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6

A MONETARY POLICY MODEL FOR INDIA

by

G.S. Gupta

INDIAN INSTITUTE OF MANAGEMENT
AHMEDABAD

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To

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Name of the Author Dr. G. S. Gupta

Under which area do you (it) like to be classified? ~~Economics Area~~ Monetary Policy

ABSTRACT (within 250 words)

Based on a sample of 20 annual observations (1948-49 through 1967-68), a policy-oriented econometric model for the Indian economy with an emphasis on the monetary sector has been formulated, estimated, and analysed. Besides national income and its components, the demand, supply, and equilibrium condition of each of the six kinds of financial assets (currency, bank reserves, government bonds, demand deposits, time deposits, and private non-bank liabilities with banks) were considered. Every effort was made to introduce as many policy variables in as many equations as permissible both on theoretical and on statistical grounds. The primary objective was to quantitatively evaluate the direct and indirect impacts of various policy variables on the model's endogenous variables. The model should be of help in understanding the portfolio management by the different sectors of the economy.

Please indicate restrictions if any that the author wishes to place upon this note (This ~~[illegible]~~ paper has been accepted for publication in Sankhya, Part B, Quantitative Economics.)

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Signature of the Author
Gupta

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Based on a sample of 20 annual observations (1948-49 through 1967-68), a policy-oriented econometric model for the Indian economy with an emphasis on the monetary sector has been formulated, estimated, and analysed. Besides national income and its components, the demand, supply, and equilibrium condition of each of the six kinds of financial assets (currency, bank reserves, government bonds, demand deposits, time deposits, and private non-bank liabilities with banks) were considered. Every effort was made to introduce as many policy variables in as many equations as permissible both on theoretical and on statistical grounds. The primary objective was to quantitatively evaluate the direct and indirect impacts of various policy variables on the model's endogenous variables. The model should be of help in understanding the portfolio management by the different sectors of the economy.

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INTRODUCTION

Monetary policy is presumed to influence the ultimate target variables (national income, price level, employment, balance of payments, etc.) only indirectly through its effects on the financial variables (quantity of money, bank deposits, bank credit, interest rates, etc.), known also as intermediate target variables. Therefore, for a monetary policy to be of any significance with respect to the nation's high level goals, the presence of a dual causal link is imperative. There should exist a link between monetary policy instruments (Bank rate, open market operations, variable reserve requirements, selective credit controls, etc.) and the above mentioned financial variables; and the latter set of variables, or at least one of these, in turn, should exercise some significant influence on the ultimate target variables. There is an unanimous opinion among the economists about the existence of the first link, though not of course about its quantitative estimate. However, the present day economists are not so sure about the nature of the second link.

A fairly large number of studies for developed countries like the United States of America, Canada, and the United Kingdom have been undertaken to study the above two causal links and also to quantify the direct and indirect effects of monetary policy instruments on the economy's endogenous variables.[1] However, to date, at least to the author's knowledge, no systematic attempt has been made to specify a monetary policy model for India, which could produce some useful

* This paper is based on an econometric model developed by the author in his doctoral dissertation submitted to the Johns Hopkins University in 1970. The author is highly indebted to Professors Carl F. Christ and Jurg Niehans, under whose supervision the dissertation was completed, and is grateful to an anonymous referee for some useful comments. However, he alone is responsible for errors and omissions, if any.

1 To name only a few, the following should be mentioned. U.S.A.: De Leeuw (1965), Goldfeld (1966), Boughton, Brau, Naylor and Yohe (1969), and Silber (1969); Canada: Shapiro (1964), Weber (1964), and Stewart (1966); United Kingdom: Crouch (1967) and Norton (1969).

suggestions as to the role of monetary policy in the economy.[2] The present paper, besides providing a theoretically more sound and consistent monetary policy model than the ones available in the literature, aims at filling this gap in the Indian monetary research.

THE MODEL

The model presented in this paper is a four-sector model. The four sectors are the government (including the Reserve Bank of India) (g), the commercial banking (cb), the State cooperative banking (sb), and the private non-banking sector (p). The emphasis in the model is placed on the monetary sector. The real sector is included because it contains the target variables which needed to be determined endogenously in the model and with respect to which the efficiency parameters of the different policy variables were to be considered.

Besides national income and its components, the model considers six kinds of financial assets, i.e., currency, bank reserves, government bonds, demand deposits, time deposits, and private non-bank liabilities (bank loans). The model has demand and supply functions together with an equilibrium condition for each of the assets considered[3], and the budget constraints of the four sectors have not been completely overlooked. In fact, the government budget restraint forms an integral part of this study. Unborrowed reserve money is the assumed endogenous policy variable. There are nine exogenous monetary policy variables and five exogenous fiscal policy variables, each of whose quantitative impact on each of the model's endogenous variables is evaluated. These policy variables are listed below separately in the list of variables.

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2 A partial attempt in this direction was made for the first time by Mammen (1967).

3 If either the demand or supply equations or equilibrium condition for any asset is not specified, the reason for that is given in the text.

The estimated equations use 20 annual observations for the sample period 1948-49 through 1967-68. Incidentally, this period closely coincides with the post-nationalization period of the Reserve Bank of India (RBI), the post-India-Pakistan partition period, and the planning period in India. In the model, the causal structure is simultaneous, all equations are over-identified by the order condition for identifiability, and the number of predetermined variables exceeds the number of observations. Faced with these features, all the estimates have been obtained by a "modified" two-stage least squares (2SLS) method of estimation.[4] Under this method, instead of using all the predetermined variables in the first stage of the 2SLS estimates, we have used only an important subset of them. In all other respects it is the true 2SLS method of estimation. The estimates reported here were obtained by using different subsets of predetermined variables (each containing 13 such variables) in the first stage of the estimation of different types of equations. The predetermined variables in each set were chosen on the criteria given by Klein and Goldberger.[5]

The data used in the model are drawn largely from the RBI and Central Statistical Organization's publications, and they can be obtained directly from the author on request.

The model consists of 42 independent equations in as many endogenous variables. The equations of the model in their estimated form are as follows (A list of notation for the different kinds of variables appears immediately following the equations.):

Estimated Equations

In presenting the estimated model, the t-values of the estimated coefficients (given in parentheses underneath the corresponding regression coefficients), the coefficient of determination unadjusted for degrees of freedom (R^2), and the Durbin-Watson d statistic (DW), have all been noted for each of the stochastic equations. The t-value of a coefficient is marked by *, **, and *** if it (coefficient) is statistically significantly different from zero at the 10, 5, and 1 per cent levels and beyond respectively by the usual (one-tail) t-test.[6] The estimated equations are reported in Table 1.

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4 Several alternative forms of each stochastic equation were first estimated by the ordinary least squares (OLS) method, and the one that appealed most both on theoretical and statistical grounds was selected for the modified 2SLS estimation. In some cases, 2-3 alternative forms were estimated even by modified 2SLS to select their best forms.

5 Klein and Goldberger (1955) pp. 48-49.

6 Although an acceptable test procedure for testing the significance

(cont'd on p.4)

Table 1

Estimated Equations (Two-stage Least Squares)

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1. Commercial bank excess reserves demand

$$ER^{cb} = \underset{(1.39)^{*}}{673.36} + \underset{(2.90)^{***}}{.0470\,DD^{cb}} + \underset{(3.65)^{***}}{.0453\,DT^{cb}} - \underset{(0.15)}{30.69\,i_g} - \underset{(1.48)^{*}}{114.95\,i_1} + \underset{(0.05)}{0.75\,i_{B1}} - \underset{(1.47)^{*}}{.284\,ER^{cb}_{-1}}$$

$R^2 = .8738$, $DW = 2.1518$

2. State cooperative bank excess reserves demand

$$ER^{sb} = \underset{(2.24)^{**}}{4.75} + \underset{(0.94)}{.0075\,(DD^{sb} + DT^{sb})} - \underset{(1.04)}{4.89\,(i_g - i_B)} + \underset{(1.33)^{*}}{.441\,ER^{sb}_{-1}}$$

$R^2 = .7651$, $DW = 2.2414$

3. Commercial bank government bonds demand

$$GS^{cb} = \underset{(0.21)}{-421.91} + \underset{(0.58)}{.0338\,DD^{cb}} + \underset{(4.91)^{***}}{.4248\,DT^{cb}} + \underset{(1.72)^{*}}{1314.87\,i_g} - \underset{(2.72)^{***}}{832.84\,i_1} + \underset{(0.41)}{.074\,GS^{cb}_{-1}}$$

