88. The financial projections are based on Plan assumptions about the growth rate, gross saving rate and net inflow of capital. It is projected that government sector's investment would be about 44.7 per cent of total domestic investment while the shares of private corporate business and household sectors are estimated at 20.9 per cent and 33.3 per cent, respectively. The Government and the private corporate sectors are expected to finance 13.6 per cent and 37.8 per cent of their respective investment from their saving. The estimated behavioural relations of supply of and demand for funds suggest that (a) the interest rates show some evidence of influence on financial transactions; (b) the adjustment of transactions for various sectors is not instantaneous and the speeds of adjustment are different from one sector to another. The equations from both supply and demand sides have high explanatory power except those relating to the rest of the world sector.

Introduction

In developing economics, planning is often used as an instrument to further economic growth. The role of investment planning and the

financing of investment, therefore, assumes critical importance in such economics. The investment targets of the Plan are made by commodity classification based on industrial groupings and also by institutional classi- fication into public and private sectors. On the basis of the nature of the industries covered under public and private sectors, overall investment is allocated between the two sectors. The pattern of financing of their investment from own funds (i.e., saving) and external funds assumes importance and differ widely as between the two sectors. It is, therefore, important to assess the resources that are available during the Plan period while finalizing the targets for real variables. The feasibility of the Plan is assured when the investment targets can be derived consistent with the envisaged resources of the economy.

The objectives of the paper are two-fold. First, the paper estimates sectoral investment consistent with the envisaged sectoral saving and finan- cial transactions matrix for the Eighth Plan period (1992-97), based on the framework of Stone (20). Second, the paper examines the behavioural equations for the supply of (demand for) funds by different sectors to (from) others based on data for the period 1970-71 to 1987-88.

The paper is organized in six sections. The first section briefly tou- ches upon the review of the literature. The methodological framework is presented briefly in the second section. The data base and certain limitations are described in section 3. Section 4 discusses the patterns of supply of and demand for funds for different sectors of the economy for the period 1969-70 to 1987-88. Section 5 presents the projected pat- tern of supply of funds for the Eighth Plan and the forecasts of sectoral investment consistent with the envisaged saving. The inter-sectoral transac- tions for the Plan period is also presented in this section. The system of equations explaining the behaviour of supply of and demand for funds for the six sectors of the Indian economy are presented in section 6. Some broad conclusions are also given in this section.

Section 1

Review of the Literature

The concept of financial projections is introduced by Stone (20) who developed a framework to obtain the projections. The object of financial projections is to describe whether in the absence of structural changes, any shortages or surpluses of capital funds for a particular sector are likely to arise and whether any adjustments are required to allocate sectoral investment. In brief, under Stone's framework, balance sheet

data of different sectors, into which the economy has been divided (say, 'n' sectors), are transformed into 'sector x instrument' type matrix wherein instruments are classified into financial assets (or financial liabilities; say 'm' instruments) and real assets (or accumulated saving). He then projects into future the sectoral investment programme (or intended saving) consistent with the envisaged saving (or investment target) assuming the observed sectoral pattern of asset holding or issuance of liabilities, classified by instrument to hold good for the immediate future.

The framework of Stone, thus, facilitates the projection of investment targets consistent with the envisaged saving, assuming that the patterns of asset holding and issuance of liabilities by different sectors are constant. This implicitly assumes constancy of portfolio preferences of holding or issuing financial claims by each of the institutional sectors. But a question arises whether a stable pattern is assumed across the classification of transactions by 'sector x instrument' or 'sector x sector' basis. It was pointed out by Pani (11) that when it comes to one of control, it is easy to handle institutions and make laws affecting them individually or in groups rather than enact a legislation for individual financial claims. However, if the objective is to perceive the impact of interest rate changes on sectors' holding, then claim-wise presentation is useful.[1] Although the claim-wise data are more readily available, the objective pursued determines the use of sectoral classification or claim-wise classification in the projections. The usefulness of the framework is illustrated by Fry (9) for Turkey to compare sectoral saving with planned sectoral investment, indicating the necesary financial transfers required to achieve the targets; and by others for India.

Adopting Stone's framework to flow data, Divatia (6) derives for the Indian economy, the investment targets consistent with planned saving for the Fourth Plan period.[2] Application of Stone's procedure to flow data assumes implicity that the marginal propensities to finance expenditure of different sectors are constant and equal to average propensities observed from the balance sheet data. Divatia observes that the coefficient of variation in the pattern of supply of and demand for funds is higher for small coefficients and lower for large coefficients, based on data for the Third Plan (1961-62 to 1965-66) for the Indian economy. On comparing the patterns of supply of and demand for funds for different plan periods, Divatia (8) points out that the differences in the patterns are because of structural changes, such as setting up of new institutions and nationalization of commercial banks, that have occurred during 1961-62 to 1973-74.

Pani (11) presents the framework in more general terms and shows that Stone's model is a special case of the institutional classification, namely, financial and non-financial sectors. When the classification of sectors' assets or liabilities is made by instrument, instead of institutional sectors, then Stone's model is obtained. Pani also demonstrates the methodology to work out sectoral saving (also investment) for the Indian economy for the Fifth Plan period (from 1974-75 to 1979-80) and compares the saving estimates with the envisaged targets given in the plan document. In these exercises, the economy is closed by recording transactions external to economy under a separate sector called 'rest of the world'. Pani further discusses about the behavioural relations in respect of supply of (demand for) funds by different sectors to (from) others through other exogenous variables such as interest rates, sectoral investment, national income, etc. He indicates some evidence of the influence of the interest rates on the financial transactions and points out, though with a degree of caution, that the error in ignoring interest rates may not be large in financial projections. This paper examines these relations with recent data.

The main criticism of Stone's model is the assumption of constancy of average ratios derived from the balance sheet data. But, Bhatt (2) while adopting Stone's procedure for the Fourth Plan period (from 1969-70 to 1973-74), assumes that marginal ratios, derived from the balance sheets, are constant. These ratios, which represent the coefficients of supply of (demand for) funds classified by financial claims held (issued), are estimated by regressing each of the cell elements of the transaction matrix on total assets (liabilities) of the respective sectors, based on balance sheet data constructed for the Indian economy for the years from 1955-56 to 1968-69. The slopes of these regressions denote marginal ratios. He, thus, incorporates into the model the changing portfolio preferences of sectors.

Two other studies by Ramachandra Rao (13) and Rama Rao et al (14) adopt the procedure described above to the net matrix of flow data and estimate the investment targets respectively for the Sixth Plan (1980-85) and for the Eighth Plan (1990-95)[3]. Certain policy changes envisaged in the Plan are incorporated into the matrix of supply of funds to project investment for the Sixth Plan. The investment projections for the Eighth Plan period, made in the latter paper, are based on gross matrix.

The exercises made so far project investment targets likely to be achieved with planned saving or project saving requirements to meet planned investment. However, they have not indicated the direction of

estimation, i.e., whether investment is better projected or saving. It is therefore, beneficial to planners to know whether saving stimulates investment or investment creates additional saving, although theoretical constructs indicate investment multiplier leads to increase in saving through output. This paper attempts to examine this aspect of causality between saving and investment; and projects sectoral investment for the Eighth Plan.

Section 2
Methodological Framework

The modelling of the financial system is based upon the social accounting matrix as developed by Stone (20), through the framework of an input-output type transactions matrix. Stone's framework is developed essentially with the sectoral balance sheets, i.e., the portfolio of claims held and issued by different sectors as at a particular time point. The model is based on certain fixed relationships within the national balance sheet. For this purpose, the balance sheet entries are arranged in a matrix form, similar to commodity x industry input-output table, distinguishing financial assets and real assets on the assets side and liabilities to others (financial liabilities) and liabilities to self (i.e., accumulated saving) on the liabilities side. The framework assumes constancy of two matrices relating to asset portfolio of the sectors (sector vs. instrument held) and liability pattern (sector vs. instrument issued). Following Stone's framework, the transactions table is modified in some of the subsequent research studies. The basic method of financial modelling, as argued by Pani (11), can be extended to the general case of institutional classification of financial activitiy and to gross basis of transactions.

Basic Framework

A modified form of transactions table akin to commodity x commodity input-output table, is presented below. Assets and liabilities of each sector are classified by sector to whom they lent and from whom they borrowed. These transactions are then put into a matrix form such that the data when read column-wise denote liabilities and row-wise they represent assets of the concerned sector. The matrix is as shown in Table 2.1

Table 2.1 : Matrix of flow funds

| Lending Sector | Borrowing Sector | | Financial Assets | Physical Assets | Total Assets |
	Financial Sectors 1 2 3 ... m	Real Sectors 1 2 3 ... n			
Financial Sectors (1 to m)	X_1 $_{(m \times m)}$	X_3 $_{(m \times n)}$	a		^{a} $_{(m \times 1)}$
Real Sectors (1 to n)	X_2 $_{(n \times m)}$	X_4 $_{(n \times n)}$		C $_{(n \times 1)}$	^{w} $_{(n \times 1)}$
Financial Liabilities					
Accumulated Saving		S $_{(1 \times n)}$		TS = TC	
Total Liabilities	l $_{(1 \times m)}$	z $_{(1 \times n)}$			TA = TL

Note: Notation given in brackets denotes the order of the matrix or vector.

The matrix (X) of flow of funds between different sectors is divided into four sub-matrices such that X_1 represents transactions between 'm' financial sectors, X_2 denotes liabilities of 'm' financial sectors to 'n' real sectors, X_3 represents the liabilities of 'n' real sectors to 'm' financial sectors and X_4 represents the transactions between real sectors.[4] Total assets (also financial assets) and total liabilities (also financial liabilities) of financial sectors are given by 'a' and 'l', column and row vectors, respectively. The row vectors, 'S' and 'z' denote accumulated saving and total liabilities of real sectors; 'C' and 'w' are column vectors of physical assets (i.e., accumulated investment) and total assets of real sectors. Given 'S' and the transactions matrix, the 'C' vector can be worked out in the following manner.

Let Da and Dw, the diagonal matrices, be defined as :

Da = diag [a_1, a_2, . . . , a_m]
Dw = diag [w_1, w_2, . . . , w_n].

The pattern of supply of funds matrix, 'x', is given as

$$x = \begin{pmatrix} x_1 & x_3 \\ x_2 & x_4 \end{pmatrix}$$

where, $x_1 = Da^{-1} * X_1$ $x_2 = Dw^{-1} * X_2$

$$x_3 = Da^{-1} * X_3 \qquad x_4 = Dw^{-1} * X_4 \qquad\qquad ...... (1)$$

From the balance sheet identity, we can write

$$z = S + I1 * X_3 + I2 * X_4 \qquad ...... \qquad\qquad ...... (2)$$

where $I1 = [1,1,1,.....,1]$ of order $(1,m)$ and
$\quad\quad I2 = [1,1,1,.....,1]$ of order $(1,n)$

From (1) and (2), we have,

$$z = S + (I1 * Da * x_3) + (I2 * Dw * x_4)$$
or $\quad z = S + (a^T * x_3) + (w^T * x_4) \, ... \qquad\qquad .... (3)$

where 'T' denotes the transpose of the vector (or matrix). But total liabilities and total assets are equal for any sector. Therefore, we have $a^T = l$. Further, total liabilities, l, of financial sectors can be written as

$$l = I1 * X_1 + I2 * X_2$$
or $\quad l = I1 * Da * x_1 + I2 * Dw * x_2$
i.e., $\quad a^T = a^T * x_1 + w^T * x_2$
or $\quad a^T = w^T x_2 (I3 - x_1)^{-1} \, ... \qquad\qquad ..... (4)$

where I3 is an identity matrix of order $(m \times m)$.

Substituting (4) in (3), we get,

$$z = S + w^T x_2 (I3 - x_1)^{-1} * x_3 + w^T * x_4 \qquad\qquad ..... (5)$$

But, total assets, $z = w^T$, total liabilities.

Therefore, from (5) w^T is given as
$$w^T = S [I4 - x_4 - x_2 * (I3 - x_1)^{-1} * x_3]^{-1} \qquad\qquad .... (6)$$

where I4 is an identity matrix of order $(n \times n)$.

Thus, given the vector S, and the transaction matrix (supply pattern), the total uses of funds of real sectors are estimated. The accumulated investment vector, C, is estimated from the idendity.

$$C = w - X_4 * (I2)^T - X_2 * (I1)^T$$

Substituting from (1) we can write

$$C = Dw \ [(I2)^T - x_4 * (I2)^T - x_2 * (I1)^T] \qquad \qquad .... (7)$$

Total funds disbursed by financial sectors are obtained from (4) and the transactions matrix can be derived from the C, a and w.

Thus, the model gives a balanced transactions table and investment target consistent with the initial assumptions of sectors' saving intentions. Alternatively, assuming the sectoral investment targets and the pattern of demand for funds, the sectoral saving required to be mobilized so as to meet the targeted investment can be estimated.[5] This model projects the transactions table and the saving vector consistent with the initial assumptions of investment intentions and the pattern of demand for funds.

The assumption of constancy of proportions may be valid in the case of institutional classification[6]; it, however, does not take into account the changes over time whether they are based on balance sheet data or flow data. This is, perhaps, because developing economies, over a period of time, set up new institutions, create new instruments to mobilize surplus resources available in the economy and thus provide a wider choice of financial assets to savers and also provide long and short-term credit to the investors. Such institutional changes can be captured in the parameters of the model by the marginal ratios of different claims held or issued by different sectors to respective total assets or liabilities instead of average ratios.[7] The marginal ratios are estimated using the sectoral balance sheets described earlier in Table 2.1. In brief, they are estimated as outlined below.

Suppose α_{ij} and β_{ij} are the matrices, respectively, of intercepts and regression coefficients. The regression equations are given by

$$X_{ij} = \alpha_{ij} + \beta_{ij} \ Da \qquad \text{for } i = 1, 2, ..., m \text{ and}$$
$$j = 1, 2, ..., n$$

and $X_{kj} = \alpha_{kj} + \beta_{kj} \ Dw \qquad \text{for } k,j = 1, 2, ..., n$

then, we can have $\quad \Delta X_{ij} = \beta_{ij} \ \Delta \ Da$ and
$$\Delta X_{kj} = \beta_{kj} \ \Delta \ Dw$$

where 'Δ' denotes differencing in consecutive observations. The matrix of β coefficients thus obtained is substituted for the matrix 'x' of supply of funds coefficients in the formulations described above and the exercise is continued in incremental terms to estimate the investment target consistent with planned saving. Bhatt (2) adopted this variant of Stone's method to the Indian data.

The system presented in Table 2.1 has basically ($2mn + m^2 + n^2 + 2m + 4n + 2$) variables. These variables arc inter-connected through their balance sheet identities and the like, which number to ($3n + 3m + 2$), leaving ($m^2 + n^2 + 2mn + n - m$) degrees of freedom. Even when the above matrix is respresented by flows, the degrees of freedom remain the same. If it is assumed that the sectors' saving preferences, including inflow from the foreign sector, are given, which number to 'n', then the degrees of freedom are reduced to $[(m + n) (m + n) - m]$.

Behavioural Equations

The behaviour of supply of (demand for) funds by different sectors to (from) other sectors in the economy is examined through simple linear regression analysis. The equations are selected based on various statistical criteria, such as appropriateness of the sign of the coefficient, significance of the coefficients based on t-statistic, coefficient of multiple determination (R^2 adjusted), Durbin-Watson (DW) statistic, and the standard error of the estimate (SER). The regressions are estimated for the period 1970-71 to 1987-88.

Section 3
Data Base

The study is based mainly on 'financial flow of funds' accounts which are published from time to time in the Reserve Bank of India Bulletin and the Report on Currency and Finance (in vol. 2 as summary statements), by the Reserve Bank of India (RBI). The period of the study relates to 1961-62 to 1987-88. These accounts are published for six sectors, viz., banking, other financial institutions (OFI), private corporate business (PCB), government, rest of the world (ROW) and households.[8] The first two sectors are known as financial sectors and the remaining as non-financial sectors. Among the non-financial sectors, PCB and government sectors are termed as deficit sectors because their saving is less than their investment; and the households is termed as a surplus sector because its saving exceeds its investment. The rest of the world sector records all transactions of the domestic economy with foreign entities. It is generally accepted that financial institutions intermediate between savers and investors and they do not have any real activity, such as saving or investment. But, in practice they save and invest in fixed assets and, therefore, these activities of the financial institutions are shown, in this study, under a separate sector called Financial Intermediaries (FI).

The data on financial flow accounts are transformed into an input-output type transactions matrix such that the data when read column-wise represent borrowing, and row-wise, denote lending of different sectors. These matrices can be prepared on either net or gross basis and they are shown on gross basis in this study. Thus, the matrices included in the study present net increase in borrowing (sources of funds) of a sector as well as net lending (uses of funds) by that sector.[9] These matrices are then supplemented with data on saving and investment of the respective sectors such that financial sources plus saving would be equal to total sources of funds, and financial uses plus investment would equal total uses of funds. Further, total uses of funds are equal to total sources of funds for each of the six sectors and for the total economy. The patterns of supply of funds and demand for funds coefficients are based on these data for the period 1969-70 through 1987-88.