$R^2 = .9826$, $DW = 1.8371$

4. State cooperative bank government bonds demand

$$GS^{sb} = \underset{(0.20)}{14.72} + \underset{(1.00)}{.0411\,(DD^{sb} + DT^{sb})} + \underset{(0.15)}{5.82\,i_g} + \underset{(3.73)^{***}}{.801\,GS^{sb}_{-1}}$$

$R^2 = .9584$, $DW = 2.3834$

5. Commercial bank lender's private non-bank liabilities demand

$$LI^{cb} = \underset{(0.45)}{1010.91} + \underset{(3.04)^{***}}{.6426\,DD^{cb}} + \underset{(2.09)^{**}}{.2802\,DT^{cb}} - \underset{(1.40)^{*}}{1513.68\,i_g} + \underset{(2.03)^{**}}{1093.06\,i_1} + \underset{(1.95)^{**}}{.458\,LI^{cb}_{-1}}$$

$R^2 = .9970$, $DW = 1.9581$

6. State cooperative bank lender's private non-bank liabilities demand

$$LI^{sb} = \underset{(0.14)}{41.98} + \underset{(1.87)^{**}}{.5298\,(DD^{sb} + DT^{sb})} - \underset{(0.41)}{39.69\,i_g} + \underset{(4.57)^{***}}{.780\,LI^{sb}_{-1}}$$

$R^2 = .9727$, $DW = 2.6435$

---

of the regression coefficients of 2SLS estimates is yet to be developed, t-test is used in the present analysis in view of its robustness. See Rao (1965) pp.419-421. One-tail rather than two-tail t-test is used because the algebraic sign of the coefficient is presumed to be known if it is not zero. See Christ (1956).

Table 1 (continued)

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7. Commercial bank borrowings from RBI supply

$$B^{cb} = \underset{(0.19)}{33.22} + \underset{(1.61)^{*}}{.0209}\,(DD^{cb} + DT^{cb}) + \underset{(0.07)}{12.31}\,(i_1 - i_{B1}) + \underset{(2.48)^{**}}{322.69}\,d_B - \underset{(1.30)}{.307}\,B^{cb}_{-1}$$

$R^2 = .7132$, $DW = 2.1104$

8. State cooperative bank borrowings from RBI supply

$$B^{sb} = \underset{(0.57)}{-0.89} + .0059\,(DD^{sb} + DT^{sb}) + \underset{(1.33)^{*}}{4.01}\,(i_g - i_B) + \underset{(2.88)^{***}}{.628}\,B^{sb}_{-1}$$

$R^2 = .6445$, $DW = 2.0470$

9. The time deposits rate

$$i_T = \underset{(2.88)^{***}}{-3.52} - \underset{(1.58)^{*}}{.000074}\,DD^{cb} - \underset{(0.58)}{.000023}\,DT^{cb} + \underset{(2.65)^{***}}{1.4828}\,i_g + \underset{(0.50)}{0.1100}\,i_1 + \underset{(1.53)^{*}}{.222}\,i_{T-1}$$

$R^2 = .9708$, $DW = 1.5747$

10. Private non-bank currency demand

$$CU^p = \underset{(4.81)^{***}}{4081.07} + \underset{(8.14)^{***}}{.0924}\,Y - \underset{(2.19)^{**}}{1336.24}\,i_T + \underset{(4.63)^{***}}{644.60}\,T$$

$R^2 = .9817$, $DW = 1.8593$

11. Private non-bank demand deposits demand

$$D^b = \underset{(4.82)^{***}}{-2005.80} + \underset{(10.09)^{***}}{.2397}\,Y_{Da} - \underset{(3.85)^{***}}{1395.89}\,i_1$$

$R^2 = .9788$, $DW = 0.7688$

12. Private non-bank time deposits demand

$$T^{b*} = \underset{(0.13)}{-287.37} + \underset{(14.01)^{***}}{.2599}\,Y_{Da} + \underset{(1.92)^{**}}{863.74}\,i_T - \underset{(2.12)^{**}}{2135.56}\,i_g - \underset{(3.36)^{***}}{1457.54}\,i_1 + \underset{(5.26)^{***}}{300.62}\,T$$

$R^2 = .9968$, $DW = 1.9258$

13. Private non-bank borrower's own liabilities supply

$$LI = \underset{(19.20)^{***}}{-8664.68} + \underset{(21.53)^{***}}{.3803}\,Y_{Da} - \underset{(4.19)^{***}}{1556.44}\,i_1 + \underset{(3.07)^{***}}{223.84}\,T$$

$R^2 = .9976$, $DW = 1.9196$

Table 1 (continued)

14. Non-agricultural production function

$$\log_e X_{na} = -1.43 + .9777 \log_e \left(\frac{k + k_{-1}}{2}\right) + 0.0078\, T$$
$$(0.88) \quad (7.30)^{***} \qquad\qquad (1.60)^{*}$$
$$R^2 = .9970, \quad DW = 0.7530$$

15. Private consumption demand

$$CO^p = 3105.12 + 0.9094\, Y_d$$
$$(2.42)^{**} \quad (104.72)^{***}$$
$$R^2 = .9984, \quad DW = 1.1950$$

16. Private (net) investment demand

$$I^p = 20666.55 + .1212\, Y_{-1} - 5460.72\, i_g + .8640\, (LI - LI_{-1})$$
$$(4.13)^{***} \quad (1.17) \quad (3.28)^{***} \quad (1.62)^{*}$$
$$+ .5025\, BPD + 746.90\, T - .058\, K^p_{-1}$$
$$(2.01)^{**} \quad (4.39)^{***} \quad (1.27)$$
$$R^2 = .9261, \quad DW = 2.5952$$

17. Import demand

$$IM = 159.90 + .0808\, Y_d + .074\, IM_{-1}$$
$$(0.15) \quad (4.57)^{***} \quad (0.31)$$
$$R^2 = .9131, \quad DW = 1.7395$$

18. All banks required reserves

$$RR^b = r_d^{cb}(\alpha_1 D^{cb}) + r_d^{sb}(\alpha_2 D^{sb}) + r_t^{cb}(\beta_1 T^{cb}) + r_t^{sb}(\beta_2 T^{sb})$$

19. Unborrowed reserve money identity

$$URM = CU^p + RR^b + ER^{cb} + ER^{sb} - B^{cb} - B^{sb}$$

20. Government securities identity

$$GS = GS^{cb} + GS^{sb} + GS^p$$

21. All banks time deposits

$$T^b = T^{b*} + PLF$$

22. Private non-bank liabilities identity

$$LI = LI^{cb} + LI^{sb} + LI^g$$

23. Commercial bank demand deposits

$$D^{cb} = D^b - D^{sb}$$

24. State cooperative bank demand deposits

$$D^{sb} = \alpha D^{cb}$$

Table 1 (continued)

25. Commercial bank time deposits
$$T^{cb} = T^{b} - T^{sb}$$

26. State cooperative bank time deposits
$$T^{sb} = \beta\, T^{cb}$$

27. Commercial bank disposable demand deposits definition
$$DD^{cb} = D^{cb} - r_d^{cb} \left(\alpha_1 D^{cb}\right)$$

28. State cooperative bank disposable demand deposits definition
$$DD^{sb} = D^{sb} - r_d^{sb} \left(\alpha_2 D^{sb}\right)$$

29. Commercial bank disposable time deposits definition
$$DT^{cb} = T^{cb} - r_t^{cb} \left(\beta_1 T^{cb}\right)$$

30. State cooperative bank disposable time deposits definition
$$DT^{sb} = T^{sb} - r_t^{sb} \left(\beta_2 T^{sb}\right)$$

31. Government budget restraint
$$CO^g + I^g + (GS)\,\frac{i_g}{100} = T_d + (T_i - S) + \Delta(URM) + \Delta(GS) - \Delta(LI^g) + \Delta(OS^g)$$

32. Direct taxes equation
$$T_d = t_d\,(Y)$$

33. Indirect taxes net of subsidies equation
$$(T_i - S) = t_i\,(CO^p)$$

34. Aggregate demand identity
$$Y = CO^p + I^p - (T_i - S) - IM + EX + CO^g + I^g$$

35. Aggregate supply identity
$$X = X_{na} + X_a$$

Table I (continued)

36. Private nominal disposable income definition

$$Y_d = Y + U - T_d$$

37. Nominal non-agricultural income definition

$$Y_{na} = Y - P_a X_a$$

38. NNI price deflator

$$P_y = \frac{X}{X}$$

39. Non-agricultural income price deflator

$$P_{na} = \frac{Y_{na}}{X_{na}}$$

40. Agricultural income price deflator

$$P_a = \gamma P_y$$

41. Aggregate real capital stock definition

$$k = k_{-1} + I^p/py + I^g/py$$

42. Balance of payments definition

$$BPD = IM - EX$$

List of Variables

All rupee variables are denominated in millions, the interest rate variables are measured in per cent per year, the price variables are expressed in index numbers with base 1948-49 = 1.00, and the ratio variables are measured in pure numbers. The stock (rupee) variables are measured at the end or last Friday (March) of the period. The absence of a time subscript t indicates the current value while a subscript of -1 means the one-period of lagged value of the variable in question.

The 27 Endogenous Variables of the Monetary Sector are:

ER^{cb}: Excess reserves of commercial banks

ER^{sb}: Excess reserves of State cooperative banks

GS^{cb}: Government securities held by commercial banks

GS^{sb}: Government securities held by State cooperative banks

LI^{cb}: Private non-bank liabilities held by commercial banks (= bank credit of commercial banks)

LI^{sb}: Private non-bank liabilities held by State cooperative banks (= bank credit, net of borrowings at the concessional rates from RBI, of State cooperative banks)

B^{cb}: Borrowings from RBI of commercial banks

B^{sb}: Borrowings from RBI of State cooperative banks at the Bank (non-concessional) rate

i_T: Time deposits rate (defined as a simple average of the average rate on 3-months time deposits with the State Bank of India and that with the other major scheduled commercial banks in Bombay, Calcutta and Madras.)

CU^p: Currency held by the private non-bank sector (= currency + "other deposits" with RBI)

D^b: Net demand deposits of banks

T^{b*}: Net time deposits of banks held by the private non-bank sector (= net time deposits of banks less P.L. funds' counter-part deposits)

LI : Total private non-bank liabilities (1 total bank credit)

RR^b : Required reserves of banks

i_g : Yield on government bonds (= yield on 3% conversion loan 1986 or later)

GS^p : Government securities held by private non-bank

T^b : Net time deposits of banks

i_l : Loan rate (defined as a simple average of the two rates: (i) simple average of the call loan rate of State Bank of India to scheduled commercial banks and average call loan rate of other major scheduled commercial banks in Bombay, Calcutta and Madras; (ii) simple average of Hundi rate and advance rate of the State Bank of India.)

D^{cb} : Net demand deposits of commercial banks

D^{sb} : Net demand deposits of State cooperative banks

T^{cb} : Net time deposits of commercial banks

T^{sb} : Net time deposits of State cooperative banks

DD^{cb} : Disposable demand deposits of commercial banks

DD^{sb} : Disposable demand deposits of State cooperative banks

DT^{cb} : Disposable time deposits of commercial banks

DT^{sb} : Disposable time deposits of State cooperative banks

URM : Unborrowed reserve money

The Fifteen Endogenous Variables of the Real Sector are·

X_{na} : Non-agricultural income at 1948-49 prices

CO^p : Private current (consumption) expenditures on commodities and services at current prices

I^p : Private net capital formation (investment) at current prices

IM : Imports of commodities and services (including earned income paid abroad) at current prices

T_d : Direct taxes at current prices

(T_i-S): Indirect taxes including miscellaneous fees) net of subsidies at current prices

Y : Net National income at factor cost at current prices

X : Net National income at factor cost at 1948-49 prices

Y_d : Private disposable income at current prices

Y_{na} : Non-agricultural income at current prices

P_y : Net National income price deflator

P_{na} : Non-agricultural income price deflator

P_a : Agricultural income price deflator

k : Aggregate capital stock at 1948-49 prices (defined as cumulated aggregate real net investment beginning with k = Rs.45,000 million in 1918.)

BPD : Balance of payments deficit on current account (= IM - EX)

The Nine Exogenous Monetary Policy Variables are:

i_{Bl} : Weighted average (effective) Bank rate on borrowings by the scheduled commercial banks from RBI.

i_B : Bank rate

LI^g : Private non-bank liabilities held by RBI (=RBI's loans to State cooperative banks at the concessional rates for lending for agricultural purposes)

d_B : Bill Market Scheme dummy variable[7]

GS : Total stock of government securities held outside the government sector

r_d^{cb} : Reserve requirements ratio against demand liabilities of commercial banks

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7 The time series for this dummy variable was constructed by the author on his subjective evaluation of the qualitative changes in the Bill Market Scheme. The Bill Market Scheme dummy variable is assigned a value of zero in the years 1948-49 through 1950-51, for the Scheme did not exist in these years. It is normalized to assume a value of 1 in 1951-52. The assigned values for the remaining years 1952-53, 1953-54, . . ., and 1967-68 are 1, 1.1, 1.42, 1.42, 1.52, 1.52, 1.92, 2.02, 2.12, 2.12, 2.42, 2.42, 2.42, 2.42, 2.42, and 2.42 respectively.

r_d^{sb} : Reserve requirements ratio against demand liabilities of State cooperative banks

r_t^{cb} : Reserve requirements ratio against time liabilities of commercial banks

r_t^{sb} : Reserve requirements ratio against time liabilities of State cooperative banks

The Five Exogenous Fiscal Policy Variables are:

CO^g : Government current (consumption) expenditures on commodities and services at current prices

I^g : Government investment expenditures at current prices

t_d : Direct tax rate$(= T_d/Y)$

t_i : Indirect tax (net of subsidies) rate $(= \frac{T_i - S}{CO^p})$

OS^g : Net "Other" (miscellaneous) sources of government finance (for its definition see equation 31, page 7)

The Thirteen Other Exogenous Variables are:

α : Ratio of D^{sb} to D^{cb}

β : Ratio of T^{sb} to T^{cb}

α_1 : Ratio of demand liabilities to net demand deposits of commercial banks

α_2 : Ratio of demand liabilities to net demand deposits of State cooperative banks

β_1 : Ratio of time liabilities to net time deposits of commercial banks

β_2 : Ratio of time liabilities to net time deposits of State cooperative banks

PLF : Time deposits of banks held by the United States Government in counterpart to P.L. funds receipts

X_a : Agricultural income at 1948-49 prices

EX : Exports of commodities and services (including earned income received from abroad) at current prices

U : National debt interest + transf r payments + net private donations from abroad - income from domestic product accruing to government, at current prices.

γ : Ratio of P_a to P_y

K^P_{-1} : Private capital stock at the end of the previous period at current prices (defined as a multiple of NNI price deflator, and aggregate real net capital stock less cumulated government real net investment beginning with the year 1919, i.e. $k^g_{1918} = 0$, where k^g is the government real capital stock).

T : Time trend, 1948-49 = 1

Structure of the Model

The 42 equations of the structural model may be classified as follows:

	Stochastic	Identities	Total
Financial	13	14*	27
Other (Real	4	11	15
Total	17	25	42

*Includes government budget restraint

The 13 stochastic equations of the financial sector are 1-13 and the equations 18-31 are this sector's fourteen identities. Equations 14-17 are the four stochastic equations of the real sector, and the rest are the identities of the latter sector.

Monetary Sector's Equations

The monetary sector has six markets: They are the markets for bank reserves, currency, government bonds, demand deposits, time deposits, and private non-bank liabilities. The market for bank reserves consists of equations 1, 2, and 18 on the demand side and equations 7 and 8, together with exogenous supply of unborrowed reserves, on the supply side. There is no demand equation of the RBI's lender's demand for banks' borrowings, for this is assumed to be unlimited to absorb the supply at the terms and conditions (expressed in i_{B1}, i_B and d_B) exogenously fixed by the RBI.

The market clearing condition of both the bank reserves and the currency market is expressed in equation 19. This is so because the government sector is assumed to supply a given amount of unborrowed reserve money (unborrowed bank reserves plus currency), the distribution of which into its two components is determined by its holders. Demand for currency equation 10 alone represents the currency market, for this asset has zero yield and its both demand and supply are denoted by the same notation.

The market for government securities on the demand side consists of equations 3 and 4, their supply is assumed exogenous. The demand-equals-supply condition for this market is expressed in equation 20. Please note that there is no separate equation of the demand for the asset in question by the private non-bank sector. For the latter sector is assumed to hold all exogenously supplied government bonds that are not demanded by the two banking sectors[8], at a rate determined by, to single out, equation 19.