Data in respect of gross saving and gross investment for different sectors are collected from the National Accounts Statistics (NAS) published by the Central Statistical Organization' (CSO), Government of India. Estimates of saving and investment of banking and OFI sectors are shown separately based on data given in the Annual Reports of the RBI and the Statistical Tables Relating to Banks in India and NAS. It may be mentioned that the rest of the world sector does not have investment and as such its total financial uses are equal to total uses of funds while net inflow of funds into the economy from the sector represent its saving.

The behaviour of demand for and supply of funds by the above six sectors are examined based on balance sheet aggregates (i.e., funds outstanding at the close of the year). These outstanding balances are derived by cumulating the flow data (given by transaction matrices) for the years 1961-62 to 1987-88 to a similar matrix obtained for the balance sheet data for the year 1960-61 given by Venkatachalam and Sarma (18). These data derived for 1970-71 are very close to the balance sheet data given by Venkatachalam and Sarma.[10] The cumulation of data from 1961-62 is considered so as to exclude year to year revaluations of various assets and liabilities included in the balance sheet and to keep consistency with the data used in other sections of the study. The cumulated data can approximately be assumed to represent the balance sheet aggregates except that they do not include the intra-sectoral transactions (i.e., transactions between sub-sectors of a sector). The equality of total assets (cumulated uses of funds) and total liabilities (cumulated sources of funds) as derived above assumes that assets and liabilities on account of intra-sectoral transactions are equal.

Data on different interest rates for the years 1970-71 to 1987-88, are collected from the Report on Currency and Finance published by the RBI and those on consumer price index (base 1985=100) are taken from the International Financial Statistics (IFS), published by the International Monetary Fund. The short term rate is represented by the interest rate on deposits for 1-3 year period while the rate on deposits for more than 3 year period is taken as the long term rate (R12). The commercial lending rate of the State Bank of India is taken as the lending rate (LR). The yield on private securities (YPS) is given by the average yield on ordinary shares and the yield on government securities (YGS) relates to the redemption yield (upper limit) on long term securities (15 years and above). The data on money market rate (MR) are taken from the IFS.

The financial flow accounts which formed the data base for this paper, have some limitations, such as non-uniform closing dates for the annual accounts of different economic units, differences in valuation of financial instruments, like deposits, loans, securities, etc., by the issuing and holding sectors, problems in sectoral allocation of certain instruments and time lags in the availability of data.[11] These, in turn, are applicable to the data used in the study. Further, certain adjustments are made in the financial flow data to derive the transactions matrix and also to satisfy the identities of the matrix while integrating it with saving and investment of different sectors. In such a process, certain data adjustments are made to the minimum possible, taking care to preserve basic transactions matrix. Besides, certain assumptions made in the exercise are mentioned whenever they are applicable.

Section 4

Supply of Funds

As stated earlier, the patterns of supply of and demand for funds are obtained, for the period 1969-70 to 1987-88, based on gross transactions data for each of the seven sectors, into which the economy is divided.[12] The patterns of supply of funds and demand for funds have been compared for different sub-periods up to 1986-87 in the earlier studies, although based on net transactions. The discussion in the paper is confined to the period subsequent to the nationalization of commercial banks in 1969, i.e., 1969-70 onwards. For comparative purposes, the patterns for the sub-periods from 1969-70 to 1979-80 (period 1) and from 1980-81 to 1987-88 (period 2) are presented. The allocation of funds, as interpreted by incremental data, for these two periods, is presented in Table 4.1. Similar patterns based on outstanding balances (i.e.,

cumulated flows), for the years 1970-71, 1980-81 and 1987-88 are shown in Table 4.2.

It may be seen from Tables 4.1 and 4.2 that similar trends in supply patterns are depicted over time by flow and stock data. The banking sector stepped up its finances to the government sector during period 2 over their lending in period 1. The rise in government's share is compensated by the decrease in the share of the rest of the world. The fall in the latter's share can be due to a reduction in the banking sector's holdings of foreign assets. Table 4.2 indicates also a fall in the share of the rest of the world in total assets of the banking sector from 7.2 per cent in 1980-81 to 2.2 per cent in 1987-88. The household sector, however, recorded a lower share in the banking sector's disbursements in period 2 compared with that in period 1 while the private corporate business (PCB) sector has more or less the same share in both the periods. The sector lent higher proportion of its funds to other financial institutions sector during period 2 than in period 1.

A shift in the lending pattern of OFI sector is noticed between periods 1 and 2. Although the government sector continues to account for one-half of OFI's funds, its share decreased between the two periods while that of the PCB sector increased. The PCB sector, thus, accounts for 10 points rise in its share to 24.7 per cent in 1980's from that in 1970's. About 16 per cent of OFI's total funds are lent to the banking sector, either in the form of deposits or loans in period 2 as against 18 per cent in 1970's. It is of importance to see a rise in the investment activity of the two financial sectors as reflected by the entries in FI column against these two sectors. The lending of the FI sector to banking and OFI sectors represents saving of respective sectors. Although the banking sector has a larger share than that of OFI sector in the total uses of FI sector, the share of the latter increased between the two periods of the study.

It has been noticed that there is no significant change in the pattern of uses of funds of private corporate business and government sectors except that their respective financial uses to other sectors in period 2 have lower shares in their total uses of funds than those in period 1. Their investment in real assets account for bulk (90 per cent) of their respective uses while the balance is lent to other sectors. Government sector's finances to households and the rest of the world have declined during the period of the study.

The household sector, the only domestic surplus sector, invests its resources in financial assets and physical assets. It has been observed

Table 4.1: Pattern of Supply of Funds Coefficients

(Proportions)

		BK	OFI	FI	PCB	GOVT.	ROW	HH	Fin Uses	Invest-ment	Total uses
BK											
	a.	0.0000	0.0593	0.0133	0.1297	0.4500	0.0839	0.2639	1.0000	0.0000	1
	b.	0.0000	0.1000	0.0213	0.1260	0.5341	-0.0065	0.2251	1.0000	0.0000	1
OFI											
	a.	0.1798	0.0000	0.0072	0.1461	0.6015	0.0017	0.0636	1.0000	0.0000	1
	b.	0.1654	0.0000	0.0128	0.2472	0.5154	0.0061	0.0532	1.0000	0.0000	1
FI											
	a.	0.6870	0.1375	0.0000	0.0000	0.0000	0.0000	0.0000	0.8245	0.1755	1
	b.	0.6317	0.2005	0.0000	0.0000	0.0000	0.0000	0.0000	0.8322	0.1678	1
PCB											
	a.	0.0804	0.0023	0.0000	0.0000	0.0085	0.0004	0.0222	0.1138	0.8862	1
	b.	0.0550	0.0172	0.0000	0.0000	0.0225	-0.0237	0.0124	0.0832	0.9168	1
GOVT.											
	a.	0.0585	0.0010	0.0000	0.0158	0.0000	0.0167	0.0189	0.1108	0.8892	1
	b.	0.0415	0.0272	0.0000	0.0168	0.0000	0.0036	0.0086	0.0979	0.9021	1
ROW											
	a.	0.1018	0.0109	0.0000	-0.0282	0.9155	0.0000	0.0000	1.0000	0.0000	1
	b.	0.3869	0.0602	0.0000	0.0012	0.5518	0.0000	0.0000	1.0000	0.0000	1
HH											
	a.	0.2489	0.0961	0.0000	0.0300	0.0449	0.0000	0.0000	0.4199	0.5801	1
	b.	0.2929	0.1158	0.0000	0.0416	0.1017	0.0000	0.0000	0.5519	0.4481	1
Fin. Sources											
	a.	0.1505	0.0545	0.0024	0.0420	0.1457	0.0173	0.0478	0.4601	0.5399	1
	b.	0.1661	0.0739	0.0045	0.0584	0.1900	-0.0013	0.0438	0.5354	0.4646	1
Saving											
	a.	0.0000	0.0000	0.0232	0.0738	0.1921	0.0136	0.6972	1.0000		
	b.	0.0000	0.0000	0.0464	0.0709	0.1080	0.0982	0.6765	1.0000		

Note: 1. 'a'. Relates to 1969-70 to 1979-80

      'b'. Relates to 1980-81 to 1987-88

   2. The sectors are : BK   : Banking;

                   OFI   : Other Financial Institutions

                   FI   : Financial Intermediaries

                   PCB : Private Corporate Business

                   GOVT : Government

                   ROW : Rest of the World

                   HH   : Households

Table 4.2: Pattern of Supply of Funds - 1970-71 to 1987-88

(Proportions)

	BK	OFI	FI	PCB	GOVT.	ROW	HH	Fin Uses	Invest-ment	Total uses
BK										
1970-71	0.0000	0.0180	0.0129	0.1995	0.4895	0.0176	0.2624	1.0000	0.0000	1
1980-81	0.0000	0.0587	0.0126	0.1250	0.4988	0.0716	0.2333	1.0000	0.0000	1
1987-88	0.0000	0.0880	0.0205	0.1286	0.5122	0.0221	0.2288	1.0000	0.0000	1
OFI										
1970-71	0.1152	0.0000	0.0209	0.2240	0.5745	0.0058	0.0595	1.0000	0.0000	1
1980-81	0.1621	0.0000	0.0101	0.1634	0.6004	0.0041	0.0597	1.0000	0.0000	1
1987-88	0.1635	0.0000	0.0130	0.2418	0.5212	0.0045	0.0560	1.0000	0.0000	1
FI										
1970-71	0.6203	0.1293	0.0000	0.0000	0.0000	0.0000	0.0000	0.7495	0.2505	1
1980-81	0.7136	0.1208	0.0000	0.0000	0.0000	0.0000	0.0000	0.8344	0.1656	1
1987-88	0.6018	0.2166	0.0000	0.0000	0.0000	0.0000	0.0000	0.8183	0.1817	1
PCB										
1970-71	0.0497	0.0002	0.0000	0.0000	0.0087	0.0034	0.0108	0.0727	0.9273	1
1980-81	0.0795	0.0019	0.0000	0.0000	0.0089	0.0021	0.0215	0.1139	0.8861	1
1987-88	0.0577	0.0160	0.0000	0.0000	0.0195	-0.0178	0.0137	0.0891	0.9109	1
GOVT.										
1970-71	0.0503	0.0138	0.0000	0.0131	0.0000	0.0242	0.0263	0.1277	0.8723	1
1980-81	0.0590	0.0154	0.0000	0.0156	0.0000	0.0198	0.0186	0.1284	0.8716	1
1987-88	0.0518	0.0210	0.0000	0.0160	0.0000	0.0077	0.0116	0.1080	0.8920	1
ROW										
1970-71	0.0270	0.0177	0.0000	0.0913	0.8641	0.0000	0.0000	1.0000	0.0000	1
1980-81	0.1904	0.0157	0.0000	0.0266	0.7673	0.0000	0.0000	1.0000	0.0000	1
1987-88	0.2882	0.0591	0.0000	0.0090	0.6437	0.0000	0.0000	1.0000	0.0000	1
HH										
1970-71	0.1764	0.0672	0.0000	0.0243	0.0665	0.0000	0.0000	0.3344	0.6656	1
1980-81	0.2417	0.0888	0.0000	0.0307	0.0548	0.0000	0.0000	0.4160	0.5840	1
1987-88	0.2765	0.1081	0.0000	0.0360	0.0881	0.0000	0.0000	0.5087	0.4913	1

Notes: The table is based on outstandings derived by cumulating flow data.

that the share of the former in its total uses of funds increased between the two periods resulting in a decrease in the share of the latter. Among the financial assets, households' investment in claims of banking sector continues to account for the largest share. Its investment in claims of the government sector recorded the largest rise (5.6 points to 10.2 per cent in period 2) between the two periods whereas the share of claims issued by the banking sector witnessed the next largest rise (4.4 points to 29.3 per cent) during the same period. The increase.in the share of government is attributable to new savings schemes introduced by the government, such as national savings scheme, Indira Vikas Patra, Kisan Vikas Patra. Households' investment in securities of the PCB sector, however, recorded a marginal rise in the share despite a large issue of these securities during period 2.

A substantial change in the pattern of uses of funds of the rest of the world could be seen between the two periods. The government sector accounts for 55.2 per cent of the total uses of the rest of the world in period 2 as against its share of more than 90 per cent in period 1. On the other hand, the share of banking sector has increased from 10.2 per cent to 38.7 per cent during the same period. The overall pattern of sources of funds mobilized by different sectors vis-a-vis gross domestic investment indicates a faster growth in financial activity than in real activity as seen from the increased share of financial uses from 46.0 per cent in 1970's to 53.5 per cent in period 2.[13] It has been seen from Table 4.1 that gross saving of households as a proportion of gross resources of the economy has decreased marginally between periods 1 and 2 while the net inflow of capital from abroad has an increased share.[14] Another interesting development has been the reduction in the share of the government sector in gross resources from 19.2 per cent to 10.8 per cent during the period under review.

Demand for Funds

The patterns of demand for funds by different sectors are given in Table 4.3. The banking sector recorded significant changes in its demand for funds from households and rest of the world sectors. Similarly, the OFI sector witnessed major changes in its pattern of funds received from households and banking sectors. A large part of banking sector's sources of funds are received from the household sector. This share, however, decreased from 70.9 per cent of total sources of banking sector in 1970's to 63.8 per cent in 1980's. On the other hand, banking sector received 10.2 per cent of its funds from the rest of the world sector in period 2 as against 2.1 per cent in period 1. The OFI sector

received 74.9 per cent of its total sources of funds from households in 1970's which decreased sharply to 56.2 per cent in 1980's. This decline is compensated by a rise in the share of its borrowing from all other sectors, while the largest rise is accounted for by the banking sector (6 points) followed by the government sector (4.2 points). Its saving (represented as borrowing from FI sector) recorded a rise of 3.5 points to 7.1 per cent of its total sources.

Table 4.3: Pattern of Demand for Funds - 1969-70 to 1987-88

(Proportions)

		BK	OFI	FI	PCB	GOVT.	ROW	HH	Fin Uses	Investment
BK										
	a.	0.0000	0.1603	0.1461	0.2313	0.2746	0.4114	0.0893	0.1505	0.0000
	b.	0.0000	0.2204	0.1315	0.2247	0.3682	-0.0454	0.1021	0.1661	0.0000
OFI										
	a.	0.0662	0.0000	0.0294	0.1010	0.1327	0.0023	0.0084	0.0545	0.0000
	b.	0.0734	0.0000	0.0363	0.2037	0.1589	0.0108	0.0112	0.0739	0.0000
FI										
	a.	0.0646	0.0364	0.0000	0.0000	0.0000	0.0000	0.0000	0.0117	0.0044
	b.	0.0975	0.0712	0.0000	0.0000	0.0000	0.0000	0.0000	0.0215	0.0097
PCB										
	a.	0.0433	0.0025	0.0000	0.0000	0.0027	0.0018	0.0040	0.0089	0.1353
	b.	0.0297	0.0193	0.0000	0.0000	0.0088	-0.0485	0.0031	0.0075	0.1813
GOVT.										
	a.	0.0952	0.0429	0.0000	0.0493	0.0000	0.1313	0.0109	0.0310	0.4063
	b.	0.0602	0.0934	0.0000	0.0457	0.0000	0.0280	0.0058	0.0254	0.4639
ROW										
	a.	0.0212	0.0093	0.0000	-0.0154	0.0957	0.0000	0.0000	0.0267	0.0000
	b.	0.1015	0.0339	0.0000	0.0005	0.1032	0.0000	0.0000	0.0441	0.0000
HH										
	a.	0.7094	0.7486	0.0000	0.1461	0.0770	0.0000	0.0000	0.1767	0.4540
	b.	0.6377	0.5618	0.0000	0.1618	0.1533	0.0000	0.0000	0.1969	0.3451
FIN. SOURCES										
	a.	1.0000	1.0000	0.1755	0.5124	0.5828	0.5468	0.1125	0.4601	1.0000
	b.	1.0000	1.0000	0.1678	0.6363	0.7924	-0.0551	0.1222	0.5354	1.0000
SAVING										
	a.	0.0000	0.0000	0.8245	0.4876	0.4172	0.4532	0.8875	0.5399	
	b.	0.0000	0.0000	0.8322	0.3637	0.2076	1.0551	0.8778	0.4646	
TOTAL SOURCES										
	a.	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
	b.	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	

Note: 'a' relates to the period 1969-70 to 1979-80 and

'b' relates to the period 1980-81 to 1987-88.

Among the non-financial sectors, PCB and government sectors finance their investment through their own funds (i.e., saving) and funds borrowed from other sectors. The dependence of the PCB sector on external funds to finance its investment has increased between the two periods. Among the external sources, OFI sector accounts for the entire rise in the share of external funds in its sources of funds recorded during periods 1 and 2. The saving of the PCB sector accounts for 36.4 per cent of its total sources of funds in period 2 as against 48.8 per cent in period 1. The banking sector accounts for the largest share of about 22 per cent of the total sources of the PCB sector, albeit a marginal decrease in the share between the two periods while the share of OFI sector doubles to 20.4 per cent during the same period. Its direct borrowing from households increased marginally to 16.2 per cent of its total sources of funds.