The market for demand deposits is represented wholly by the demand equation 11. The two banking sectors are postulated to supply any amount of this asset to meet the private non-bank sector's demand for it, at a zero interest rate. Also, there is no market-clearing equation as both demand and supply refer to the identical aggregated variable. The demand for time deposits comes from the private non-bank sector, which is expressed in equation 12, and from the United States Government (P.L. funds counterpart deposits), which is assumed exogenous. The supply side of the time deposits market is contained in equation 9, because the two banking sectors are postulated to supply any amount of time deposits to meet the demand at an interest

8 Mamen (1967) has also made a similar assumption. In view of the fact that a large proportion of total bonds' holdings of the private non-bank sector is held by institutions like Life Insurance Corporations, Provident Funds, etc., which are obliged to do so, our assumption is not far from reality: In 1967, for example, the ownership pattern of government securities reveal that of the total government securities, 38.3% were held by the Government and the RBI, 22.2% by Commercial and Cooperative Banks, 13.8% by Insurance Corporations, 15.0% by Provident Funds, and the remaining by several other organisations.

rate determined by the commercial banking sector. Equation 21 expresses the equilibrium condition for the market in equation.

The reserve requirement ratios impinge on the creation of demand and time deposits through their effects on disposable demand and time deposits. Disposable demand and time deposits affect banks' portfolio management (and hence the loan rate and the yield on government bonds) and the time deposits rate, which, in turn, exert their influence on the size of demand and time deposits.

The model has the market for private non-bank liabilities. The demand side of this market is contained in equations 5 and 6, and in the government sector's (exogenous) demand, LI^g, for the asset in question. Since the private non-bank sector includes the non-bank financial institutions, the only sources of borrowings to the whole of this sector are from the two banking and the government sectors. The supply side and the market equilibrium condition are expressed in equations 13 and 22 respectively. Note that the demand-equals-supply condition determines the loan rate.

Equations 23-30, which are definitional equations of the monetary sector, are self-explanatory. Equation 31 stands for the government budget restraint. It states that total government expenditures on current consumption, net investment, and interest payments on its debt[9] (government bonds) must equal its following financial sources: direct taxes, indirect taxes net of subsidies, new issuances of unborrowed reserve money, net issuance of government bonds, net monetization of private non-bank liabilities, and net "other" sources of government finance.[10]

The government budget restraint is an integral part of a policy model like this.[11] Its significance lies in the fact that the government can choose all but one policy variable at its discretion, the remaining one has to be determined in the model. This

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9 Note that government interest payment on its debt is here approximated by $(GS)\frac{i_g}{100}$. This approximation is necessary because we are using only one interest rate (i_g) on government bonds of all maturities.

10 Net "other" sources of government finance includes net borrowings from abroad, foreign aids, decline in gold holdings and foreign exchange assets, net income from government commercial enterprises, etc.

11 See Christ (1968, 1969)

remaining policy variable could be any one of all the monetary and fiscal policy variables appearing in the restraint in question: CO^g, I^g, GS, t_d, t_i, URM, LI^g, and CS^g. Its choice has to be more or less arbitrary. However, since we wish to analyse the effects of government tax rates, government expenditures, open market operations, etc. on the target and other endogenous variables; since in the literature either a change in unborrowed reserve money (ΔURM) or a change in the stock of government securities held outside the government sector (ΔGS) is chosen to measure open market operations; and since we believe that ΔGS provides a better measure of open market operations than does ΔURM; we have chose URM as the endogenous policy variable.

Real Sector's Equations

Turning to the real sector part of the model, the production function 14 constitutes a supply equation for non-agricultural output. Agricultural output is assumed exogenous. Equations 15, 16, and 17 represent the demand for three components of net national income, i.e., private consumption, private investment and import respectively.

Equations 32 and 33 are institutional identities. Since direct taxes are mostly on income and indirect taxes are on private consumption, income is taken as the base of direct taxes and private consumption as the base of indirect taxes. The tax equations are specified in the present forms because ours is a policy model in which every effort has been made to introduce, as far as possible, every policy variable in its true exogenous form.[12] Strictly speaking, t_d and t_i are not true exogenous tax rates, for, a change in t_d can come through a change in direct tax laws (tax base) or in income distribution, and t_i will change even in the face of a change in indirect tax (and subsidies) laws or in consumption pattern. However, to have true exogenous tax rates, we would require much more information, which may not be available, and much more expansion of this part of the model, which may not be worth it. Therefore, t_d and t_i are assumed to be exogenous tax rates. This is certainly a better approximation than the assumption of exogenous tax yields.

Equation 34 is a familiar definition equation of NNI. It defines NNI from the expenditures side.

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12 Pavlopoulos (1966) used a similar specification in his model of the Greek economy.

Equations 35-39 and 41-42 are straightforward definitional equations. The ratio of agricultural price to general price is postulated to be exogenous in equation 40.

Suppressed Balance Sheet Identities

Implicit in these equations are for balance sheet identities, one for each of the four sectors, that are suppressed together with two "net other liabilities" and two "net worth" variables. They are:

(A) $ER^{cb} + GS^{cb} + LI^{cb} - B^{cb} = DD^{cb} + DT^{cb} + OL^{cb}$

(B) $ER^{sb} + GS^{sb} + LI^{sb} + LI^{g} - B^{sb} = DD^{sb} + DT^{sb} + LI^{g} + OL^{sb}$

(C) $CU^{p} + D^{b} + T^{b*} + GS^{p} + (K^{p}_{-1} + I^{p}) = LI + (W^{p} - W^{b}_{p})$

(D) $(K^{g}_{-1} + I^{g}) + LI^{g} = URM + GS + (W^{g} - W^{b}_{g})$

The new variables are:

OL^{cb} = "net other liabilities" of commercial banks

OL^{sb} = "net other liabilities" of State cooperative banks

W^{p} = "net worth" of private non-bank

W^{b}_{p} = banks' net worth, held by private non-bank

W^{g} = net worth of government

W^{b}_{g} = banks' net worth, held by government

The four suppressed endogenous variables are OL^{cb}, OL^{sb}, $(W^{p} - W^{b}_{p})$ and $W^{g} - W^{b}_{g})$.

Note that equations A and B, which are balance sheet identities of the commercial and State cooperative banking sectors respectively, are net of the corresponding sector's required reserves. Equations C and D represent the balance sheets of the private non-bank sector and the government sector respectively. They need no explanation.

The omission of these four equations with the said four endogenous variables implies that once all the other jointly dependent variables are determined in the model, each of the four omitted variables will be determined by the corresponding omitted equations.

Discussion of the Estimated Equations

The basic form of each of the stochastic equations was hypothesized on the principles of economic theory.[13] These equations in the form reported here were then selected from a host of each one's alternative forms on the basis of the *a priori* expected signs for the explanatory variables and on the basis of three statistics: t-values of the estimated coefficients, coefficient of determination, and Durbin-Watson statistic. To save space, the interpretation of these statistics, in general, is left out from this paper; suffice it to point out here that each independent variable of each estimated equation appears with the *a priori* sign. Furthermore, the estimated equations of the model are not discussed one by one, instead they are discussed below in certain convenient groups.

Portfolio Equations of the Commercial Banking Sector

Taking first the relevant portfolio equations of the commercial banking sector (1, 3, 5 and 7), we observe that they reveal an encouraging fit both on theoretical and statistical grounds. This sector's response to changes in its disposable demand and disposable time deposits, the bond yield, and the loan rate is more or less in accordance with prior expectations.[14] The effective bank rate appears only in two equations (1 and 7) and with near zero t-values of its estimated coefficients. This suggests a rather insignificant role of the Bank rate in the portfolio behaviour of commercial banks. However, the sector in question does respond significantly

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13 The one-period lagged dependent variable appears as an explanatory variable in each of the two banking sectors' stochastic equations, for in view of the several kinds of uncertainities that a back face we have postulated a stock adjustment model for these two sectors.

14 The coefficients of DD^{cb} and DT^{cb} in commercial banks' excess reserves demand equation suggest that these two variables should be combined to form one $(DD^{cb} + DT^{cb})$ explanatory variable. But when it was done so, at least one of the other explanatory variables entered with the wrong sign.

to the other dimension of the Bank rate policy, i.e., eligibility of bills against which it could borrow from the RBI, which is expressed in the Bill Market Scheme dummy variable d_B (vide equation 7). To analyse the quantitative impact of a unit change in each of the independent variables on this sector's portfolio behaviour, let us consider a hypothetical example.

Consider the consequence of Rs.100 increase in each of the commercial banking sector's disposable demand deposits (DD^{cb}) and disposable time deposits (DT^{cb}), all other arguments being held constant. The relevant coefficients indicate that in the short run the commercial banking sector's holdings of excess reserves (ER^{cb}), government bonds (GS^{cb}), and private non-bank liabilities (LI^{cb}), and its supply of borrowings from the RBI (B^{cb}) will increase by Rs.9.23, Rs.45.86, Rs.92.28, and Rs.4.18, respectively. Therefore, the restoration of this sector's balance sheet (equation A, page 17) would require a decrease of Rs.56.81 [=-100 -100 +(9.23 + 45.86 + 92.28 - 4.18)] in its other liabilities (OL^{cb}). In the long run, for a stationary state the increase in ER^{cb}, GS^{cb}, LI^{cb}, and B^{cb} will be approximately equal to Rs.7.19, Rs.49,59, Rs.170.26, and Rs.3.20 respectively.[15] Then the required change in OL^{cb} for the balance sheet to hold equals + Rs.23.84 [= - 100 - 100 + (7.19 + 49.59 + 170.26 - 3.20)]. Exactly the reverse will hold in the face of a *ceteris paribus* decrease of Rs.100 in each of DD^{cb} and DT^{cb}.

It can be seen from the individual coefficients of DD^{cb} and DT^{cb} that the bulk of a change in the former is mirrored in LI^{cb}, while in the latter it is reflected in GS^{cb} and LI^{cb}, more in the former than in the latter. Similarly, the effects of a change in other arguments can be discussed. However, it has not been done so here for lack of space.

Portfolio Equations of the State Cooperative Banking Sector

The estimated equations of the State cooperative banking sector, although not unsatisfactory, are less successful than those of the commercial banking sector. Incidentally, note that the State cooperative banking sector accounts for less than 4% of the country's total (non-central) banking. Nevertheless, the behavioural equations of the two banking sectors are specified separately, for the various portfolio items have different relative shares in the portfolios of different banking sectors, the two banking sectors are subject to

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15 The long run stationary state coefficients are obtained by setting lagged values equal to their corresponding current values.

different regulations, etc.[16]

The loan rate, which was expected to enter all the behavioural equations of the State cooperative banking sector does not appear in any of them. For, its inclusion has proved to be statistically unwarranted.[17] This may be due to our wrong proxy for it. Furthermore, we observe that the two relevant disposable deposit variables appear as a single aggregated variable all through these questions. The speed of adjustment in all cases is rather low. The effects of a unit change in any one of the explanatory variables on this sector's Portfolio items can be analysed in the same way as we did for the commercial banking sector's equations.

The Time Deposit Rate Equation

The time deposits rate equation 9, which is the supply of time deposits equation in its reduced form, reveals a good fit. The rate on time deposits (i_T) is found to depend negatively on the commercial banking sector's disposable demand and disposable time deposits, and positively on the bond yield, the loan rate, and the one-period lagged yield on time deposits. The effective Bank rate (i_{B1}) did not prove useful here.

The (negative) coefficient of DD^{cb}_{cb} is a little more than three time that of DT^{cb}_{cb}. This means that DD^{cb}_{cb} has a greater effect than DT^{cb}_{cb} on i_T and that a transfer of funds from the latter to the former causes a decline in the time deposits rate. One would usually expect a greater effect of the asset (DT^{cb}_{cb}) than of its substitute (DD^{cb}_{cb}) on its yield (i_T). However, our reverse finding may be due to the fact that demand deposits are interest barren and that banks do not regard them as a long-term source of funds.

The coefficients of i_g and i_l indicate a much larger role of the former than of the latter in the determination of i_T: 1% increase in i_g leads to about 1.48% increase in i_T; while an equivalent increase in i_l^g brings only about 0.11% increase in the latter. The greater effect

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16 For a detailed comparative study of the two banking sectors, see Gupta (1970)

17 The loan rate of commercial banks is here assumed to be also the loan rate of State cooperative banks.

of i_g than of i_l on i_T is obvious from the fact that government bonds /and time deposits are better substitute than are government bonds and bank loans in the portfolio of the private non-bank sector. This is because, while a saver has a choice to put-up his savings either in government bonds, or in time deposits or in any other asset, a borrower usually has no savings to own time deposits. Thus, if the yield on government bonds goes up, banks will lose their customers unless they offer proportionately higher rates on time deposits. Since borrowers are not usually the same persons as time depositors, banks are not required to raise time deposits rate in proportion to the loan rate.

The indicated speed of adjustment is 0.778. This means that nearly 78% of the gap between the actual and the desired rate on time deposits is covered in the first period, the average lag being roughly three months.

Portfolio Equations of the Private Non-Bank Sector

Equations 10, 11, 12, and 13 express the private non-bank sector's demand for currency, demand deposits and time deposits, and borrower's supply of its own liabilities respectively. In general the statistical results of these equations are encouraging.

The demand for currency is found to depend positively on the NNI (Y) and time (T) and negatively on the interest rate on time deposits (i_T). The final form of the equation expressing the demand for demand deposits contains only two arguments, the non-agricultural income (Y_{na}) and the loan rate (i_l), both with properly signed and significant coefficients. The trend variable did not prove useful here.

The finding of the different lists of arguments for currency and demand deposits' demand supports our disaggregation of money (currency + demand deposits) into its two components. Furthermore, the negative coefficients of i_T and i_l in equations 10 and 11 respectively, substantiate the belief that both time deposits and private non-bank liabilities are substitutes for money. These coefficients suggest that the demand for money is interest elastic in the Indian context.

The notable feature of the demand for time deposits equation 12 is that it contains all the three relevant interest rates (i_T, i_g, and i_l) together with Y_{na} and T with appropriately signed and significant coefficients. The interest rate coefficients suggest that time deposits are substitutes for both government bonds and private non-bank liabilities in the private non-bank sector's portfolio.

The supply equation of private non-bank liabilities relates positively the supply of the asset in question with the non-agricultural income and time, and negatively with the loan rate. Neither the bond yield nor the yield on time deposits proved to be of importance in this equation. The coefficients of all the three arguments are highly significant ($/t/ \geq 3.07$).

The mean elasticity transformation of the coefficients of the explantory variables in equations 10-13 are tabulated below:

Table 2

Elasticities in the Private Non-Bank Sector's Equations

Partial mean elasticity of demand for	With respect to				
	Y	Y_{na}	i_T	i_g	i_l
CU^p	0.65		-0.19		
D^b		1.97			-0.74
T^{b*}		2.20	0.29	-1.04	-0.80
LI		1.98			-0.52

As these estimates reveal, the income (Y) elasticity of currency is much lower than the income (Y_{na}) elasticity of demand deposits, time deposits, or private non-bank liabilities. These elasticities imply that both demand deposits and time deposits are "luxury" goods in India. A relatively high income elasticity of time deposits is welcome in so far as increased time deposits indicate increased long term saving, which is so essential for the growth of the economy; savings in the form of currency and demand deposits may be for a short duration.

Friedman's argument that money is a luxury good is valid in the Indian context if money is defined in his fashion to include time deposits. His argument of a zero or near interest elasticity of money has no significance in the economy under study. As one would expect, time deposits are the most interest sensitive among the four assets in question. These various interest rate elasticities argue that the four assets under consideration are substitutes, but less than perfect substitutes in the private non-bank sector's portfolio.

Non-Agricultural Production Function

The non-agricultural output is found to depend positively on the level of aggregate real capital stock (average of beginning and end-of-year figures) and time (proxy for the level of technology). The estimated relationship is of the Cobb-Douglas' type (equation 14).

Because of data limitation, the labour input, which is otherwise an argument in the function under consideration, does not appear explicitly in the function under discussion. However, our function will work well if the unobservable labour input changes approximately in accordance with a function of k and T.[18] As the data on labour input are not available, there is no way to test the validity of this assumption. In case the assumption is incorrect, we are omitting the labour input for lack of data. In our function, please note that the contribution of labour input to output is emobodied in that of capital input.

The estimated coefficients of capital stock implies nearly constant returns to scale in the non-agricultural sector, while that of T indicates an increase in the non-agricultural output due to technological progress by 0.78% per year. These estimates seem reasonable, for the Indian economy is characterized by capital scarcity and slow technological progress. However, the Durbin-Watson statistic does indicate first-order positive autocorrelation. But this testing procedure is not valid for simultaneous equation models.