The government sector recorded a substantial fall in its saving in financing its investment during period 2 resulting in higher borrowing from the rest of the economy. Its dependence on banking sector remarkably increased during the two periods accounting for nearly half of the rise in the share of external funds. The government sector's saving accounted for only 20 per cent of its total sources of funds in period 2 (41.7 per cent in period 1) resulting in nearly 80 per cent of its total sources of funds from other sectors in period 2. The banking sector accounted for the largest rise of 9 points in its share to 36.8 per cent in period 2 and household sector accounts for a rise of 8 points in its share to 15.3 per cent in period 2. The shares of OFI and the rest of the wrold sectors, however, increased marginally during the same period.

The household sector is a surplus sector and, therefore, its own saving accounts for the bulk (88 per cent) of its total sources of funds; thus, it receives only 12 per cent of its funds from other sectors. It may be observed that there is not much change in the demand for funds pattern between the two periods although marginally higher proportion of funds are received from banking and OFI sectors. The rest of the world sector, namely, the foreign sector, witnessed a see-saw change in the pattern of demand for funds between the two periods. While its saving is only 45 per cent of its total sources of funds in period 1, the share is more than 100 per cent in period 2. The sector received more than 40 per cent of its total sources from the banking sector in period 1 while the share is negative in period 2 implying that the Indian economy received funds from the ROW sector. This is because of decrease in the banking sectors's holdings in foreign assets. The ROW sector received a lower proportion of funds from the government in

period 2 (5 per cent) as compared with the share in period 1 (8.3 per cent).

For the economy as a whole, saving forms a lower share at 46.5 per cent of total sources of funds generated in 1980's as against 54.0 per cent in 1970's. The analysis, thus, indicates higher proportion of inflow of foreign resources in period 2 compared with that in period 1.

Variation in Patterns of Supply of and Demand for funds

It is quite possible that, over a period of time, the-utilization (and borrowing) of funds by different sectors can undergo change with changes in economic activity. It is also quite likely that changes in the patterns may not be substantial. But, the use of such patterns for forecasting purposes can raise doubts, although the forecasts may be for a few years into future. In order to examine such changes in the coefficients of supply and demand, the variability in each of the coefficients is estimated for the two periods and given in Tables 4.4 and 4.5.

It may be seen from Tables 4.4A, 4.4B, 4.5A and 4.5B that the variation in the coefficients is lower for the period 1980-81 to 1987-88 than that observed for 1969-70 to 1987-88, as generally expected. During 1980's, the largest variability is recorded at 1.47 per cent in the coefficient of rest of the world sector's uses to banking sector followed by 1.42 per cent by FI sector's uses to banking sector. The proportion of government's investment in its uses of funds also has a large variation at 1 per cent. The percentage variation is slightly large at 0.8 to 1.0 per cent for the coefficients in respect of uses from 'banking to government', 'government to banking' and 'FI sector to OFI'. It is generally seen that the variation is less than 0.5 per cent for all other coefficients.

In the case of the pattern of demand for funds, the variability in the coefficients of borrowing by the rest of the world sector from banking is the largest at 6.7 per cent in 1980's. The proportion of saving of the rest of the world (net inflow of resources) in its total sources of funds also has large variation at 5.3 per cent. The coefficients of demand for funds by banking sector from government and household sectors have variation of 1.57 per cent and 1.06 per cent, respectively. The variation in other coefficients is relatively small. It may be mentioned that the coefficients obtained in this paper do not follow any pattern. It may be recalled that according to Divatia (6), the higher the coefficients, the lower the coefficient of variation and vice versa for the period

Table 4.4A: Percentage Variation in Supply of Funds of Coefficients
(1969-70 to 1987-88)

	Bank-ing	OFI	FI	PCB	GOVT.	ROW	HH	Fin Uses	Invest.
Banking	0.000	0.122	0.006	0.111	2.163	0.959	0.772	0.000	0.000
OFI	0.148	0.000	0.001	0.362	0.343	0.004	0.054	0.000	0.000
FI	0.808	0.511	0.000	0.000	0.000	0.000	0.000	0.177	0.177
PCB	0.110	0.021	0.000	0.000	0.013	0.037	0.033	0.215	0.215
GOVT.	0.968	0.016	0.000	0.007	0.000	0.030	0.007	1.007	1.007
ROW	6.706	0.165	0.000	0.061	7.660	0.000	0.000	0.000	0.000
HH	0.207	0.023	0.000	0.023	0.099	0.000	0.000	0.694	0.694
Fin. Sources	0.057	0.016	0.000	0.014	0.113	0.026	0.008	0.316	0.316
Saving	0.000	0.000	0.019	0.012	0.318	0.329	0.125	0.000	0.361

Table 4.4B: Percentage Variation in Supply of Funds of Coefficients
(1980-81 to 1987-88)

	Bank-ing	OFI	FI	PCB	GOVT.	ROW	HH	Fin Uses	Invest.
Banking	0.000	0.096	0.009	0.094	0.968	0.446	0.230	0.000	0.000
OFI	0.101	0.000	0.001	0.222	0.241	0.007	0.037	0.000	0.000
FI	1.419	0.800	0.000	0.000	0.000	0.000	0.000	0.201	0.201
PCB	0.067	0.035	0.000	0.000	0.007	0.054	0.003	0.122	0.122
Govt.	0.811	0.015	0.000	0.008	0.010	0.018	0.001	1.000	1.000
ROW	1.473	0.227	0.000	0.017	0.628	0.000	0.000	0.000	0.000
HH	0.092	0.022	0.000	0.014	0.037	0.000	0.000	0.253	0.253
Fin. Sources	0.029	0.011	0.000	0.008	0.031	0.008	0.003	0.098	0.098
Saving	0.000	0.000	0.004	0.002	0.136	0.031	0.106	0.000	0.000

Table 4.5A: Percentage Variation in Demand for Funds of
Coefficients (1969-70 to 1987-88)

	Banking	OFI	FI	PCB	GOVT.	ROW	HH	Fin Uses
BK	0.000	0.384	0.133	0.123	1.121	30.186	0.030	0.057
OFI	0.000	0.000	0.009	0.448	0.083	0.011	0.002	0.016
FI	0.031	0.089	0.000	0.000	0.000	0.000	0.000	0.003
PCB	0.052	0.022	0.000	0.000	0.002	0.175	0.001	0.001
GOVT.	0.028	0.206	0.000	0.071	0.000	1.414	0.002	0.065
ROW	2.185	0.046	0.000	0.011	0.861	0.000	0.000	0.055
HH	0.466	1.256	0.000	0.242	0.222	0.000	0.000	0.052
Fin. Sources	0.000	0.000	0.177	0.685	1.879	35.490	0.032	0.316
Saving	0.000	0.000	0.177	0.685	1.879	35.490	0.032	0.316

Table 4.5B: Percentage Variation in Demand for Funds Coefficients (1980-81 to 1987-88)

	BK	OFI	FI	PCB	GOVT.	ROW	HH	Fin Uses
BK	0.000	0.235	0.147	0.078	0.459	6.704	0.008	0.029
OFI	0.026	0.000	0.010	0.336	0.076	0.019	0.002	0.011
FI	0.027	0.111	0.000	0.000	0.000	0.000	0.000	0.001
PCB	0.015	0.033	0.000	0.000	0.001	0.265	0.000	0.001
GOVT.	1.572	0.240	0.000	0.082	0.000	0.632	0.000	0.065
ROW	0.110	0.069	0.000	0.004	0.080	0.000	0.000	0.005
HH	1.061	0.174	0.000	0.164	0.129	0.000	0.000	0.030
Fin. Sources	0.000	0.000	0.201	0.164	0.444	5.332	0.009	0.098
Saving	0.000	0.000	0.201	0.164	0.444	5.332	0.009	0.098

1961-62 to 1965-66. The percentage variation in the supply of funds coefficients, however, has been observed to be smaller than that in the pattern of demand for funds. It may, thus, be mentioned that the forecasts for a few years into future, made for sectoral investments based on supply patterns should have smaller percentage forecast error than those based on the demand patterns.

Section 5

Projections for the Eighth Plan

The framework of Stone enables us to project either saving or investment given the other and the transactions matrix. But, it will be advantageous to know whether to (i) fix the target of investment and determine the resources required to meet these targets, or (ii) fix the saving targets and estimate the likely investment that can be achieved with the envisaged saving. The precision of the forecasts can be higher if the direction of causality between saving and investment is known *a priori*. This is examined through 'Granger causality' test and the decomposition of forecasted error variance.

It has been observed from the casuality tests that investment targets are better determined, given the envisaged saving.[15] The forecasts of sectoral investment and inter-sectoral transactions for the Eighth Plan period are, thus, obtained consistent with the envisaged sectoral saving. The paper takes into account the proposals of the Eighth Plan, as available in November 1991. The projections presented here give broad order of sectoral investment. A comparison is made with the projections given in the Plan Documents.[16] The forecasts are derived in two stages. First,

the inter-sectoral pattern of supply of funds is estimated for the Plan period based on regression analysis for the period 1970-71 to 1987-88. Based on these results, the sectoral investment and the inter-sectoral flow of funds for the Plan period are then estimated.

Projected Supply Pattern

As explained in an earlier Section, the regression equations are estimated in respect of flow transactions by regressing each of the cell elements of the matrix, represented in Table 2.1, on the total uses of funds (read row-wise) of the respective sector, for the period 1970-71 to 1987-88.[17] The (ij)th regression coefficient represents the proportion of funds lent by sector 'i' to sector 'j'. Of the 36 equations estimated, 9 have low Durbin-Watson statistic while 10 have poor explanatory power. The coefficients, thus obtained are given in Table 5.1 and compare favourably with the trends observed in the last few years of the study period ending 1987-88.

It is expected that banking sector's portfolio will remain more or less the same except for a marginal delcine in the share of the government sector. The OFI sector is expected to step up its finances to the PCB sector following the trends observed up to 1988. The household sector will invest a larger proportion of its funds in financial assets during the Eighth Plan. It is, thus, estimated that banking sector will lend 51.2 per cent of its total funds to the government sector while the PCB sector and households are expected to receive only 12.9 per cent and 21.9 per cent, respectively. The OFI sector is expected to lend 31.1 per cent of its total funds to PCB sector as against 24.7 per cent observed in period 2, while 45.7 per cent and 16.5 per cent of its funds will be lent to government and banking sectors. It is estimated that PCB and government sectors will continue to invest about 90-92 per cent of their funds in real assets. Household's investment in financial assets is expected to increase to 61.3 per cent of its total uses of funds from an average share of 53.5 per cent during 1980-88. The household sector will lend a higher proportion of its funds (13.2 per cent) to the government sector as against 10.2 per cent in period 2. It is also projected that household lending to Banking and OFI sectors will also be slightly at a higher proportion of its funds during the Plan period. The rest of the world will lend about 61.3 per cent of its funds to government and 28.1 per cent to the banking sector. These patterns of supply of funds are assumed to forecast investment for the Eighth Plan period, consistent with the envisaged saving.

Table 5.1: Pattern of Supply of Funds : Projected for the Eighth Plan Period

(Proportions)

	Banking	OFI	FI	PCB	GOVT.	ROW	HHS	Fin Uses	Invest-ment	Total uses
BK	0.0000	0.1050	0.0305	0.1291	0.5120	0.0040	0.2194	1.0000	0.0000	1
OFI	0.1649	0.0000	0.0167	0.3113	0.4575	0.0033	0.0463	1.0000	0.0000	1
FI	0.4939	0.2886	0.0000	0.0000	0.0000	0.0000	0.0000	0.7825	0.2175	1
PCB	0.0378	0.0352	0.0000	0.0000	0.0315	-0.0322	0.0052	0.0774	0.9226	1
GOVT	0.0640	0.0219	0.0000	0.0137	0.0000	-0.0027	0.0035	0.1004	0.8996	1
ROW	0.2810	0.1054	0.0000	0.0008	0.6128	0.0000	0.0000	1.0000	0.0000	1
HH	0.3123	0.1316	0.0000	0.0376	0.1315	0.0000	0.0000	0.6130	0.3870	1

Note : Entries in ROW column against BK and OFI rows and investment column are derived as residuals. Other coefficients are obtained from the regressions of cell elements of the matrix (based on flow data) on the total uses of funds of the respective sector. The slopes of these equations are the coefficients given in this Table.

Plan Assumptions

The Eighth Plan (12) have assumed that the gross domestic product (GDP), in real terms, will grow by 5.6 per cent annually during the Plan period and the gross saving rate (gross domestic saving as percentage of GDP at 1991-92 prices) as 21.6 per cent for the Plan period (1992-97). The Plan also envisages gross saving rates for households, public sector and private corporate sector at 17.6 per cent, 2 per cent and 2 per cent, respectively. The sectoral estimates of saving, thus, assumed are given in Table 5.2. These rates indicate that households will have higher share (81.5 per cent) in gross domestic saving during the Plan than that observed in period 2. It further assumes that the net capital inflow from abroad forms about 1.4 per cent of the GDP at market prices during the Plan period. The gross domestic saving for the Plan period is, thus, envisaged at Rs. 743,000 crore at 1991-92 prices and net inflow of foreign capital at Rs. 49,000 crore.[18] The total Plan outlay is thus placed at Rs. 792,000 crore.[19]

Sectoral Investment Projections

Adopting the procedure described earlier and based on the envisaged sectoral saving, net inflow of capital, the projected supply pattern, the sectoral investment targets for the Eighth Plan are worked out. These are given in Table 5.2 along with Plan projections.

Table 5.2: Eighth Plan - Sectoral Investment Projections

(Rs. crores)

Sector	Envisaged Saving		Projected Investment		Projections as per Plan Proposals	
Financial Intermediaries	26,874	(3.6)	8,393	(1.1)	..	
Private Corporate Business	62,726	(8.4)	165,939	(20.9)	148,000	(18.7)
Government	48,230	(6.5)	354,296	(44.7)	342,000	(43.2)
Households	605,170	(81.5)	263,372	(33.3)	302,000	(38.1)
All Domestic Sectors	743,000	(100)	792,000	(100)	792,000	(100)
Net Foreign Inflow	49,000		–		–	
Total Economy	792,000		792,000		792,000	

Notes : 1. Figures in brackets are percentages to total saving/investment.

2. Source for the last column is Planning Commission (12)

It is projected that the government sector will have the largest share of 44.7 per cent of the domestic investment while the PCB sector will account for 20.9 per cent. Government and PCB sectors are expected to finance 13.6 per cent and 37.8 per cent of their respective investment from their own saving. The household sector is expected to invest in real assets, about 43.5 per cent of its gross saving which in turn will form 33.3 per cent of the domestic investment. The household sector's investment is, however, expected to be lower by 12.8 per cent from that of the Plan projections. Financial Intermediates are expected to invest about 1 per cent of the domestic investment amounting to Rs. 8,393 crore during the Plan period.

The inter-sectoral transactions matrix projected for the Eighth Plan period is given in Table 5.3. The table presents the amount of funds that could be mobilized by financial institutions and relent to real sectors during the Plan period. The table also indicates the amount of funds that are expected to be raised by the deficit sectors, directly from households.

Table 5.3: Inter-sectoral Flow of Funds - Projections for 1992-97

(Rs. crores)

Sector	BK	OH	FI	PCB	GOVT	ROW	HHS	Total Finanl. uses	Invest-ment	Total uses
BK	0	31601	9179	38855	154094	1204	66032	300966	0	300966
OH	25045	0	2536	47279	69484	501	7032	151877	0	151877
FI	19060	11137	0	0	0	0	0	30197	8393	38590
PCB	6799	6332	0	0	5666	-5792	935	13941	165939	179879
GOVT.	25206	8625	0	5396	0	-1063	1378	39541	354296	393837
ROW	12322	4622	0	35	26871	0	0	43850	0	43850
HHS	212535	89560	0	25589	89492	0	0	417176	263372	680548
Total Finan. Sources	300966	151877	11716	117153	345607	-5150	75378	997547	792000	1789547
Saving	0	0	26874	62725	48230	49000	605170	792000		
Total Sources	300966	151877	38590	179879	393837	43850	680548	1789547		

Note: The total Plan outlay has since been revised upwards to Rs. 798,000 crore from Rs. 792,000 crores.

Section 6

Supply of (Demand for) Funds: Behavioural Relations

The projections of financial transactions matrix and investment (or saving), thus estimated, assume the constancy of portfolio preferences. These projections, therefore, do not take into account the influence of other variables, such as interest rates and national income. The parameters of the matrix estimated through regressions discussed above, however, are influenced by the changing patterns of funds over time in total assets/liabilities; yet the influence of other variables is not reflected in the parameters. The transactions matrix is viewed, as described earlier, from two angles, namely, i) the pattern of allocation of funds to other sectors (supply of funds) and ii) borrowing pattern of the sectors (demand for funds). Thus, interest rates and other exogenous variables can influence the behavioural relations of supply of (and demand for) funds of different sectors. The demand and supply conditions of various sectors determine the interest rates and the transaction of funds in equilibrium. However, when the interest rates are regulated, and independent estimation of supply of and demand for funds relations can indicate the extent of imbalances between the two. The identities of the matrix, however, would impose certain restrictions on the behavioural relations, such as the total supply of funds by each sector and for total economy is equal to total demand

for funds by the respective sector and for total economy. Therefore, one of the sector's supply of funds or demand for funds is to be excluded to achieve identification of the model.