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18 For example, if the true function is $X_{na} = \alpha k^{\beta} L^{\gamma} e^{\delta t} + u$ and labour changes in accordance with $L = \lambda k^{\epsilon} e^{\eta t} + v$ then,

$$X_{na} = \alpha \lambda^{\gamma} k^{\beta + \epsilon\gamma} e^{(\delta + \eta\gamma)T} + u + v$$
$$= Ak^{B} e^{CT} + w$$

where, α, β, γ, δ, λ, ϵ, η, A, B, and C are constants and u, v and w are disturbance terms.

Private Consumption Function

The consumption function 15 is Keynesian. It relates private money consumption to private money disposable income. Just one explanatory variable explains almost all the movement in the dependent variable. The indicated marginal propensity to consume (out of disposable income) is 0.9094, which is reasonable for a low per-capita income country like India.

Private Investment Function

The form of the function in question (16) relates private nominal investment (I^p) positively with the one-period lagged NNI (Y_{-1}), change in private on-bank liabilities ($LI - LI_{-1}$), nominal balance of payments deficit (BPD), and time (T), and negatively with the bond yield (i_g) and the previous period's nominal private capital stock (K^p_{-1}). It is interesting to note that the coefficient of i_g is significant at the 1% level and of ($LI - LI_{-1}$) at the 10% level and beyond.

The marginal propensity to invest (out of the previous period's NNI) is 0.1212. The partial mean elasticities of I^p with respect to Y_{-1}, i_g, ($LI - LI_{-1}$), BPD, and K^p_{-1} are 2.20, -3.15, 0.18, 0.25 and 2.16 respectively.

Import Demand Function

As equation 17 shows, nominal imports are determined by private nominal disposable income and the previous period's nominal imports. Attempts to improve the R^2 by including the import price relative to the domestic price, total monetary resources, and/or time in the equation in question were unsuccessful.

The implied short and long run marginal propensities to import (out of disposable income) are approximately 0.081 and 0.087 respectively. The partial mean income elasticity of imports computed at the point of sample means is approximately 0.92 in the short run and 0.99 in the long run. These estimates fall somewhere between the estimates of other researchers: Murti and Sastri, using annual time series data for the period 1927 to 1937 estimated income elasticity of import at 2.01; Dutta, working with 10 annual observations for the period 1951 to 1960 estimated industrial output elasticity of import at 2.27; and Marwah, using annual data for the period 1939 to 1965 obtained income elasticity of import at 0.42.[19] Since a larger proportion of Indian imports are essential imports, an income elasticity of import close to or greater than two is hard to believe. Similarly, an income elasticity of import in the neighbourhood of 0.5 is also difficult to accept, for ours is a growing economy and that it has a good potentiality for imported items. Thus, our estimate of the said elasticity at close to one seems to be a better estimate of true elasticity.

INTER-DEPENDENCE OF THE MONETARY AND REAL SECTORS

The interdependence of the monetary and real sectors, as noted earlier, constitutes the "heart of the monetary control." Links between the two sectors in our model come from the following sources: The monetary sector affects the real sector through the bond yield and the availability of bank loans, i.e., change in private non-bank liabilities, both of which influence private investment (equation 16). The monetary sector, in turn, is affected by the real sector through NNI, which assumes a non-zero coefficient in the demand for currency (equation 10), and non-agricultural income, which affects the private non-bank sector's demand for demand deposits (equation 11) and time deposits (equation 12), and its borrower's supply of private non-bank liabilities (equation 13). It will be seen from the corresponding estimated equations that these links are significant, i.e., the coefficients of i_g, $(LI - LI_{-1})$, Y, and Y_{na} in the just mentioned equations are significantly different from zero at the 1, 10, 1, and 1% level respectively, by the usual t-test. Further, the government budget restraint has two endogenous monetary sector variables (i_g and URM) and two endogenous real sector variables [T_d and $(I_i^g - S)$]; hence, it provides an additional link between the two sectors. The simultaneous equation (modified 2SLS) method of estimation provides yet another link between the two sectors in our model.

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19 Murti and Sastri (1951), Dutta (1964), Marwah (1972)

The interdependence of the monetary sector and the real sector implies that a disturbance in any one sector will cause a disturbance in the other sector. Thus, in this model, although monetary policy instruments appear only in the monetary sector's equations and fiscal policy instruments enter only the real sector's equations,[20] the effect of a change in either set of instruments is felt on the complete model. In fact, it will be seen in the following section that each of the monetary and fiscal policy instruments affects each of the endogenous variables in this model. This means that the model provides scope for the effectiveness of both monetary and fiscal policy with respect to the ultimate (Y, X, P_y, BPD, etc.), intermediate (CU^p, D^p, LI, i_g, etc.), or any other target variables. The evaluation of the actual effects of several policy and other predetermined variables on the economy's endogenous variables is the subject of the next section.

APPLICATION OF THE MODEL: IMPACT MULTIPLIERS

The model presented above was developed primarily to quantify the total impact of a change in each of the various policy variables on the various intermediate and target variables. In its structural form, the model is appropriate in tracing out the direct effect of a change in any one of the explanatory variables on the corresponding explained variables. However, if the model contains explanatory endogenous variables, which ours does, pr determined variables also exercise some indirect effect on at least some of the endogenous variables through their effect on the explanatory endogenous variables. The structural model must be solved into a reduced form to obtain the total (direct and indirect) effect of a change in any predetermined variable on the model's endogenous variables.

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20 There is an exception to this. The fiscal policy instruments CO^g and I^g enter the government budget restraint, which is here assumed to be a part of the monetary sector.

Since our model contains some non-linear relations, its reduced from has been obtained under the following consecutive steps: a) differentiation of the estimated model, b) linearization of its otherwise non-linear coefficients at the point of last sample period, i.e., at 1967-68 values of the pertinent variables,[21] and c) solution of the resulting model for the endogenous variables. To illustrate the model's solution, let the structural model be

(i) $F(Y, X) = 0$

where Y and X are vectors of endogenous and predetermined variables respectively, and F is a matrix of functional operators.

Total differentiation of equation system (i) yields

$$dF = \left(\frac{\partial F}{\partial Y}\right) dY + \left(\frac{\partial F}{\partial X}\right) dX = 0$$

or

$$\text{(ii)} \quad dX = -\left(\frac{\partial F}{\partial X}\right)^{-1} \left(\frac{\partial F}{\partial Y}\right) dY = \pi\, dY$$

$$\text{where } \pi = -\left(\frac{\partial F}{\partial X}\right)^{-1} \left(\frac{\partial F}{\partial Y}\right)$$

Since our model is non-linear in variables, the elements of matrix will depend on the values of variables and on structural parameters. By linearising π, as mentioned above, we obtain its linear version: π_o and the equation system (ii) becomes:

$$\text{(iii)} \quad dX = \pi_o \; dY$$

Since we are here concerned with year-to-year changes in

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21 Goldberger (1959) has linearized the Klein-Goldberger model at the point of sample means. We have linearized at the point of last sample period, for these coefficients are appropriate only at the point of linearization and our interest is in prescribing some policy packages for future government actions.

Y and X, (iii) should be written in terms of first differences:

$$\text{(iv)}\quad \Delta X = \pi_o \, \Delta Y$$

Equation system (iv) provides a reduced form version of the structural model (i).

In our model, predetermined variables are of two kinds: policy variables and non-policy variables. If we separate these two kinds of variables, equation system (iv) can be rewritten as

$$\text{(v)}\quad \Delta X = \pi_{o1} \Delta Y_1 + \pi_{o2} \Delta Y_2$$

where ΔY_1 is a vector of policy variables, ΔY_2 is a vector of all the other predetermined variables in the model, π_{o1} is the matrix of coefficients of ΔY_1 and π_{o2} is the matrix of coefficients of ΔY_2.

The structural model as presented in Table 1 was solved in the form of equation system (v), which we call the complete reduced form. However, since our interest is in analysing the impact of exogenous policy variables on the model's endogenous variables, i.e. in the elements of matrix π_{o1}, we present in Table 3 the elements of matrix π_{o1} alone, which we call the elements of the "policy sub-reduced form." Note that the "policy sub-reduced form" will be the complete reduced form only if all the non-policy predetermined variables are held constant, i.e. $\Delta Y_2 = 0$. Recall that the model is solved by assuming URM as the endogenous policy variable and thus the "policy sub-reduced form" as reported in Table 3 is subject to this assumption.