The behavioural relations of supply of and demand for funds for the Indian economy are estimated based on cumulated financial flow data for the years 1970-71 to 1987-88. These data, as mentioned earlier, are approximated to balance sheet accounts. A few limitations are, however, present in the system of equations estimated from these data. The transactions are at historical prices, and exclude revaluations made from time to time. The coefficients based on balance sheet data are treated as 'normal' coefficients, although Stone regards only those coefficients that lead to estimates at constant prices as 'normal'. Revaluation of the elements of the transactions matrix is not tried, since as pointed by Pani, many questions arise about the types of deflators that could be used for individual cells in the transactions matrix, quite apart from the pricing problem. Only a few interest rates have been used in explaining the behaviour of the transactions of different sectors instead of taking weighted rates suitable to individual cells of the matrix. This is due to nonavailability of data on various types of borrowing and lending rates. The error on this account, however, could be small in some cases as the financial transactions between different sectors are to a large extent through single instrument.[20]

The following observations are made on the basis of the equations presented in Annexure 1.[21]

i) The interest rates are significant in only a few equations although they have the expected signs, with some exceptions. This indicates that the influence of interest rates on financial transactions is seen, to a certain extent. ·

ii) The equations from both supply and demand sides have high explanatory power. It is, thus, difficult to say whether the supply of funds by different sectors to others are better explained so that demand for funds will get adjusted automatically or vice versa. Probably, the presence of lagged dependent variable, total assets/liabilities and/or time as exogenous variables resulted in good explanatory power. However, the equations explaining the behaviour of the transactions of the rest of the world do not have good explanatory power and possibly have large coefficient of variation.

iii) The adjustment of financial transactions of various sectors is not instantaneous. The speeds of adjustment are different from one sec-

tor to another and also between the supply side and demand side. Many equations presented here are free from the presence of autocorrelation unlike in Pani (20), perhaps because of inclusion of the lagged dependent variable.

Conclusions

The role of financial projections in mobilizing and allocating the available resources to meet investment (saving) targets is reinforced by this paper. It has been observed that the patterns of supply of and demand for funds change over time as generally expected, and require updating for use in Plan exercises. Policy changes can also be incorporated into the model if they are known *a priori*. If the coefficients are estimated either through simple linear regressions or behavioural relations, better results can be obtained.

·   The patterns of supply of and demand for funds estimated through regression equations could take into account to a certain extent the changes in the behaviour of total assets/liabilities during the period of the study. The paper finds that the direction of causality between saving and investment runs from the former to the latter. Taking into account this aspect, it is projected that the investment of the government sector accounts for 44.7 per cent of total domestic investment envisaged for the total Plan period. The household sector, on the other hand, is expected to invest about 43.5 per cent of its gross saving in physical assets, lower than the share observed during the 1980s. It is, thus, estimated that the household sector will invest more of its saving in financial assets.

The behavioural relations estimated for supply of (demand for) funds by the different sectors to (from) others for the Indian economy indicate that interest rates are significant, to a certain extent, in determining the funds flow between the sectors. It could not, however, be ascertained whether the relations explaining the supply of funds give better estimates so that the demand for funds get adjusted or vice versa. However, when the flow data are taken for estimating the behavioural relations, supply of funds equations seem to have edge over those of demand for funds. Despite the limitations discussed earlier, the procedure of estimation gives the feasibility of achieving the investment targets or otherwise, with *ex ante* resources and the likely resources that can flow from savers to financial intermediaries and producers. The exercise can be extended further to project various financial instruments for the Plan period by reconstructing the transaction matrices in terms of sectors and financial claims issued or held.

The Government of India have announced in July 1991 and also subsequently various economic measures, such as liberalization of industrial licensing policy, new import-export policy, upward revision in the limit (to 51 per cent) in the share of foreign investment in company's capital and in particular, to more than 75 per cent if the entire production is export-oriented, relaxation of MRTP Act, privatisation of public capital, acquisition of long term loan from the IMF, special schemes regarding the inward and outward remittances in foreign currency, etc. Under the new environment, higher growth in domestic investment is expected to take place in future years. It is, therefore, likely that new investment in the private corporate business sector may grow beyond the Plan targets and even exceed public sector's investment. Thus, the funds flow pattern may also undergo considerable change. But the sudden changes in economic policies can not be captured in a forecasting exercise of the sort that has been attempted in this paper.

Notes:

1. See V.V. Bhatt (2).

2. Most of the studies for the Indian economy are based on flow data as the balance sheet data are not readily available.

3. Initially, the Eighth Plan related to 1990-95 period and this was taken into the paper.

4. Real sectors, also known as non-financial sectors, are grouped into 'deficit' and 'surplus' sectors and undertake production of goods and services. Deficit sectors are those whose investment exceed their saving and for surplus sector, saving exceed investment. Financial sectors undertake financial activity and intermediate between savers and deficit sectors.

5. For details please see Stone (20), Pani (10), Divatia (6).

6. Pani (10).

7. Bhatt (2). A difficult problem arises with respect to price adjustments associated with the balance sheet data. The data obtained as cumulated flows exclude yearly revaluations in the data to some extent although variations due to year to year price changes still exists. Data, thus, are at the past history of prices.

8. For scope and coverage of sectors, please see Reserve Bank of India (16).

9. Alternatively, the transactions are said to be gross when sources of funds include increase in liabilities and decrease in assets while uses of funds cover increase in assets and decrease in liabilities. The accounts are referred to as net when, in the accounts of a particular sector, the sources from another sector are netted against the uses to that sector.

10. The value of land held by households is not included in the paper while deriving total value of physical assets held by households because the increase/decrease in the asset can be only on account of price change.

11. For complete details, please see RBI (16), August 1980.

12. The concept of gross transactions has been described earlier. The supply of funds should analytically be equal to the demand for funds at the economy level while this need not hold good for any particular sector. In reality this equivalance even at macro level may not be found partly because of reporting period, estimational and other differences.

13. Among other financial ratios, the ratio of total financial assets to physical assets, termed as financial interrelations ratio (FIR), measures the growth in financial activity relative to real activity.

14. a) In terms of gross domestic saving, households have an increased share during 1980s than in 1970s.

    b) Gross resources are defined as gross domestic saving plus net capital inflow from abroad.

15. Granger causality test and the results are given in the Technical Appendix.

16. Planning Commission (12).

17. The regression coefficients estimated on the basis of outstandings (stocks) are quite close to those obtained from flow data, except for a few coefficients.

18. 1 crore = 10 million. Therefore, the amount is also written as Rs. 7,430 million.

19. The plan outlay has been further revised to Rs. 798,000 crore as per the final plan released in the news papers (The Economic Times, May 8, 1992). The net inflow of foreign resources has been revised to 1.6 per cent of GDP.

20. Pani (20). He adds that the cross effects of coefficients across investment and across sectors should be zero, which however, may not be satisfied as only a few interest rates are used.

21. Some of the observations are very similar to Pani (20) whose period of analysis related to 1950-51 to 1969-70.

22. For details, please see Granger (10). Subsequently, a number of research papers also discussed the methodological details of VAR.

Select References :

1. Bain, A.D. (1977), "Flow of Funds Analysis," *Surveys of Applied Economics*, Vol. 2, The Royal Economic Society and the Social Science Research Council.

2. Bhatt, M.D. (1972), "Forecasting in Financial Sector," A paper submitted to the European Meeting of the Econometric Society held at Budapest, September (Mimeograph).

3. Bhatt, V.V. (1969), "Saving and Flow Funds Analysis: A Tool for Financial Planning," *Reserve Bank of India Bulletin*, Reserve Bank of India (RBI), Bombay, September.

4. Box, G.E.P. and Jenkins G.M. (1976), *Time Series Analysis: Forecasting and Control*, Holden Day Inc, San Francisco.

5. Central Statistical Organisation (CSO). (1990), *National Accounts Statistics, 1990*, CSO, Ministry of Planning, Government of India, New Delhi, March.

6. Divatia, V.V. (1969), "An Operational Technique of Financial Planning," *Reserve Bank of India Bulletin*, RBI, Bombay, September.

7. Divatia, V.V. and Venkatachalam, T.R. (1975), "Flow of Funds Accounts," *Reserve Bank Staff Occasional Papers*, RBI, Bombay, December.

8. Divatia, V.V. (1979), "Structure of Inter-sectoral Flow of Funds in the Indian Economy, 1961-62 to 1975-76," A paper submitted to the Seminar of the Indian Association for Research in National Income and Wealth, January (Mimeograph).

9. Fry, Maxwell, J. (1972), *Finance and Development Planning in Turkey*, Leiden, The Netherlands, E.J. Brill.

10. Granger, C.W.J. (1969), "Investigating Causal Relations by Econometric Models, "*Econometrica*, Vol. 37, No. 3, July.

11. Pani, P.K. (1977), *A Macro Economic Model of the Indian Economy*, Macmillon Company of India Ltd., pp. 242-293.

12. Planning Commission, (1991), "Eighth Five Year Plan," *The Business Standard*, June 12.

13. Ramachandra Rao, K.S. (1981), "Forecasting of Inter-sectoral Flow of funds, "A paper submitted to the Banker's Training College, Reserve Bank of India (RBI), Bombay (Mimeograph).

14. Rama Rao, T., Ramachandra Rao, K.S. and Nag, A.K. (1990), "Financial Development and Planning in India", *The Journal of Income and Wealth*, Vol. 12, No. 2, July.

15.   Report of the Working Group on Savings, (1982), *Capital Formation and Saving in India, 1950-51 to 1979-80,* Reserve Bank of India, Bombay, February.

16.   Reserve Bank of India, (1988), Articles on "Financial Flows (Flow of Funds) in the Indian Economy", *Reserve Bank of India Bulletin,* RBI, July 1969, August 1975, March 1980 and December.

17.   Reserve Bank of India, *Report on Currency and Finance,* RBI, Bombay, different issues.

18   Venkatachalam, T.R. and Sarma, Y.S.R. (1977), "Structure and Trends in the National Balance Sheet of India, *"The Journal of Income and Wealth,* Vol. 1, No. 2, April.

19.   Sims, Christopher, A. (1972), "Money, Income and Causality," *The American Economic Review,* Vol. 62, No. 4, September.

20   Stone, Richard. (1966), "The Social Accounts From a Consumer's Point of View", *Review of Income and Wealth,* Series 12, March.

21.   Tod, Richard. M (1990), "Vector Autoregression Evidence on Monetarism : Another look at the Robustness Debate," *Quarterly Review,* Federal Reserve Bank of Minneapolis, Minnesota, Spring.

ANNEXURE 1

The description of the variables appearing in different equations is as given below. Figures in brackets below each of the coefficients denote 't-statistic' value. R^2 is the adjusted multiple coefficient of determination. DW is the Durbin - Watson Statistic. SER is the standard error of regression. The number of observations (n) is 18 from 1970-71 to 1987-88, unless specified. 'Mean' denotes the mean of the dependent variable, in Rs. crores.

Description of Variables		Notation	Units
Supply of (Demand for) funds by Banking (BK) to (from)	OFI PCB GOVT. ROW HHS	SBO (DBO) SBP (DBP) SBG (DBG) SBR (DBR) SBH (DBH)	Rs. crores
Supply of (Demand for) funds by Other Financial Institutions (OFI) to (from)	BK PCB GOVT. ROW HHS	SOB (DOB) SOP (DOP) SOG (DOFG) SOR (DOR) SOH (DOH)	Rs. crores
Supply of (Demand for) funds by Private Corporate Business (PCB) to (from)	BK OFI GOVT. ROW HHS	SPB (DPB) SPO (DPO) SPG (DPG) SPR (DPR) SPH (DPH)	Rs. crores
Supply of (Demand for) funds by Government (GOVT.) to (from)	BK OFI PCB ROW HHS	SGB (DGB) SGO (DGO) SGP (DGP) SGR (DGR) SGH (DGH)	Rs. crores
Supply of (Demand for) funds by Rest of the World (ROW) to (from)	BK OFI PCB GOVT.	SRB (DRB) SRO (DRO) SRP (DRP) SRG (DRG)	Rs. crores
Supply of (Demand for) funds by Households (HHS) to (from)	BK OFI PCB GOVT.	SHB (DHB) SHO (DHO) SHP (DHP) SHG (DHG)	Rs. crores

The variables, such as 'DSHB' or 'DDHB' indicate the consecutive differenced series of the original series SHB or DHB.

Commercial Banks Advance Rate	LR	Per cent
Short-term interest rate on deposits	R_1	-do-
Long-term interest rate on deposits	R_{12}	-do-
Inter-bank call money rate	MR	-do-
Yield on Industrial securities	YPS	-do-
Interest rate on Debentures of Private Corporate Sector	DR	-do-
Yield on Long-term Securities of Government	YGS	-do-
Consumer Price Index Number	CPI	Base:1985=100
Gross Domestic Product at Current Prices	Y	Rs. crores

Total Assets :	Banking	BTU (BTS)
(Liabilities of)	OFI	OTU (OTS)
	PCB	PTU (PTS)
	GOVT.	GTU (GTS)
	ROW	RTU (RTS)
	HHS	HTU (HTS)

Accumulated Saving of:

    (i) Government   SG

    (ii) Private Corporate sector   SP

Accumulated Investment:

    (i) Private Corporate Sector   PI

    (ii) Government   GI

Rs. crores

Time   T

A. Supply of Funds by different Sectors

A.1 By Banks to Others

1. SBO = 48.75512 - 98.35720 LR - 21.84977 YPS + 0.06884 BTU
      (0.079)   (-1.876)   (-0.244)   (3.220)

      + 0.35729 SBO_{-1}
      (1.397)

  R^2 = 0.997; DW = 2.702; SER = 292; Mean = 5339

2. SBP = 388.13048 + 0.05624 BTU + 0.62835 SBP_{-1}
      (1.769)   (3.084)   (3.546)

  R^2 = 0.998; DW = 1.920; SER = 303; Mean = 10189

3. SBG = -813.22329 + 0.48714 BTU + 0.06575 SBG_{-1}
      (-1.705)   (6.74)   (0.406)

  R^2 = 0.999; DW = 1.367; SER = 1150; Mean = 38184

4. SBG = -1455.14210 - 229.59154 LR + 571.52499 YGS
       (-0.454)   (-2.013)   (0.918)

      +0.50614 BTU
      (23.848)

  R^2 = 0.999; DW = 1.682; SER = 1049; Mean = 38184

5. SBR = -3773.97960 + 377.46129 T - 0.02340 BTU + 0.62579 SBR$_{-1}$
         (-2.040)   (2.392)   (-2.376)   (3.219)

   R^2 = 0.893; DW = 1.170; SER = 765; Mean = 3448

6. SBH = -249.17658 +31.97215 LR + 0.03645 BTU + 0.96999 SBH$_{-1}$
         (-0.590)   (0.893)   (0.744)   (3.834)

   R^2 = 0.999; DW = 2.839; SER = 333; Mean = 17357

A.2 By Other Financial Institutions to Others

1. SOB = -288.80754 - 87.44946 R$_{12}$ - 51.9772 DR + 0.16417 OTU
         (-1.545)   (1.533)   (-1.354)   (123.43)

   R^2 = 0.999; DW = 2.446; SER = 96; Mean = 4676

2. SOP = 2582.2429 - 807.61962 DR + 545.30066 R$_{12}$ + 0.26213 OTU
         (3.760)   (-5.725)   (2.602)   (53.643)

   R^2 = 0.997; DW = 2.075; SER = 351; Mean = 5907

3. SOG = -1949.2192 + 65.66384 YGS + 0.09299 OTU + 135.15876 YPS
         (-1.769)   (0.446)   (1.851)   (1.981)

       + 131.56880 R$_{12}$ + 0.95293 SOG$_{-1}$
         (1.968)   (7.495)

   R^2 = 1.00; DW = 2.138; SER = 201; Mean = 16310

4. SOR = -114.32633 + 9.19402 T + 0.70467 SOR$_{-1}$
         (-1.708)   (2.083)   (3.892)

   R^2 = 0.847; DW = 2.105; SER = 56.72; Mean = 138.44

5. SOH = -346.87501 + 30.58689 T + 0.02881 OTU + 0.47330 SOH$_{-1}$
         (-2.187)   (2.520)   (2.159)   (1.697)

   R^2 = 0.996; DW = 2.099; SER = 92; Mean = 1768

A.3 By Private Corporate Business to Others

1. SPB = -952.86186 + 330.87736 DR - 267.5476 R$_{12}$ + 0.05465 PTU
         (-2.644)   (4.426)   (-2.423)   (25.512)

   R^2 = 0.992; DW = 1.732; SER = 185; Mean = 2883

2. SPB = -934.72207 + 194.17074 YGS + 10.04729 R_{12} + 0.087105 SPB_{-1}
    (-1.501)   (1.723)   (0.183)   (6.859)

R^2 = 0.991; DW = 1.156; SER = 195; Mean = 2883

3. SPO = 1734.0151 - 56.97122 R_{12} - 336.05056 YGS + 0.03697 PTU
      (4.649)   (-1.439)   (-4.062)   (7.367)

R^2 = 0.921; DW = 2.124; SER = 136; Mean = 259

4. SPG = -81.43364 + 0.92919 SPG_{-1} + 0.00856 PTU - 16.86081 T
      (0.774)   (4.349)   (1.724)   (-1.349)

R^2 = 0.996; DW = 2.795; SER = 40; Mean = 562

5. SPH = -275.58135 + 28.43697 T + 0.74732 SPH_{-1}
      (-4.904)   (5.657)   (13.103)

R^2 = 0.998; DW = 2.002; SER = 21; Mean = 751

6. SPR = -311.02351 + 55.84813 T - 0.02122 PTU + 0.53884 SPR_{-1}
      (-0.881)   (1.476)   (-2.254)   (2.366)

R^2 = 0.951; DW = 1.064; SER = 170; Mean = -361

A.4 By Government to Others

1. SGB = -2359.1409 + 234.44506 T + 0.03988 GTU
      (-1.351)   (1.576)   (4.491)

R^2 = 0.957; DW = 2.795; SER = 1011; Mean = 6969

2. SGO = -754.50596 + 63.88894 T + 0.96038 SGO_{-1}
      (-2.666)   (3.121)   (16.989)

R^2 = 0.993; DW = 1.276; SER = 188; Mean = 2358

3. SGP = -602.3937 + 68.27863 DR + 0.00615 GTU + 0.63204 SGP_{-1}
      (-2.064)   (2.181)   (1.771)   (2.958)

R^2 = 0.989; DW = 1.798; SER = 170; Mean = 2094

4. $SGR = -749.40997 + 103.55707 \ T - 0.00358 \ GTU + 0.62834 \ SGR_{-1}$
   $\quad\quad (-1.575) \quad\quad (2.113) \quad\quad (-1.789) \quad\quad (3.063)$

   $R^2 = 0.920; \ DW = 2.193; \ SER = 222; \ Mean = 1756$

5. $SGH = -97.52610 + 22.30720 \quad T + 0.91918 \ SGH_{-1}$
   $\quad\quad (-1.132) \quad\quad (1.948) \quad\quad (13.186)$

   $R^2 = 0.998; \ DW = 1.579; \ SER = 45; \ Mean = 2053$

A.5 By Households to Others

1. $DSHB = -18.18002 + 30.05837 \ R_1 - 90.69087 \ DR + 0.33669 \ DHU$
   $\quad\quad\quad (-0.009) \quad\quad (0.077) \quad\quad (-0.389) \quad\quad (2.689)$

   $\quad\quad\quad -0.06200 \ DSHB_{-1}$
   $\quad\quad\quad (-0.149)$

   $R^2 = 0.972; \ DW = 2.409; \ SER = 918; \ Mean = 7504; \ n=17$

2. $SHB = -859.39765 + 305.56507 \ R_{12} - 1087.1213 \ DR + 0.30052 \ HTU$
   $\quad\quad\quad (-0.588) \quad\quad (0.581) \quad\quad (-3.592) \quad\quad (24.266)$

   $\quad\quad\quad -0.09564 \ CPI$
   $\quad\quad\quad (-0.002),$

   $R^2 = 0.999; \ DW = 2.196; \ SER = 732; \ Mean = 50343$

3. $SHO = 520.24178 - 908.13440 \ DR + 564.95807 \ R_{12} + 0.11777 \ HTU$
   $\quad\quad\quad (.707) \quad\quad (-5.893) \quad\quad (2.545) \quad\quad (107.351)$

   $R^2 = 0.999; \ DW = 2.220; \ SER = 372; \ Mean = 19061$

4. $SHP = -622.44576 + 226.03016 \ DR + 0.02831 \ HTU - 178.84392 \ T$
   $\quad\quad\quad (-1.419) \quad\quad (2.695) \quad\quad (3.527) \quad\quad (-2.351)$

   $\quad\quad\quad + 0.41604 \ SHP_{-1}$
   $\quad\quad\quad (2.068)$

   $R^2 = 0.998; \ DW = 2.26; \ SER = 245; \ Mean = 6766$

5. $SHG = 3355.3966 + 676.12831 \ YGS - 2236.2253 \ DR + 1262.4527 \ R_{12}$
   $\quad\quad\quad (1.060) \quad\quad (1.042) \quad\quad (-5.502) \quad\quad (2.018)$

   $\quad\quad\quad + 0.09634 \ HTU$
   $\quad\quad\quad (10.019)$

   $R^2 = 0.993; \ DW = 1.935; \ SER = 1050; \ Mean = 14032$

A.6   Rest of the World

1. SRB = -1130.8563 + 0.02183 Y + 0.73650 SRB_{-1}
$\quad\quad\quad$ (-2.533)$\quad$ (3.418)$\quad\quad\quad$ (6.100)

$\quad\quad R^2 = 0.993$; DW = 1.131; SER = 449; Mean = 4960

2. SRO = 716.97737 - 109.17263 T + 0.08948 RTU
$\quad\quad\quad\quad$ (2.061)$\quad\quad\quad$ (-3.765)$\quad\quad\quad$ (8.540)

$\quad\quad R^2 = 0.907$; DW = 0.527; SER = 263; Mean = 641

3. SRP = 123.40987 - 0.00058 RTU + 0.80112 SRP_{-1}
$\quad\quad\quad\quad$ (1.354)$\quad\quad$ (-0.631)$\quad\quad\quad$ (6.223)

$\quad\quad R^2 = 0.716$; DW = 1.335; SER = 54; Mean = 624

4. SRG = 1156.9145 - 0.00617 Y + 0.38313 RTU + 0.49753 SRG_{-1}
$\quad\quad\quad\quad$ (2.113)$\quad$ (-0.748)$\quad\quad\quad$ (5.060)$\quad\quad\quad\quad$ (3.317)

$\quad\quad R^2 = 0.997$; DW = 1.307; SER = 434; Mean = 15500

B.   Demand for Funds

B.1   By Banking Sector from others

1. DBO = 860.02460 - 260.53181 R_{12} + 65.71242 MR + 0.07302 BTS
$\quad\quad\quad\quad$ (1.617)$\quad\quad\quad$ (-3.154)$\quad\quad\quad\quad$ (1.783)$\quad\quad\quad\quad$ (44.811)

$\quad R^2 = 0.997$; DW = 1.396; SER = 268; Mean = 4676

2. DBP = -213.33411 + 54.18245 R_{12} + 0.03585 BTS + 0.37500 DBP_{-1}
$\quad\quad\quad\quad$ (-0.473)$\quad\quad$ (0.829)$\quad\quad\quad$ (13.864)$\quad\quad\quad$ (2.060)

$\quad R^2 = 0.991$; DW = 1.280; SER = 199; Mean = 2883

3. DBG = -662.62089 - 57.12612 R_{12} + 208.2911 LR + 0.06979 BTS
$\quad\quad\quad\quad$ (-0.288)$\quad\quad$ (-0.119)$\quad\quad\quad\quad$ (1.066)$\quad\quad\quad$ (10.713)

$\quad R^2 = 0.995$; DW = 2.632; SER = 1077; Mean = 6969

4. DBH = 1775.5598 - 482.23716 R_{12} + 250.82072 LR + 0.24953 BTS
$\quad\quad\quad\quad$ (1.084)$\quad\quad$ (-1.446)$\quad\quad\quad\quad$ (1.865)$\quad\quad\quad\quad$ (2.571)

$\quad\quad\quad$ + 0.70556 DBH_{-1}
$\quad\quad\quad\quad$ (4.027)

$\quad R^2 = 0.999$; DW = 2.265; SER = 734; Mean = 50343

5. $DBR = -633.03458 + 0.03234 \ Y - 82.40576 \ T + 0.62346 \ DBR_{-1}$
   (-0.824)   (1.668)   (-0.624)   (2.626)'

$R^2 = 0.993; \ DW = 1.118; \ SER = 445; \ Mean = 4713$

B.2 By Other Financial Institutions from others

1. $DOB = -2416.9043 + 368.82617 \ YGS - 44.88973 \ MR$
   (-4.274)   (3.913)   (-1.966)

   $+0.13510 \ OTS + 0.30419 \ DOB_{-1}$
   (5.151)   (2.108)

$R^2 = 0.999; \ DW = 1.894; \ SER = 194; \ Mean = 5339$

2. $DOP = 812.36049 - 18.30573 \ R_1 - 71.34768 \ T + 0.03103 \ OTS$
   (2.480)   (-0.351)   (-3.495)   (8.291)

$R^2 = 0.899; \ DW = 1.072; \ SER = 154; \ Mean = 259$

3. $DOFG = -1406.0211 + 263.64987 \ YGS + 0.01013 \ OTS$
   (-1.705)   (1.816)   (0.760)

   $+0.69642 \ DOFG_{-1}$
   (2.812)

$R^2 = 0.990; \ DW = 1.444; \ SER = 222; \ Mean = 2358$

4. $DOH = -826.6824 - 41.78154 \ R_{12} + 0.27023 \ OTS + 167.35731 \ T$
   (-1.535)   (-0.660)   (2.917)   (2.164)

   $+ 0.57094 \ DOH_{-1}$
   (2.653)

$R^2 = 1.00; \ DW = 1.859; \ SER = 164; \ Mean = 19061$

5. $DOR = 998.0816 - 0.02992 \ Y + 0.13334 \ OTS$
   (5.591)   (-7.429)   (9.552)

$R^2 = 0.959; \ DW = 0.740; \ SER = 174; \ Mean = 641$

B.3 By Private Corporate Business from Others

1. $DPB = -157.63336 + 5.71579\ LR + 0.22862\ PTS$
   $\quad\quad\quad\ (-1.038)\quad\quad (0.415)\quad\quad\quad (157.176)$

   $R^2 = 1.00;\ DW = 2.245;\ SER = 135;\ Mean = 10189$

2. $DPO = 2835.0924 - 585.60388\ DR + 0.23667\ PI$
   $\quad\quad\quad\ (3.834)\quad\quad (-7.368)\quad\quad\quad (40.597)$

   $R^2 = 0.994;\ DW = 1.456;\ SER = 465;\ Mean = 5907$

3. $DPG = -699.19613 + 82.10393\ DR + 0.01156\ PTS + 0.73649\ DPG_{-1}$
   $\quad\quad\quad\ (-2.189)\quad\quad (2.475)\quad\quad\quad (1.336)\quad\quad\quad (3.607)$

   $R^2 = 0.998;\ DW = 1.946;\ SER = 178;\ Mean = 2094$

4. $DPR = 126.84675 - 0.00028\ PTS + 0.79552\ DPR_{-1}$
   $\quad\quad\quad\ (1.363)\quad\quad (-0.650)\quad\quad\quad (6.074)$

   $R^2 = 0.716;\ DW = 1.332;\ SER = 54;\ Mean. = 624$

5. $DPH = 98.63665 - 42.77263\ YPS + 0.07251\ PTS + 0.62297\ DPH_{-1}$
   $\quad\quad\quad\ (0.138)\quad\quad (-0.416)\quad\quad\quad (1.589)\quad\quad\quad (1.957)$

   $R^2 = 0.996;\ DW = 1.155;\ SER = 343;\ Mean = 6767$

B.4 By Government from Others

1. $DGB = -3570.7383 - 201.41379\ YGS + 0.27474\ GTS$
   $\quad\quad\quad\ (-0.831)\quad\quad (-0.236)\quad\quad\quad (4.785)$

   $\quad\quad\quad\quad\quad + 0.27533\ DGB_{-1}$
   $\quad\quad\quad\quad\quad\ (1.576)$

   $R^2 = 0.998;\ DW = 1.803;\ SER = 1421;\ Mean = 38184$

2. $DGO = 297.48880 - 200.15296\ YGS + 0.05383\ GI + 0.84448\ DGO_{-1}$
   $\quad\quad\quad\ (0.529)\quad\quad (-1.641)\quad\quad\quad (2.502)\quad\quad\quad (6.178)$

   $R^2 = 1.00;\ DW = 2.419;\ SER = 193;\ Mean = 16310$

3. DGP = 1335.4594 - 134.97622 YGS + 0.01513 GTS - 86.88271 T
        (7.197)   (-3.756)   (16.583)   (-9.847)

R^2 = 0.992; DW = 1.395; SER = 59; Mean = 562

4. DGR = -18.19347 + 0.05116 Y - 0.09311 SG + 0.86878 DGR_{-1}
       (-0.025)   (2.128)   (-1.897)   (4.765)

R^2 = 0.994; DW = 1.271; SER = 651; Mean = 15500

5. DGH = 11874.498 - 761.96488 YGS + 0.23224 GI - 939.99821 T
        (7.668)   (-2.473)   (27.316)   (-12.495)

R^2 = 0.998; DW = 0.543; SER = 511; Mean = 14032

B.5 By Households from Others

1. DHB = -703.20158 - 113.06633 LR - 0.08703 HTS - 0.02680 Y
        (-2.456)   (-2.589)   (4.391)   (-1.992)

        + 0.39110 DHB_{-1}
        (2.167)

R^2 = 1.00; DW = 2.716; SER = 222; Mean = 17357

2. DHO = -251.92345 + 0.00604 HTS + 0.53339 DHO_{-1}
        (-2.682)   (3.290)   (2.824)

R^2 = 0.997; DW = 2.423; SER = 86; Mean = 1768

3. DHP = -147.75730 + 18.7448 LR + 0.00042 HTS + 0.83267 DHP_{-1}
        (-5.832)   (7.827)   (2.113)   (12.728)

R^2 = 0.999; DW = 2.643; SER = 16; Mean = 752

4. DHG = 162.40291 + 54.74836 LR + 0.00564 HTS
        (1.276)   (4.551)   (18.661)

R^2 = 0.986; DW = 0.847; SER = 111; Mean = 2053

B.6 By Rest of the World from Others

1. DRB = -2686.6429 + 309.41396 T - 0.07156 RTS + 0.61207 DRB$_{-1}$
      (-1.649)   (2.092)   (-2.084)   (2.968)

   R^2 = 0.885; DW = 1.136; SER = 791; Mean = 3448

2. DRO = -114.32633 + 9.19402 T + 0.70467 DRO$_{-1}$
         (-1.708)   (2.083)   (3.892)

   R^2 = 0.847; DW = 2.105; SER = 57; Mean = 138

3. DRG = -60.168279 + 34.82634 T + 0.70956 DRG$_{-1}$
         (-0.201)   (1.069)   (3.312)

   R^2 = 0.908; DW = 1.899; SER = 238; Mean = 1756

TECHNICAL APPENDIX

Test For Causality

Vector Autoregression (VAR) Analysis

The vector autoregression analysis is adopted to examine the direction of causality, based on Granger's Test, between a) saving and investment of private corporate business and government sectors, b) investment of government and private corporate business sector and c) domestic investment and net inflow of capital from abroad. Briefly, the VAR analyis basically estimates a system of equations which makes each endogenous variable a function of its own past and the past of the other endogenous variables in the system.[22]

Mathematically, the model is written as,

$$Y_t = \sum_{r=1}^{L} \beta_r \ Y_{t-r} + U_t$$

where, $\Sigma \ (u_t \ u'_t) = \Sigma$, the covariance matrix of U_t; Y_t is a vector of n variables and β_r is an (nxn) coefficient matrix. There are '$n^2 L$' coefficients in the model.

An F-test is conducted to test the null hypothesis that $\beta_{jr} = 0$, the coefficients of Y_j, in the regression of Y_i. This will indicate whether the past values of Y_j affect the endogenous variable, Y_i. Another measure in this direction is obtained by estimating the decomposition of the forecasted error variance of the variable Y_i in the system. In other words, it analyses how much of the average squared forecasted error which the model is likely to make, is caused by the surprise movements associated with each of the variables in the model. Thus, if u_j and u_i are the errors of Y_j and Y_i regressions, and if Y_j does not cause Y_i then the forecasted error variance of Y_i is completely explained by the movements in u_i and not of u_j. The ordering of the endogenous variables is important in the decomposition of the variance if *a priori* the order is not known.

Results of Causality Test

It is hypothesized that saving is exogenous to investment; the government sector's investment is exogenous to that of private corporate sector; and net inflow of capital is exogenous to investment. The analysis is

based on the annual data for the years 1961-62 to 1987-88. The series are, however, taken in nominal terms. The vector autoregressions include a constant, five lags of each of the endogenous variables. The regressions of private corporate sector include also the variable on its financial sources of funds as an explanatory variable. Similarly, the regressions of government include its financial sources of funds as an exogenous variable.

It is seen from Table A that in the case of private corporate business sector, the null hypothesis that saving is exogenous is not rejected when the financial variable is also present in the regressions. The test rejects the hypothesis that investment is exogenous for the private corporate sector. In the case of the government sector, the rejection of the null hypothesis that the saving is exogenous is not strong while the null of investment is exogenous, is rejected. In other words, investment in the private corporate business and government sectors is affected by their

Table A : F - Statistic for Restricted Regressions

Dependent Variable	Variable testing for equality of coefficients, with 5 lags, to zero	F - test Statistic	
PI	SP	1.480	(3.803)
SP	PI	0.223	(0.249)
GI	SG	1.850	(1.058)
SG	GI	1.028	(1.310)
PI	GI	1.965	
GI	PI	1.615	
TI	SR	1.217	
SR	TI	3.910	

Notes : 1. Variables are in logarithmic levels except TI and SR.