For ease of presentation and for the reader's convenience, the units of measurement for some variables have been changed. The rupee variables and the ratio variables are changed from millions and fractions (which were the units of measurement in the structural model) to billions and percentages respectively. The base figure of the index number variables (prices) is changed from 1.00 to 100.00. The interest rate variables are retained in percentages. The coefficients of the two Bank rates are reported up to four decimal points, all others are up to three decimal points. Please note that since the model was first differentiated and then linearized, all the variables are now in the first difference form.

Table 3

Policy Sub - Reduced Form : $\Delta X = \Pi_{01} \Delta Y_1$

Endogenous Variable	Exogenous Monetary Policy Variable Δi_{B1} (1)	Δi_B (2)	Δd_B (3)	ΔLi^g (4)	ΔGS (5)	Δr_d^{cb} (6)	Δr_d^{sb} (7)
ΔER^{cb}	.0005	-.0002	.006	.134	-.019	-.028	-.001
ΔER^{sb}	-.0*	.0049	.0**	.0**	-.001	-.0**	-.0**
ΔGS^{cb}	.0004	.0003	-.010	.833	.028	-.109	-.003
ΔGS^{sb}	-.0*	-.0**	.0**	.003	-.0**	-.0**	-.0**
ΔLI^{cb}	-.0062	-.0042	.154	.295	-.451	-.194	-.002
ΔLI^{sb}	-.0002	-.0001	.005	.034	-.014	-.005	-.004
ΔB^{cb}	-.0125	-.0001	.327	.032	-.013	-.009	-.0**
ΔB^{sb}	.0*	-.0040	-.0**	.001	.0**	-.0**	-.0**
Δi_T	.0018	.0012	-.045	-.068	.131	.031	.001
ΔCU^p	-.0065	-.0044	.161	.406	-.471	-.099	-.003
ΔD^b	-.0036	-.0024	.089	1.023	-.260	-.148	-.004
ΔT^{b*}	-.0047	-.0032	.116	.922	-.339	-.126	-.004
ΔLI	-.0064	-.0044	.159	1.329	-.466	-.199	-.006
ΔRR^b	-.0003	-.0002	.007	.063	-.019	.199	.006
Δi_g	.0011	.0007	-.027	.049	.078	-.002	.0**
$\Delta GS^{b'}$	-.0004	-.0003	.009	-.836	.973	.109	.003
ΔT^b	-.0047	-.0032	.116	.922	-.339	-.126	-.004
Δi_1	-.0011	-.0008	.028	-.447	-.081	.054	.001
ΔD^{cb}	-.0035	-.0024	.086	.989	-.251	-.143	-.004
ΔD^{sb}	-.0001	-.0001	.003	.034	-.009	-.005	-.0**
ΔT^{cb}	-.0045	-.0031	.111	.885	-.325	-.121	-.004
ΔT^{sb}	-.0002	-.0001	.005	.036	-.013	-.005	-.0**
ΔDD^{cb}	-.0034	-.0023	.083	.959	-.244	-.346	-.004
ΔDD^{sb}	-.0001	-.0001	.003	.033	-.008	-.005	-.006
ΔBT^{cb}	-.0044	-.0030	.108	.858	-.315	-.117	-.004
ΔDT^{sb}	-.0002	-.0001	.004	.036	-.013	-.005	-.0**
ΔURM	.0062	.0042	-.153	.570	-.497	.081	.003
ΔX_{na}	-.0006	-.0004	.014	.043	-.040	-.008	-.0**
ΔCOP	-.0391	-.0266	.965	3.021	-2.827	-.551	-.019
ΔP^p	-.0132	-.0090	.325	1.018	-.953	-.186	-.006
ΔIM	-.0035	-.0024	.086	.268	-.251	-.049	-.002
ΔT_d	-.0012	-.0008	.029	.090	-.084	-.016	-.001
$\Delta (T_i - S)$	-.0046	-.0032	.115	.359	-.336	-.066	-.002
ΔY	-.0441	-.0301	1.090	3.412	-3.193	-.623	-.021
ΔX	-.0006	-.0004	.014	.043	-.040	-.008	-.0**
ΔY_d	-.0429	-.0293	1.061	3.321	-3.108	-.606	-.021
ΔY_{na}	-.0215	-.0147	.532	1.665	-1.558	-.304	-.010
ΔP_y	-.0261	-.0178	.646	2.021	-1.892	-.369	-.013
ΔP_{na}	-.0215	-.0147	.332	1.666	-1.559	-.304	-.010
ΔP_a	-.0328	-.0224	.811	2.539	-2.376	-.463	-.016
Δk	-.0055	-.0037	.136	.425	-.398	-.078	-.003
ΔBPD	-.0035	-.0024	.086	.268	-.251	-.049	-.002

* Absolute value less than 0.00005

Table 3 (continued)

Plicy Sub- Reduced Form : $\Delta X = \Pi_{01} \Delta Y_1$

Endogenous Variable	Exp. M.P.V. Δr_t^{cb} (8)	Δr_t^{sb} (9)	Exogenous Fiscal Policy Variables ΔCO^g (10)	ΔI (11)	Δt_g (12)	Δt_i (13)	ΔCS^g (14)
ΔER^{cb}	-.020	-.001	-.020	-.021	.035	.052	-.020
ΔER^{sb}	-.0**	-.0**	-.0**	-.0**	-.0**	.0**	-.001
ΔGS^{cb}	-.131	-.004	-.141	-.145	.308	.368	.030
ΔGS^{sb}	-.0*	-.0**	.001	.001	-.001	-.002	-.0**
ΔLI^{cb}	-.142	-.003	.425	.435	-1.066	-1.106	-.477
ΔLI^{sb}	-.004	-.005	.005	.005	-.017	-.014	-.015
ΔB^{cb}	-.008	-.0**	.010	.010	-.026	-.026	-.013
ΔB^{sb}	-.0**	-.0**	.0**	.0**	-.0**	-.0**	.0**
Δi_T	.028	.001	.048	.050	-.050	-.124	.139
ΔCU^p	-.100	-.004	.386	.385	-.991	-1.006	-.498
ΔD^b	-.097	-.006	.150	.154	-.415	-.391	-.275
ΔT^{b*}	-.99	-.005	.177	.181	-.502	-.462	-.358
ΔLI	-.146	-.008	.430	.441	-1.083	-1.120	-.493
ΔRR^b	.203	.008	.010	.011	-.029	-.027	-.020
Δi_g	.009	.0**	.020	.021	-.013	-.053	.082
ΔGS^p	.131	.004	.141	.145	-.307	-.367	-.029
ΔT^b	-.099	-.005	.177	.181	-.502	-.462	-.358
Δi_1	.014	.002	.0**	.0**	-.001	-.001	-.086
ΔD^{cb}	-.094	-.005	.145	.149	-.401	-.378	-.266
ΔD^{sb}	-.003	-.0**	.005	.005	-.014	-.013	-.009
ΔT^{cb}	-.095	-.005	.170	.174	-.482	-.443	-.344
ΔT^{sb}	-.004	-.0**	.007	.007	-.020	-.018	-.014
ΔDD^{cb}	-.091	-.005	.141	.144	-.389	-.367	-.258
ΔDD^{sb}	-.003	-.0**	.005	.005	-.013	-.013	-.009
ΔDT^{cb}	-.302	-.005	.165	.169	-.467	-.430	-.333
ΔDT^{sb}	-.004	-.009	.007	.007	-.019	-.018	-.014
ΔURM	.091	.004	.367	.365	-.960	-.956	-.525
ΔX_{na}	-.009	-.0**	.0002	.062	-.023	-.001	-.043
ΔCO^p	-.594	-.024	4.315	4.329	-12.65	-11.23	-2.990
ΔI^p	-.200	-.008	.454	.459	-1.430	-1.182	-1.008
ΔIM	-.053	-.002	.383	.385	-1.124	-.998	-.266
ΔT_d	-.018	-.001	.128	.129	2.457	-.335	-.089
$\Delta (T_i - S)$	-.070	-.003	.512	.514	-1.502	1.270	-.355
ΔY	-.671	-.028	4.873	4.890	-11.46	-12.69	-3.377
ΔX	-.008	-.0**	.0002	.062	-.023	-.001	-.043
ΔY_d	-.653	-.028	4.745	4.761	-13.91	-12.35	-3.288
ΔY_{na}	-.327	-.014	2.324	2.386	-5.484	-6.050	-1.648
ΔP_y	-.397	-.017	2.950	2.897	-6.912	-7.678	-2.001
ΔP_{na}	-.328	-.014	2.411	2.387	-5.656	-6.276	-1.649
ΔP_a	-.499	-.021	3.705	3.639	-8.681	-9.644	-2.513
Δk	-.084	-.004	.002	.609	-.224	-.006	-.420
ΔBPD	-.053	-.002	.383	.385	-1.124	-.998	-.266

* Absolute value less than 0.00005

** Absolute value less than 0.0005

Since the model contains several lagged endogenous variables, the reduced form coefficients measure only the first-period effect on the corresponding endogenous variables of a unit change in the corresponding predetermined variables. These coefficients have been called impact multipliers, which differ from the time-less Keynesian multipliers of comparative statics.