2. Figures in brackets are F - statistic when the financial variable (i.e., sources of funds from other sectors) is also included as an exogenous variable in the vector autoregressions and follow $F_{6, 10}$. The F - Table values are $F_{5, 11} = 2.45$ and $F_{6, 10} = 2.46$ at 90 per cent confidence level.

internal sources, i.e., saving, although the effect is not strong for the latter. While the borrowing from other sectors is significant for private corporate sector, it is not the case for the government sector. The direction of causality, thus seems to be from saving or availability of funds to investment for both sectors. In the case of household sector, it may not be appropriate to test the causality as saving is estimated as the

total of net acquisition of financial assets and physical assets (i.e., investment). Considering the interdependence of investment of government and private corporate sectors, it could be observed that former's investment is exogenous while the hypothesis of exogeniety of the latter's is rejected. The test also rejects the hypothesis that net inflow of foreign capital is exogenous to domestic investment. But the test do not reject that investment is exogenous to net inflow.

Decomposition of Forecasted Error Variance

The decomposition of forecasted error variance of saving and investment of private corporate business and government sectors, and that of their investments are given in Tables B, C, and D. These results are based on decomposition of the variance of the forecast errors at different points of time, into a sum of components associated with each set of orthogonal innovations. The forecasted error variance of saving of the private corporate sector for 6 periods ahead is entirely explained by itself whereas that of investment is explained by its innovations to the tune of 29-30 per cent in the first two periods falling to less than 10 per cent of the total error variance from 4th period onwards and thus the error variance is almost due to saving. Similarly, for the government sector, the forecasted error variance of saving is explained by itself (Table C). The error variance of investment although explained by investment itself by about 70 per cent in the first period, decreased to 36 per cent by period 3 and further to 20 per cent by period 5. In other words, the error variance of investment due to saving increased from 40 per cent in period 2 to 80 per cent by period 5. Thus, the composition of error variance is more revealing supporting the results of the F-statistic and, therefore, the causality seems to flow from saving to investment for both these sectors.

Between government and private corporate sectors' investment, that of former is exogenous as its forecasted error variance is explained by itself. The investment of the latter is exogenous in the initial two periods but, the variance explained by itself decreased to 79 per cent by period 5 (Table D). That means, the variance due to government's investment increased to 21 per cent by period 5. In the long run, government's invesment seems to affect that of private corporate sector. Judging from the results, it is appropriate to forecast sectoral investment based on ex ante saving of the individual sectors and also the overall resources available to these sectors rather than to forecast saving to achieve investment target.

The test for causality between domestic investment and net inflow of capital from abroad indicated that the forecasted error variance of the former is explained by itself whereas that of net inflow is influenced by innovations to investment. Thus, causality seems to run from investment to net inflow of foreign capital. This, in other words, suggests that the envisaged net inflow of capital in the Plan changes and adjusts to subsequent fluctuations in investment.

Table B : Variance Decomposition of Saving and Investment of Private Corporate Business Sector

(percentages)

Period	Saving			Investment		
	Standard error	LSP	LPI	Standard error	LSP	LPI
1	12.301	100.00	0.00	4.395	71.21	28.79
2	13.355	99.76	0.23	4.458	70.00	30.00
3	13.391	99.24	0.76	6.084	80.53	19.47
4	16.468	98.76	1.24	9.166	90.12	9.88
5	19.019	98.89	1.11	12.576	94.13	5.87
6	20.145	98.99	1.01	14.850	95.76	4.24

Notes : The order of the variables included in the decomposition is as presented in the table. The financial variable (PFS) is present in the vector autoregressions. Even when PFS is not included in the regressions, there is no change in the pattern of decomposition of variance.

Table C : Variance Decomposition of Saving and Investment of Government Sector

(percentages)

Period	Saving			Investment		
	Standard error	LSG	LGI	Standard error	LSG	LGI
1	20.456	100.00	0.00	7.044	26.69	73.31
2	25.163	98.56	1.44	10.079	40.85	59.15
3	26.874	96.16	3.84	13.201	63.90	36.10
4	29.968	96.84	3.16	16.593	75.87	24.13
5	35.466	95.40	4.60	18.372	80.29	19.71
6	39.932	93.46	6.54	20.442	84.07	15.93

Notes : The order of the variables included in the estimation of decomposition is the same as presented in the table. Even when the financial variable (GFS) is included, there is not much change in the pattern of decomposition.

Table D : Variance Decomposition of Investment of Private
Corporate Business and Government Sectors

(percentages)

Period	Government			Private Corporate Business		
	Standard error	LGI	LPI	Standard error	LGI	LPI
1	6.947	100.00	0.00	14.965	0.00	99.99
2	10.057	93.66	6.34	18.644	8.72	91.28
3	11.752	88.45	11.55	19.111	13.01	86.99
4	13.013	90.47	9.53	19.851	16.61	83.39
5	14.638	92.45	7.55	20.654	21.17	78.82
6	16.947	92.66	7.34	22.392	28.81	71.19

Notes : The order of variables included in the regression is as presented in the table.

The Monetary Approach to Balance of Payments

(A Viewpoint)

Himanshu Joshi*

Abstract

The empirical models of the Monetary Approach to Balance of Payments (MABP) assume exogeneity of variables pertaining to domestic credit, money-multiplier and the rate of interest with respect to the flows over the external account. This assumption is particularly crucial in interpreting the counterpart standard reserve flow equation, because in its absence the estimators associated with the said equation turn out to be biased. This paper tests for the exogeneity assumption employing a systems test and then interprets the standard reserve flow equation. Another positive contribution of this paper lies is securing a definite evidence of the applicability of the MABP to the Indian economy as well as in achieving the resolution of the vexatious issue of the presence or absence of sterilization.

Introduction

The monetary approach to balance of payments (BOP) states that BOP is essentially a monetary phenomenon. In the words of Johnson, *'the essence is to put at the forefront of analysis the monetary rather than relative price aspects of international adjustments'* (Johnson, 1975). A surplus in the money account, according to the approach, reflects an excess domestic flow demand for money. Consequently, in analysing the money account, or more familiarly, the rate of increase or decrease in a country's international reserves, the monetary approach focuses on the determinants of the excess domestic flow demand for or supply of money' (Frankel and Johnson, 1976). Put in a simple way, the monetary approach to BOP (MABP) states that in an open economy, under fixed exchange rate, the stock of money cannot be controlled by the monetary authority (money supply is endogenous rather than exogenous policy variable). In other words, if the monetary authority attempts to expand money supply beyond the level that domestic residents wish to hold, the excess

stock would directly be channelled into external account leading to an identifiable loss of reserves. As Kreinin and Officer (1978) put it, under this scenario, people try to get rid of excess supply (of money). They do that by increasing purchases of foreign goods and services, by investing abroad, or by transfering short-term funds abroad to acquire foreign assets. Thus, the deficit is viewed as a spill-over of the excess supply of money; its composition is immaterial. The MABP differs from the standard Keynesian model of BOP in that the latter allows the monetary consequences of BOP surpluses or deficits to be absorbed (sterilized) by the monetary authority so that a surplus or deficit can be treated as a flow disequilibrium (Johnson, 1976). Under the contemporary theory of MABP, surpluses or deficits cannot be extinguished owing to the fact that the demand for money is a stock and not a flow, and so the 'variation of the supply of money relative to the demand for it associated with deficit or surplus must work towards an equilibrium between money demand and money supply with a corresponding equilibrium of the BOP' (Johnson, 1976).

The Critical Assumptions of MABP :

To see that the MABP represents the real world process, a few assumptions are required to be made. First, the economy in question must possess a stable demand for money function, the said demand being a stable function of the growth of nominal income. Secondly, there must be perfect international capital mobility and perfect substitutibility among foreign and domestic bonds. A perfect international capital mobility would imply that the interest rate on domestic bonds should be equal to that available on foreign bonds in addition to the usual covered interest parity. In view of this, economic agents should, in principle, be able to allocate their portfolio across the spectrum of domestic and foreign bonds with the same rate of interest and without any risk of default or without any fear of being caught unawares in the midst of unexpected changes in either the rules of financial markets or cross border exchange rate regimes. Finally, MABP also assumes that purchasing power parity (PPP) holds. PPP embodies the 'law of one price', a proposition under which international arbitrage tends to equalize the money price of goods in terms of either currency. This corresponds to the global monetarist view that national commodity markets are merely parts of a single unified world commodity market. In other words, prices are assumed to be perfectly flexible and, changes in nominal exchange rate would not, therefore, be reflected in the real exchange rate. There would also exist, in tandem, a perfect flexibility in the price of labour. Full employment and output would thus prevail. Under a flexible exchange rate regime,

the above assumptions associated with the MABP under a fixed rate system require to be slightly modified. In this case, the uncovered parity is assumed to be. equal to the expected depreciation of domestic currency, where expected depreciation would correspond to the expected inflation differential such that it would be in tune with the purchasing power parity theory.

The Applicability of the Assumptions

The actual practice (or as revealed by empirical evidence), all of the above conditions seldom hold good. Discussing the inapplicability of the above-stated conditions, Raghavan and Saggar (1989) hold the view that where tariff and non-tariff barriers distort free trade and where strict control is exercised on international capital movements by the govern-ment, it is difficult to accept that excess supply of money can be drained through imports and investments aborad till real cash balances get in line with desired stock of cash balances.[1] As regards the condition of full employment, they argue that it can no longer be imposed even on models for several OECD countries, not to speak of developing countries. Frenkel and Johnson (1976), however, take the view that the assumption of full employment in the MABP can be defended on the grounds that these models are concerned with the longer run and that for this perspec-tive, the assumption of full employment is more appropriate than the assumption of general mass unemployment for the actual World economy since the end of Second World War. Moreover the MABP lays emphasis on the direct relationship between the money market and BOP rather than the implied changes in goods and/or financial markets, and as such offers, technically speaking, very few instruments for devising appropriate adjustment policies. Despite the criticisms, that the MABP approach has attracted to date, it has enjoyed a fairly high degree of attention. A number of writers have tested the empirical validity of the approach, on the ground that the restrictive conditions that characterise it are not such as to totally invalidate the obtained results.[2] The empirical verifica-tion of the MABP is usually based upon the well known standard reserve flow equation (discussed in detail in the following text). Either this equa-tion, or one of its variants, has invariably been used in different studies, e.g., the ones prepared by Bean (1976), Zecher (1976), Agvehli and Khan (1977), Akhtar et. al (1977), Putnam and Wilford (1977), etc. The empirical models of MABP assume exogeneity of domestic variables such as output, prices, money multiplier, rate of interest and domestic credit with respect to reserve flows. This is done because the MABP focuses essentially on the direct relationship between the money market and the BOP. If for instance, reserve flows cause domestic variables

or the monetary authority succeeds in sterilising the international compo-
nent of the high powered stock, then the estimators associated with the
standard reserve flow equation will turn out to be biased, the interpreta-
tion of the reserve flow equation differs from the usual sense in which
MABP is required to couch.

The Contributions on India

The presence or otherwise of sterilisation has been a vexed issue
in the context of the Indian economy as well. There are a number of
studies that have attempted to verify the tenets of MABP specifically
in the context of India. Mention may be made here of studies by Sundara-
jan (1986), Bhatia (1980), Sohrab-Uddin (1985), Kannan (1989) and Ragha-
van and Saggar (1989). While Bhatia estimates the reserve flow equation,
he does not seek to address the sterilisation aspect. In Sohrab-Uddin,
however, there is an attempt to explore the sterilisation aspect, but the
evidence is at best inconclusive. Sundararajan who operationalises and
simulates a monetary model of trade and inflation in India, argues that
in the short run even a small reduction in credit expansion can produce
an improvement in the BOP similar in magnitude to that of a 10.0 percent
devaluation. However, he avers that the initial improvement in the trade
balance owing to tight credit policy is purely temporary, and the trade
balance actually deteriorates in the medium term. This, he believes, is
owing to the negative liquidity effects of tight credit policies.

More serious attempts were made by Kannan and Raghavan and
Saggar in the late eighties with a data spanning a range from early
sixties through the early eighties. Kannan finds that the MABP is a
valid representation of the real world process in the context of India
but he also believes that the monetary authority succeeds in sterilizing
the international component of the high powered money. This, however,
is technically not a tenable position. For, if the monetary authority suc-
ceeds in sterilising the monetary consequences of the flow of reserves,
the standard reserve flow equation provides biased result which is, in
principle, difficult to interpret. Raghavan and Saggar, one the other hand,
state that the applicability of MABP in the context of India is inconclu-
sive. Their results are based upon a two-SLS estimation of the standard
reserve flow and sterilisation equations. While a two-SLS estimate of
their sterilisation equation rejects the null, the tests of causality are marred
by a technical difficulty since the variables employed in causality testing
have not been checked for stationarity. In both Kannan and Raghavan
and Saggar, the evidence of causality is based upon a bivariate test which
fails to take account of the presence of other potentiality important varia-

bles included in the overall system, an issue which was most succintly documented by Skoog (1976). In view of the limitations of the earlier studies on MABP in respect of India, as described above, this paper attempts to verify the validity of the tenets of MABP in a more rigourous manner. We not only estimate the standard reserve flow equation but also check the empirical validity of the exogeneity assumption which is crucial for the correct interpretation of the reserve flow equation.

The Conventional Approach to Testing the MABP :

The conventional approach to MABP is based on the theory of money market equilibrium. In the balance sheet of the monetary authority, the high powered stock of money (H) is defined as follows :

$$H = R + (OA-OL) = R + D \tag{1}$$

where, D = stock of domestic credit made available by the monetary authority, R is the net stock of the international reserves held by the Central Bank and OA and OL are other assets and other liabilities, respectively. Now if Ms is the stock supply of domestic money, the multiplier model gives :

$$Ms = k*H$$

where k is the money multiplier. Equivalently

$$Ms = k (R+D)$$

if one assumes a stable demand function for money one has Md = f (p,y,r,) $\Theta_p > o$ $\Theta_y > o$ $\Theta_r < o$

where the Θ_y denote elasticities: p = price level ;y = domestic real income; and r = domestic interest rate. Upon linearising the demand function for money one can write,

$$\ln Md = \ln c + \Theta_p \ln p + \Theta_y \ln y + \Theta_r \ln r \tag{2}$$

The money market equilibrium for supply and demand for money is given by Ms = Md, hence upon substitution,

$$\ln k + \ln (R+D) = \ln C + \Theta_p \ln p + \Theta_r \ln r + \Theta_y \ln y \tag{3}$$

Differentiating and transposing provides :

$$dR\ /\ (R+D) = \Theta_p d\ln p + \Theta_y d\ln y + \Theta_r d\ln r - d\ln k - dD\ /\ (R+D) \quad (4)$$

Or, approximating the differential operator by the discrete operator :

$$\Delta R\ /\ (R+D) = \Theta_p \Delta\ln p + \Theta_y \Delta\ln y + \Theta_r \Delta\ln r - \Delta\ln k - \Delta D/(R+D) \quad (5)$$

The above equation marks the conventional framework employed for testing the MABP. It is transformed into an empirically estimable model by appending a constant and an error term with usual properties. Accordingly, the empirical model appears as follows :

$$\Delta R/(R+D) = \beta_0 + \beta_1 \Delta\ln p + \beta_2 \Delta\ln y + \beta_3 \Delta\ln r + \beta_4 \Delta\ln k \quad (6)$$
$$+ \beta_5 \Delta D/(R+D) + \mu$$

The relevance of MABP is examined with reference to the following standard theoretical values associated with the MABP.

$$\beta_0 = 0; \ \beta_1 = 1; \ \beta_2 > 0; \ \beta_3 < 0; \ \beta_4 = -1; \ \beta_5 = -1. \quad (7)$$

The values and the signs of the partials as mentioned in the equation above could be explained on the basis of standard Keynesian mechanism relating to the change in domestic credit in an economy. For instance, an arbitrary increase in the domestic component of high powered money stock would enlarge broad liquidity through money multiplier which, in turn, will not only shore up the equilibrium real income but also lower the rate of interest. While the rise in real income will lead to deterioration in the current account, the capital account too would worsen owing to the ensuing lower rate of interest. Overall, therefore, the BOP deteriorates. In such a scenario of the initial increase in the monetary base being partly offset by reserve outflows, there would yet remain in the ultimate a net positive change in money supply. The partials associated with real output and the rate of interest in keeping with the above are negative and positive, respectively. Those associated with price and money multiplier are identically minus unity owing to the exact invesrse relationship of these with respect to reserve flows. The assumption of unitary elasticity with respect to price variable implies absence of money illusion as also long run neutrality as postulated by the quantity theory. It also ensures that the theory's equiproportionality postulate will be satisfied, that is, the price level will vary in exactly the same proportion as the money supply. In view of these analytical strands, the restrictions as mentioned in regard to expression 7 can be taken as a composite null hypothesis that the MABP is a valid description of the real world processes.

The money supply equation Ms = k * H is termed in the literature as the monetary base identity and equation 6 as the standard reserve flow equation. The coefficient associated with (ΔD/H) is referred to as the offset coefficient and is expected to show the degree to which changes in the domestic component of the monetary base are neurtalised by the changes in the international component of the high powered money. If the MABP is a valid representation of the real world process then the offset coefficient should take a value of about minus one. This is because the MABP theory suggests that under fixed exchange rates the domestic monetary policy is completely neutralised by the BOP.

Even though equation 6 is aptly called as the standard reserve flow equation, it is essentially a reduced form structure employed for testing the empirical validity of the MABP.

Problems with the Conventional approach :

There are some problems with the use of the conventional approach. As argued by Petoussis (1985), the conventional approach essentially imposes long run assumptions on the short run setting. In its original formulation the theory of MABP indeed incorporates a long run perspective and has a crucial assumption that monetary inflows or outflows associated with surpluses or deficits are not sterilised - or cannot be, within the period relevant to policy analysis (Johnson, 1976). One justification for this assumption is that the effect of sterilisation operations would be to create international interest rate differentials that would encourage capital flows and thus undermine the sterilisation policy. Yet another important problem, perhaps, the most controversial in so far as empirical verification of the MABP is concerned, relates to the validity or otherwise of the inherent exogeneity assumption. While the endogeneity of variables such as domestic output, prices and the rate of interest can be demonstrated based upon the usual macroeconomic analysis, that of domestic credit could occur if, and only if the monetary authority succeeds in sterilising the international component of the high powered money. In the event, the exogeneity assumption is invalidated. As such, the estimators associated with the standard reserve flow equation could turn out to be inconsistent (Argy and Kouri, 1974 and Geweke, 1978).

The Analytics of the Exogeneity Test

The verification of the exogeneity[3] assumption is the edifice, the critical one at that, upon which the reserve flow equation is built. For

this purpose, a rigorous econometric method may need to be employed. Geweke (1970) has suggested an appropriate systems exogeneity test. This is truly a systems test of exogeneity that does not suffer from specification errors. It is, in other words, a multivariate test that takes care to include potentially important variables that dynamically interact within the overall system. This is what has been employed here. Following Geweke (1970) a complete dynamic simultaneous system (CDSEM) [the conceptual framework for a CDSEM was first proposed by Koopmans (1959)] has been worked out as follows:

$$R\ (L)y_t\ +\ Z\ (L)x_t\ =\ e_t \qquad (8)$$
$$(g*g)\ \ (g*1)\ \ \ (g*k)(k*1)\ \ \ (g*1)$$

where

$$E\ (e_t)\ =\ O,\ \forall_t$$

$$cov\ (e_t,\ x_{t-s})\ =\ O\ \ \forall\ t,\ \ \forall\ s\ \geq\ O$$

$$cov\ (e_t,\ y_{t-s})\ =\ O\ \ \forall\ t,\ \ \forall\ s\ \geq\ O$$

R (L) and Z (L) are matrices of polynomials of infinite order in non-negative powers of the lag operator L. A CDSEM is a notionally sufficient description of the dynamic interrelationships between k exogenous variables x_t and g endogenous variables y_t. Therefore, if x_t is regressed as an infinite order autoregressive distributed lag on itself and y_t viz;

$$x_t\ =\ \sum_1^\infty Ps\ x_{t-s}\ +\ \sum_1^\infty Ts\ y_{t-s}\ +\ e_t \qquad (9)$$

one compiles a "CDSEM with exogenous x_t and endogenous y_t, and no other variables, if and only if Ts = O, $\forall$ s > O "(Dent and Geweke, 1979). In this framework implementing the test of exogeneity becomes an empirical proposition. This possibility is owing to the fact that since current and past values of x_t alone are inputs while y_t is output, only past and current values of x_t influence y_t in the CDSEM. Owing to the above interpretation, as x_t is determined outside of the CDSEM, a correct specification of the determination of x_t will not include any values of y_t. Therefore, the proper test of exogeneity is the test of hypothesis that the coefficients on the lagged endogenous variables are jointly zero (Johannes, 1981). Such a test can, in principle, be constructed by setting up the restricted and unrestricted systems and invoking the Likelihood Ratio (LR) test of the following kind :

$$LR = T^* \ln (|\ \Omega o\ |/|\ \Omega|) \tag{10}$$

where Ωo and Ω are the estimated contemporaneous covariance matrices of the restricted and unrestricted systems, respectively (Harvey, 1981). The LR statistic is distributed as a central chi-square with degrees of freedom equal to the number of restrictions. The vector process as expressed in equation 9 'represents a system of stacked or Zellner's seemingly unrelated regressions. Since each regression has the same set of regressors, the said process reduces to OLS.' (Johannes, 1981). In fact the OLS estimation of such a system of equations is equivalent to full information maximum likelihood estimation [which implies as if the 'estimation procedure arises as the solution to the application of the maximum-likelihood concept to the entire simultaneous equation system' (Pindyck and Rubinfield, 1985).] with a small error of approximation. Accordingly the chi-square test discussed above is asymptotically efficient as per standard theory.

The Empirical Verification of the MABP :

Using the data for the period 1970-71 through 1991-92 we have estimated the standard reserve flow equation and the restricted and the unrestricted systems for conducting the test of exogeneity. The data used are given at the end of the paper in Table 1. The obtained empirical results are successively reported below.

The Estimated Standard Reserve Flow Equation

Dep Var	cons	GDP	Price	Mult	DC
R flow	0.1866	-0.1479	-0.1669	-1.2971	-1.1292
	(14.984)	(-1.315)	(-1.676)	(-12.199)	(-16.675)

R-SQ = 0.955   RBAR-SQ = 0.944   DW = 2.53

Note: The figures reported in the brackets are respective t - statistics.

R flow = Reserve flow variable as defined in eq. 6.
GDP   = Gross Domestic Product (const. prices, 1980/81)
Price   = GDP deflator (base 1980/81 = 100)
DC   = Domestic Credit
Mult   = Multiplier

All the included variables in the reported equation are transformed in accordance with that suggested in equation 6.

Restricted and Unrestricted Equations for Exogeneity Test

I. Restricted System :

Dep Var	GDP-1	GDP-2	PRICE-1	PRICE-2	MULT-1	MULT-2	DC-1	DC-2	CONS	R-sq	$\bar{R}^2$	DW	BOX-Q
GDP	-0.19004 (-0.4698)	-0.036901 (-0.1241)	0.14047 (0.4282)	-0.15151 (-0.44256)	0.10464 (0.24488)	0.198194 (0.72302)	-0.20257 (-0.81968)	0.33604 (1.42922)	0.039196 (0.8506)	0.3644	-0.14401	2.0005	6.92701
Price	-0.40165 (-0.57346)	-0.59627 (-1.5524)	-0.26697 (-075672)	-0.55361 (-1.5035)	-0.33579 (0.73065)	-0.003747 (-0.012711)	0.57421 (2.16035)	-0.11166 (-0.4415)	0.11398 (2.3000)	0.56104	0.20988	1.882	3.8005
MULT	-0.40165 (-0.83965)	0.57806 (1.6444)	0.61938 (1.5965)	0.88438 (2.1842)	-0.73318 (-1.45076)	0.124 (0.38249)	-0.41483 (-1.419272)	0.025144 (0.090423)	-0.06342 (-1.1638)	0.5338	0.16085	2.1778	17.6087
DC	0.7703 (1.10938)	-1.26803 (-2.48509)	-0.67144 (-1.19236)	-1.34902 (-2.2954)	1.6861 (2.29855)	-0.988605 (-2.1008)	1.49426 (3.52207)	-0.491388 (-1.2174)	0.16798 (2.12359)	0.66318	0.3937	2.0659	15.2769

Note :

All the variables as presented in the table are in their difference of log forms respectively.
The values reported in brackets are respective t-statistics
The Box-Q test statistic reported in the relevant column is a test of zero autocorrelation among residuals
GDP = Gross Domestic Product (Constant 1980-81 prices)
PRICE = GDP Deflator (1980-81=100)
MULT = Broad money multiplier
DC = Domestic Credit or NDA (Net Domestic Assets)

II. Unrestricted System :

Dep Var	GDP-1	GDP-2	PRICE-1	PRICE-2	MULT-1	MULT-2	DC-1	DC-2	RFLOW-1	RFLOW-2	CONS	R-sq	R̄²	DW	BOX-Q
GDP	-0.11217 (-0.2408)	-0.8479 (-0.2125)	0.25129 (0.5851)	-0.23348 (-0.43121)	-0.24696 (-0.2003652)	-0.47382 (-0.372188)	-0.29688 (-0.279697)	-0.28808 (-0.24276)	0.1407 (0.45232)	-0.09379 (-0.08823)	-0.519766 (-0.54617)	0.3889	-0.3749	2.05	7.3794
PRICE	-0.06855 (0.13646)	-0.36696 (-0.85259)	-0.23173 (-0.50021)	-0.3345 (-0.57279)	0.9626 (0.7359265)	0.38893 (0.28323)	1.14496 (1.000)	0.2701 (0.21107)	-0.050548 (-0.15060)	0.5905 (0.515047)	0.2935 (0.28594)	0.57548	0.04483	1.81409	6.82344
MULT	-0.35262 (0.63103)	0.52207 (1.0904)	0.66464 (1.2897)	0.78911 (1.2146)	-0.96068 (-0.660026)	-0.30327 (-0.1985)	-0.60474 (-0.4748)	-0.376 (-0.26407)	0.077657 (0.07407)	-0.19466 (-0.15262)	-0.327912 (0.2871)	0.5386	-0.03804	2.1178	19.1611
DC	0.51999 (0.68219)	-1.030158 (-1.5773)	-0.94799 (-1.3486)	-0.9437 (-0.06494)	2.5916 (1.30577)	1.18485 (0.56865)	2.221528 (1.27875)	1.541217 (0.793537)	-0.246605 (-0.48421)	0.742072 (0.426527)	1.67267 (1.07394)	0.7056	0.33766	1.9577	24.4937

Note :

All notations as in the context of table A

The value of chi-square statistic is equal to 4.78

The results show that there is evidence of exogeneity as may be seen from the available value of the Likelihood Ratio statistic. The small value of the chi-square statistic (of the order of only 4.78 is not significant at a reasonable level) rejects the alternative hypothesis and instead lends support to the null. In view of this, one could surmise that none of the included variables in domestic sector are in fact caused by flows over the external account. Besides, the empirically estimated standard reserve flow equation shows that the value of the offset coefficient is in conformity with that indicated by the prior as also highly significant. We may, therefore, conclude that MABP could be considered as a valid representation of the real world process in the context of Indian economy. In other words, the monetary character of the BOP disequilibria is in evidence. As far as other coefficients are concerned, those associated with price and output, although unexpected in signs, are insignificant. These can at best be taken as zero. The sign and value of the coefficient regarding the money multiplier is in line with that suggested by the prior. The constant, however, is positive and significant (although small in value) which shows that the variations in reserves are not fully captured by contemporaneous variations in the considered variables in the domestic sector. This could probably be due to the time lag that the interaction between domestic credit and reserves takes.

Conclusions

The evidence obtained implies that as variables in domestic sector such as output, prices, money multiplier and domestic credit are not caused by flows over the external account, there is no evidence to show that the monetary authority could fully succeed in sterilising the international component of the high powered money. This could probably be explained by a number of factors such as the ceilings that exist in respect of the variable cash reserve ratios, absence of an effective market for gilt edged securities and the expansionary fiscal stance of the Government most of the times. In the Indian context, the issue takes a complex character since reconciliation of external as well as internal balance is akin to the well known 'assignment problem'. This problem arises owing to the assignment of different responsibilities to different agencies. For example, the Central Bank, as a monetary policy maker, is concerned chiefly with external balance while the Government controlling fiscal policy has the responsibility of developing activities and improving the situation. Unless there is coordination between the monetary authority and the fiscal agency, an optimum mix of policies may be difficult to achieve. Under such circumstances even if the Central Bank desires to sterilise the monetary consequences of the flow of reserves over the

external account, it may not completely succeed in doing so owing to the fiscal stance that the Government takes. Throwing light on this very important issue, Stanley Fischer states 'Central bankers know that fiscal deficits are the ultimate source of macroeconomic instability and inflation, while finance ministers are more inclined to attribute their macroeconomic problems to inadequate monetary policy'.[4]

Notes:

1. This view of Raghavan and Saggar (1989) was stated in connection with the Indian economy. If this were correct, no country would ever logically face a BOP crisis.

2. See for example, the empirical tests attempted by Aghevli and Khan (1977).

3. ".... exogeneity is a property of a functioning system or a proposed model that refers to the order in which the realisations of certain variables are determined. In the special case of the complete dynamic simultaneous equations model, the notion is equivalent to the dynamic ordering implicit in the usual dichotomy of variables into endogenous and exogenous variables. In this system there is a undirectional Weiner-Granger causal ordering from the exogenous to the endogenous variables; refutation of such as ordering is therefore of interest." (Geweke, J. in "Casuality, Exogeneity and Inference", paper presented at the Fourth World Congress of the Econometric Society, 1980).

4. Lecture delivered at the Reserve Bank of India, February 19, 1990 titled 'The Economics of the Government Budget Constraint'.

References :

1. Aghevli B.B. and Khan M.S. (1977), *The Monetary Approach to Balance of Payments Determination:* an empirical test in Rhomberg and Heller (1977).

2. Akhtar M.A., et al (1977), *Fiscal Constraints, Domestic Credit and International Reserve Flows*, IMF, Washington.

3. Argy V and Kouri, P.J.K. (1974), "Sterilisation policies and the volatility of international reserves", in *National Monetary Policies and the International Financial System, (Ed.)* R.S. Aliber, Chicago University Press, Chicago.

4. Bean D.L. (1976), "International reserve flows and money market equilibrium : the Japanese case". in *Frenkel and Johnson (1976)*.

5. Bhatia B.L. (1980), "The Monetary Theory of BOP under Fixed Exchange Rates : India 1951-1973, *'The Indian Economic Journal*.

6. Cox W.M. and Wilford D.S. (1977), *The Monetary Approach to the Balance of Payments and World Monetary Equilibrium*, IMF, Washington.

7.   Dent W. and Geweke J. (1979), *On Specification in Simultaneous Equations Models*, University of Wisconsin, Madison.

8.   Fischer, Stanley (1990), Lecture delivered at R.B.I., February 19.

9.   Frenkel, J.A. and Johnson H.G. (1976), *The Monetary Approach to the Balance of Payments (Ed.)*, George Allen and Unwin.

10. Genberg, H. (1976), "Aspects of the monetary approach to Balance of Payments : an empirical study of Sweden", in *Frenkel and Johnson (1976)*.

11. Geweke, J. (1978) "Testing the exogeneity specification in the complete dynamic simultaneous equations model, *Journal of Econometrics*, 7.

12. Harvey, A.C. (1981), *The Econometric Analysis of Time Series*, Phillip Allan, Oxford.

13   Johnson, H.G. (1976), "The Monetary Approach to BOP Theory", in *Frankel and Johnson, 1976*.

14. Johannes, J.M., (1981), "Testing the exogeneity specification underlying the monetary approach to balance of payments." *Review of Economics and Statistics*, 63.

15. Kannan, R (1981), "Monetary Approach to BOP - A Case Study of India, 1968-85", EPW, Vol. xxiv, No. 4.

16. Kreinin, M.E. and Officer L.H. (1978), *The Monetary Approach to BOP : A Survey*, Princeton University, 1978.

17. Petoussis, E. (1985, "Short run data and long run theories: testing the monetary approach to balance of payments", *Kredit and Kapital*, 18.

18. Pindyck, R.S. and Rubinfield D.L. (1985), *Economic Models and Economic Forecasts*, McGraw - Hill Book Company, Singapore.

19. Raghavan, V.S. and Saggar M (1989), "Applicability of Monetary Approach to Balance of Payments", *Economic and Political Weekly*, Vol. xxiv, No. 32.

20. Rhomberg, R.R. and Heller H.R. (1977), "Introductory Survey" in *The Monetary Approach to the BOP*, International Monetary Fund, 1977.

21. Skoog, J.R. (1976), *"Causality Characteristics : Bivariate, Trivariate and Multivariate Propositions,"* Federal Reserve Bank of Minneapolis, Minnestoa.

22. Sohrab-Uddin, M (1976), "Monetary Approach to BOP, Evidence from Less Developed Countries", *The Indian Economic Journal, Vol. 33 (1)* July-September.

23. Sundarajan, V (1986), "Exchange Rates versus Credit Policy," *Journal of Development Economics*, 20.

24. Zecher, J.R. (1976), "Monetary Equilibrium and International Reserve Flows in Australia," in *Frankel and Johnson (Eds.)*, 1976.

The Monetary Approach to Balance of Payments

A Viewpoint

YR	GDP	RM	M3	FRX	PRC	NDA
1970	904.26	48.2200	110.190	5.30000	43.9	42.92
1971	913.39	53.8100	126.920	6.08000	46.3	47.73
1972	910.48	60.3300	150.130	5.69000	51.0	54.64
1973	951.92	72.7300	176.240	6.61000	59.8	66.12
1974	962.97	76.0400	195.500	3.69000	69.6	72.35
1975	1049.68	78.0700	224.800	9.24000	67.8	68.83
1976	1062.80	97.9800	277.810	25.99000	72.0	71.99
1977	1142.19	109.4100	329.060	45.32000	76.5	64.09
1978	1205.04	140.8300	401.120	54.31000	77.9	86.58
1979	1142.36	165.7300	472.260	53.88000	89.7	111.85
1980	1224.27	194.5300	557.740	47.75000	100.0	146.78
1981	1298.89	209.9800	627.520	27.06000	110.2	182.92
1982	1339.15	231.1000	731.840	17.29000	119.2	213.81
1983	1448.65	289.9300	865.250	16.24000	128.2	273.69
1984	1504.69	352.1600	1029.330	28.99000	138.6	323.17
1985	1566.00	381.6500	1193.940	37.41000	149.1	344.23
1986	1627.11	448.0800	1416.320	46.21000	159.2	401.87
1987	1700.41	534.8900	1642.750	54.16000	173.1	480.73
1988	1877.25	629.5800	1934.930	62.01000	187.4	567.57
1989	1993.29	775.9100	2309.500	60.68000	200.2	715.23
1990	2104.77	877.7900	2658.280	79.83000	224.5	797.96
1991	2157.39	994.9101	3150.930	188.38000	246.9	806.53

YR   =   YEAR
GDP =   GROSS DOMESTIC PRODUCT
RM   =   RESERVE MONEY (Rs. billions)
M3   =   BROAD MONEY (Rs. billions)
FRX =   FOREX ASSETS OF THE R.B.I (Rs. billions)
NDA =   NET DOMESTIC ASSETS OF THE R.B.I. (Rs. billions)
PRC =   GDP DEFLATOR

Note :

* GDP at 1980/81 prices.
* GDP deflator with 1980/81=100.

BOOK REVIEWS

**The Indian Economy – Problems and Prospects, edited
by Bimal Jalan, Viking Penguin Books India (P) Ltd., B4/246,
Safdarjung Enclave, New Delhi 110 029, India, 1992,
pp. xxiii + 367 Rs. 250/-.**

When a person of such eminence as Bimal Jalan edits a book on
the Indian Economy, the destinies of which were to no small extent
influenced by him as the Chief Economic Adviser to the Government
of India, and Chairman of the Economic Advisory Council, one has
to take due note of it simply because it *should have* extraordinary
insights into the behavioural relationships among the different critical
economic variables. One should grant that this is the least of expectations
of any rational individual. Jalan has attempted to give a very varied
fare. Thus, diverse aspects, such as poverty, industrial and agricultural
policies, financial reforms, public debt and fiscal issues, balance of
payments, energy policy, population, unemployment, and the political
economy of development, have been touched upon by different experts,
giving attention to the past situation and to the most important current
issues, and in a limited way to the policy options for the future. Jalan
did not reconcile the viewpoints of authors and rightly so, in the view
of this reviewer. His own preference would be for an open-ended, eclectic
and pragmatic discussion on economic policy questions, since economic
adjustment since 1991-92 required a shift away from the inefficiencies
associated with centralized planning and bureaucracy. 'Ideological certain-
ty', as the development experiences of Latin America have shown, can
lead to economic disasters. Jalan has left an impression that the crisis
at the beginning of the 'nineties is essentially a reflection of the inadequa-
te corrective actions to the emerging economic contradictions and malaise
which were not noticed by many an economist, and the multilateral institu-
tions, fascinated as they were by what Jalan has termed 'the superficial
assessments' of India's economic performance.

In this review, we will not present an account of what each one
of the papers has stated. This has already been done, competently by
Jalan himself in his introduction. This reviewer would therefore evaluate
critically only those points that emerge as the basic message of the papers.

Bipan Chandra's historical account of the colonial legacy sets the tone for the book. The central point here is that the activist role for the State in industrial and agricultural development was postulated in the last quarter of the 19th Century and in the first half of the present Century by economic thinkers as well as political leaders, influenced as they are by the political and ideological character of the nationalist movement. While this is undoubtedly true, the question remains as to whether there could be different *strategies* of development even within a State-dominated framework. It is here the different hues of economic thinking that prevailed before India's Independence in 1947 give some clues to our understanding of the colonial legacy. One wishes that there had been some discussion of the views of Gopal Krishna Gokhale, M.N. Roy and Mahatma Gandhi on the role of the State and of the kind of public expenditures that should be incurred by the State as also on such matters as, mechanization, industrial structure, and employment creation in some detail.

Dandekar's essay brings out in one sweep, as it were, the economic progress made in the forty and odd years after Independence. But it does not give any idea of the author's own view of the approaches that need to be pursued in future. Rakesh Mohan's essay is again useful for gaining historical insights. His argument that MRTP, FERA, reservation and concessional policies in regard to small scale industries and Industrial Disputes Act had all led to a slowdown of industrial growth in the 'sixties and 'seventies after having got a 'sound' industrial base in the Second and Third Plan periods, is an important one, but its power would have enhanced had there been some empirical testing of the implied hypotheses.

C.H. Hanumantha Rao's perceptive piece underscores the need for increasing public investment in economic infrastructure in terms of irrigation, research and extension, and in social development (rural health and education) as a key to realisation of the potential for private investment in agriculture which in its turn would depend critically on the viability of the formal credit institutions. But it appears that most of the issues concerning rural credit delivery cannot be resolved without a strong budgetary support, and without the services of a committed bank personnel - the two conditions which are not easily available in the foreseeable future. C. Rangarajan and Narendra Jadhav note that the internal and external constraints to attainment of viability of banks and term lending institutions would need to be relaxed *in a phased manner,* and that subsidization beyond a point cannot be done without Government (budget) support. Both these are important issues that need to be pursued under the

programme of financial sector reforms along with a supervisory system that requires to be strengthened. Undoubtedly, this would imply some additional budget allocations which need to be accommodated by rationalising public expenditures and by raising revenues.

Jalan's paper on balance of payments (BoP) situation in 1956 to 1991 is remarkable for its clarity and forthrightness of views. After presenting the developments in BoP, Jalan argues that in the present circumstances, import liberalisation for the domestic market would not be a feasible strategy simply because it will tend to raise the import ratio. Linked with this is Jalan's advocacy for promotion of exports through supportive fiscal and exchange rate policies as also by 'generalised' policies that improve economic efficiency and 'special' policies that provide preferential support. Once exports pick up, Jalan would argue, import liberalization for the domestic market could follow - a sequencing that makes eminent sense, considering the fact that a number of export success stories (Japan and Korea, for example) have followed this route. Jalan's suggestions for a rough rule for principal debt servicing (not to exceed 20 per cent of 'normal' foreign exchange reserves) and for providing foreign investment flows linked to production rather than foreign financial investments in shares and stocks in Indian capital markets, are useful and worthy of pursuit. It should be possible, in fact, to establish through some good econometric exercise (such as probit analysis), the debt servicing rule.

Raja J. Chelliah's piece on the growth of Indian public debt is already well known in academic circles in India. The scenario building made on the assumption that primary deficit to GDP ratio is kept at 1 per cent, shows that total internal debt to GDP has to be brought down from 50 per cent in 1990-91 to 44 per cent in 2000. A larger order of decline is needed in total debt to GDP ratio - 8 percentage points-on the same assumptions. Chelliah's proposals to bring down the primary deficit through controlling the growth of Government's consumption expenditures and subsidies are in the spirit of the times in which we live, but we need to ensure that drastic cuts in this area do not lead to cutbacks in economic activity, in view of the complementarity of public and private expenditures, and erosion in the welfare of the sections of people indentifiable as economically vulnerable. Chelliah's arguments for treating RBI as a public enterprise are interesting but need to be closely examined in the light of the on-going literature of policy credibility and Central bank autonomy.

In the paper of Sudipto Mundle and Govinda Rao, the precariousness of the States' finances is sought to be corrected by a number of measures,

including freeze on employment by the State sector, sharp improvement in user charges, and introduction of value-added sales tax. These ideas are not politically feasible for the present, though one could legitimately argue for making a movement in these directions.

The points made by Jyoti Parikh and Kirit Parikh about appropriate pricing of energy and provision of financial incentives for conservation of oil products should be implemented in all seriousness. Pravin Visaria's suggestions for modernizing the management of the Indian family planning programme, and effecting a system of 'incentives and disincentives' would go a long way to moderate, and, with a bit of luck, lower growth rate in population. T. S. Papola, pointing out the falling employment elasticities in recent years, has suggested the need for promoting tiny, non-household sector development for creating employment and for correcting the factor price relativities now distorted against labour use in the modern small scale sector, for improving the employment situation. This will, however, imply a sharp sustained growth in the economy as a whole, and in the industrial sector in particular realised with the help of a productivity increase that will, of necessity, help improve the employment elasticities to an aggregate of near about 0.5.

The last two articles by Pranab Bardhan and Kaushik Basu raise intellectually absorbing issues. One cannot but admit with Bardhan that the present developments in terms of economic liberalization cannot get political legitimacy on a durable basis unless the elite joins hands with other pressure and social groups for securing some minimal social security net. Basu's suggestion for a legal framework to make the markets work efficiently should be taken seriously and implemented without a let-up. Deregulation, after all, cannot be a free for all. Markets work best under a well managed re-regulatory set up, and a legal system that dispenses justice quickly and fairly.

When one looks back at the end of the journey through the pages of the book, one is bound to feel somewhat over-powered by the thought that the challenges are far too many and have to be *quickly* faced, almost all of them, in a simultaneous fashion, making sure that the expected transmission channels of policy action work effectively. This is where problems galore. Past data emanating from the controlled regime may not exactly help to determine the behavioural relationships. The analytical transmission mechanisms for the period of transition have to be evolved for different sectors of activity and have to be ultimately integrated to obtain an overall view of the way the system would function. This is not easy. A good team effort is needed to present such an outcome.

Yet it must be conceded that we cannot wait for this to happen. In the meanwhile Jalan, through this book, has done the good deed of injecting the idea that policy actions have to be based on facts, and judgemental analysis of the interrelationships. This can be a good basis for further work in the area of policy modelling for transitional situations.

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Fiscal Policy for the National Capital Region by Mahesh C. Purohit, C. Sai Kumar, Gopinath Pradhan and O.P. Bohra, (National Institute of Public Finance and Policy, Vikas Publishing House Pvt. Ltd., New Delhi, 1992 pp. 169)

The role of fiscal policy as an engine of economic growth is well recognised in the literature of public economics. The above study undertaken by the researchers of the National Institute of Public Finance and Policy (NIPFP) under the sponsorship of the National Capital Region Planning Board (NCRPB) is an impirical verification of the existing theory that taxation, as a fiscal measure, influences industrial concentration and dispersal of trading activities in a region. The findings of the study would, therefore, help to formulate a suitable fiscal policy in general and a unified tax structure in particular, for the balanced economic growth of the proposed National Capital Region (NCR), which comprises the Union Territory of Delhi as its core and the contiguous parts of three neighbouring States of Haryana, Uttar Pradesh and Rajasthan.

The study started off with the assumption that in a distorted tax regime, on a priori reasoning, the region with low tax base would attract industrial concentration and also flow of trading activities towards it. This reasoning assumes much relevance in the context of the NCR where the tax rates of the constituent States are relatively high as compared to Delhi, which being a Union Territory, enjoys a comparatively low tax base. Given the heterogeneity in tax structure, a harmonisation of the existing tax structure is considered to be inevitable for a balanced growth of the entire NCR, which would necessitate an upward or downward adjustment in the existing tax rates of Delhi as well as the constituent States. This would, however, strongly be opposed to, both by the States and the Union Territory of Delhi on revenue earning ground. In the circumstances, an alternative and feasible solution is the formulation of an optimal tax-mix for the NCR, which would call for an indepth examination of the existing tax structure, concessions, industrial structure and the level of trading activities in each of the constituent of the NCR.

As a first step, the study, therefore exhaustively examined the entire gamut of the existing tax structure of the various constituents (States and Union Territory of Delhi) of the NCR with special reference to sales tax, motor vehicles tax, passengers and goods tax, electricity duty, local taxes, such as octroi and property tax levied by 'sub-national

governments'. The areas of intense probe, among other things, were structure and rates of tax across the region, mode of collection and level and extent of tax concessions provided by each State to attract industries.

The detailed probe into the existing tax structure of the NCR revealed wide variation in the rates of tax as well as tax concessions among the constituent States and also between the States and the Union Territory of Delhi. The general observation on sales tax is that, excepting Delhi, other NCR States follow the 'first-point' tax collection whereas in Delhi it is mostly the 'last-point' the latter is, however, more succeptible to tax evasion. Likewise, the tax incentives provided for attracting industries in the States, vary from meagre to liberal concessions. Thus, the variations in tax rates as well as concessions, by and large, have contributed to the significant differences in the effective tax rates among the constituent States of the NCR. In comparison, except in respect of property tax, Delhi enjoys an edge over other States in the matter of sales tax, motor vehicle tax, passenger and goods tax, electricity duty and octroi (or entry tax), resulting in a lower effective tax base in the former as compared to other NCR States.

In the above context, the study made an attempt to empirically verify that given the size of infrastructure how far effective tax differential can influence the decisions in the location of firms and diversion of trading activities.

For measuring industrial concentration, the researchers have made use of the conventional tool *viz.,* location quotient which they have estimated for each district in the NCR on the basis of output, employment and capital employed. The results have shown that concentration of industries vary from State to State as they are largely influenced by the availability of raw materials, transportation facilites, political and cultural barriers and availability of requisite resources. However, by and large, the region as a whole, has a larger concentration of industries like food and beverages, textiles and foot-wear, non-metallic minerals and base metals, with Delhi having fairly larger representation of almost all these industries as revealed by the level of significance of location quotient.

The inter-districts variation in industrial concentration and the superior status enjoyed by Delhi prompted the researchers to further test the influence of various locational factors in industrial concentration in an area. These locational factors are broadly divided into demand side, such as market conditions and tax incentives on finished goods and supply side factors like production costs (costs of raw materials, fuel and energy, wages, transportation) and taxes on inputs. The exercise was attempted through regression applying Ordinary Least Squares (OLS)

method. In the model, location quotient was taken as dependent variable, while input cost, wage cost, effective tax rate and availability of electricity were considered as independent variables. The model has been applied to six districts giving due representation to each constituent of the NCR. The broad indication of the regression results was significance influence of sales tax rates on the location of industries, as the coefficient was found to be positive and highly significant in almost all NCR States. Admittedly, the variables like infrastructure, input costs, wage cost and power were also found to be significant.

Having seen the extent of the industrial concentration in the NCR and the factors influencing thereon, the study has then taken a recourse to test the causality between the effective tax rates and diversion of trading activities to a region. Studies have already proved that in a situation of differential tax bases, trading activities get diverted to those areas where the effective tax rates were comparatively low. This assumption holds relevant even in the case of NCR, as the findings unfold the fact that approximately three-fourth of the wholesale trade in the NCR is conducted in Delhi alone, and over the period it has become the 'entrepot' for North India for a number of commodities. The advantages of Delhi in attaining this position are the special privileges enjoyed by Delhi being the capital city.

The study, as customary, concludes with certain policy prescriptions for the NCR, having confirmed the influence of taxation on industrial concentration and dispersal of trading and commercial activities in a region. These are based on the premises of the major findings that among commodity taxes, sales tax and octroi duties are largely responsible for variations in the cost of production for the industry and are creating inefficiencies through an undesirable diversion of trade in a region. For an integrated development of the NCR, the study has suggested structural reforms in the existing taxes, modification in the incentives, introduction of new taxes and strengthening of infrastructure. As structural reform, the study recommended mainly for adopting a unified system of first-point sales tax for the entire NCR, hike in the existing sales tax rates in Delhi to the levels prevailing in the neighbouring States to remove the existing distortions, uniform tax incentives to be provided by all the constitutuent States and replacement of octroi duties with uniform entry tax. Besides these tax reforms, which would act as 'push factors' to divert industry to the neighbouring districts, the study also stressed the need for the creation of necessary infrastructure facilities in the NCR districts which would perform as 'pull factors' to attract industries and, therefore, would be complementary to the proposed fiscal measures to achieve an integrated and balanced growth of the region.

The basic message of the study is that, in a distorted system of commodity taxation, industrial as well as commercial activities would tend to conjuncture to those areas where the effective tax is relatively low which would ultimately lead to imbalance in the regional economic growth. The study, therefore, places emphasis on the need for harmonization of taxes for achieving balanced growth of the proposed NCR. This issue has, however, wide macro-economic implications. Though studies have argued the welfare implication of cross-border tax differential from the point of consumers (Gregory A. Tendel, Journal of Public Economics, December 1992), the current thinking is largely in favour of tax harmonization especially in the western world as it is more Pareto-optimal (Michael Keen, the Institute for Fiscal Studies, August 1986). In the Indian context, harmonization implies a convergence towards a more uniform effective tax burden on commodities or on factors of production across the States. As a long-term strategy, it should form the major plank in the development strategy for a balanced regional growth and for efficient and equitable federal resources transfers. As far as Indian federal finances are concerned, both 'vertical' and 'horizontal' fiscal imbalances are quite conspicuous. While the vertical imbalance is inevitably inherent, in a system where the Central Government rules the roost in fiscal operations, the horizontal imbalance is tried to be solved through resource sharing by the Centre. Though various alternative measures are available for consideration by successive Finance Commissions for sharing resources among the federal units, such as through the divisions of tax powers, tax-base sharing, tax-proceeds sharing and inter-governmental grants (Chelliah et al, Economic and Political Weekly November 21, 1992), each one has its own limitation, arising largely out of differences in resource potential of the States. The long term taxation policy should, therefore, be one which would allow each State to attain the optimum level of resources within the existing potential through a uniform system of commodity taxation. Thereafter, the gap in resources needs to be filled through resource sharing by the Centre. It is against this backdrop, tax harmonization proposed by the study under review for the NCR merits consideration. Moreover, harmonisation of taxes should form the basic objective in the future formulation of fiscal policy at macro level. Results from similar studies for other regions in the country would provide the necessary policy inputs.

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