The impact multipliers are now discussed. Columns 1, 2, 6-9, 12, and 13 of Table 3 record the impacts on the endogenous variables of a one-percentage point change in exogenous variables i_{B1}, i_B, r_d^{cb}, r_d^{sb}, r_t^{cb}, r_t^{sb}, t_d, and t_i respectively; column 3 presents the impacts of a change in d_B by one; and the remaining columns of the table record the impacts of a one billion rupee change in the corresponding exogenous variables. For example, the corresponding figures indicate that 1% increase in i_{B1} causes Rs.0.0005 billion increase in ER^{cb} in the first period, Rs.1 billion increase in GE results in Rs.0.019 billion increase in ER^{cb} in the first period, and so on. Similarly, these figures indicate that 1% increase in i_{B1} brings 0.0018% increase in i_T and 0.0261 decrease in the general price index, and so on.

The impact of a unit change in each of the two or more exogenous variables on an endogenous variable is given by the sum of the corresponding multipliers. For example, the impact of a unit increase in i_{B1} and a unit increase in i_B on ER^{cb} equals .0005 - .0002 = .0003. Similarly, the impact multiplier of a unit change in an exogenous variable on the sum of the two or more endogenous variables is given by the sum of the corresponding multipliers. For example, the impact of a unit increase in i_{B1} on the sum of CU^p and D^b equals -.0065 -.0036 = -.0101. Note that since the reduced form is linear, these multipliers are symmetric in the upward and downward directions.

In general, the various multipliers are appropriately signed and their magnitudes do not look unbelievable. Since our model has a large number of endogenous variables and exogenous policy variables, we shall discuss only the impacts of the selected exogenous policy variables on the selected endogenous variables. For easy reference, these selected multipliers are reported in Table 4.

Table 4

Selected Impact Multipliers

Endogenous variable	$\Delta \bar{i}_{Bl}$	$\Delta \bar{r}_d^{cb}$	$\Delta \bar{r}_t^{cb}$	ΔGS	ΔCO^g	ΔI^g	$Y\Delta t_d$	$CO^p\Delta t_i$
	Exogenous Policy Variable							
ΔER^{cb}	.0005	-.028	-.020	-.019	-.020	-.021	.013	.020
ΔB^{cb}	-.0125	-.009	-.008	-.013	.010	.010	-.009	-.010
ΔCU^p	-.0065	-.090	-.100	-.471	.386	.385	-.358	-.386
ΔD^b	-.0036	-.148	-.097	-.260	.150	.154	-.150	-.151
ΔT^b	-.0047	-.126	-.099	-.339	.177	.181	-.182	-.177
ΔLI	-.0064	-.199	-.146	-.466	.430	.441	-.395	-.430
Δl_T	.0018	.031	.028	.131	.048	.050	-.018	-.048
Δi_g	.0011	-.002	.009	.078	.020	.021	-.004	-.019
ΔY	-.0441	-.623	-.671	-3.193	4.873	4.890	-4.153	-4.875
ΔX	-.0006	-.008	-.008	-.040	.0002	.062	-.008	-.0004
ΔP_y	-.0261	-.369	-.397	-1.892	2.950	2.897	-2.505	-2.950
ΔBPD	-.0035	-.049	-.053	-.251	.383	.385	-.407	-.383
ΔURM	.0062	.081	.091	-.497	.367	.365	-.348	-.367
ΔT_d	-.0012	-.016	-.018	-.084	.128	.129	.891	-.129
$\Delta (T_i - S)$	-.0046	-.066	-.070	-.336	.512	.514	-.545	-.483
$\Delta [GS(ig)/100]$	.0004	-.001	.003	.083	.007	.008	-.002	-.008

In table 4 the tax rate multipliers are expressed in the same units as government investment multipliers, etc. The direct tax rate multipliers here represent the impacts on the corresponding endogenous variables of a change in the direct tax rate of size such that the direct tax yield will increase by Rs.1 billion at the original level of income (Y). These are obtained by dividing the corresponding impact multipliers of the direct tax rate by the level of income in 1967-68.[22] Similarly, the indirect tax rate multipliers here represent the first-period effects on the corresponding endogenous variables of a change in the indirect tax rate of a size such that the indirect tax yield will increase by Rs. 1 billion at the original level of private consumption (CO^p). These multipliers are obtained by dividing the corresponding impact multipliers of the indirect tax rate by the level of private consumption in 1967-68.[23]

All the multipliers, except that of r_d^{cb} on i_g in Table 4, conform to their expected signs. They indicate that a unit change in the stock of government bonds with the non-government sector (GS) has a larger impact (in absolute terms) on all the financial variables except excess reserves of commercial banks (ER^{cb}) than a unit change in any other exogenous variable in the table. With respect to ER^{cb}, government investment (I^g) is the most efficient instrument.[24] However, the efficiency coefficient of GS with respect to ER^{cb} (-.019) is only a little less (in absolute value) than that of I^g (.021). Thus, we conclude that in general GS is the most efficient instrument with respect to the financial variables.

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22 For this purpose the direct tax rate multipliers were changed in units to correspond to a one-point change in the direct tax rate instead of a one-percentage-point change in it.

23 For this purpose the indirect tax rate multipliers were changed in units to correspond to a one point change in the indirect tax rate instead of a one percentage point change in it.

24 In this discussion, it is assumed that a unit change in one policy variable equals a unit change in any other policy variable.

It will be seen from Table 4 that the impact on the non-financial variables (Y, X, P_y, BPD) of a unit change in I^g is the largest of that of any other exogenous policy variable. Thus, I^g is the most efficient instrument in this respect.

The greater efficiency of GS with respect to financial variables and of I^g with respect to non-financial variables may be illustrated in terms of their effect on $M(=CU^p+D^p)$ and Y. In order to increase the money stock by, say, Rs.0.731 billion by the use of either instrument, we have to decrease GS by Rs.1 billion or have to increase I^g by Rs.1.36 $(\frac{.471 + .260}{.385 + .154})$ billion. As against this, say, a Rs.3.193 billion increase in Y can be brought out either by a Rs.1 billion decrease in GS or a Rs.0.65 $(\frac{3.193}{4.890})$ billion increase in I^g.

It will also be seen from Table 4 that the first period effects of the various policy variables is large on nominal income and the general price level and small on real income. This means that the government can increase real output only if it is willing to accept rising prices. This suggests the existence of the "Phillips curve" in the Indian context.

The numbers in the table indicate that nearly 50% of the increase in the supply of government bonds is counter-balanced in the government budget restraint by a decrease in unborrowed reserve money (URM), 34% by the decrease in induced indirect taxes, 8% by the decrease in induced direct taxes, and 8% by the increase in government interest payments. Nearly 64% of both kinds of government expenditures are financed by induced taxes (direct and indirect) and 36% by the increase in unborrowed reserve money. This suggests that nearly two-thirds of government expenditures are self-financing.

Having discussed the role of the important instruments individually, let us consider them in certain groups. Take the following six *ceteris paribus* policy actions:

A) $i_{bl} = -1$, $i_B = -1$. This is a policy of 1% decrease in each of the two Bank rates. Call it the expansionary Bank rate policy.

(B) $\Delta r_d^{cb} = -1, \Delta r_d^{sb} = -1, \Delta r_t^{cb} = -1, \Delta r_t^{sb} = -1$. This is a policy of 1% decrease in each of the four reserve requirements ratios. Call it the expansionary reserve requirements policy.

(C) $\Delta GS = -1$. This is a policy of Rs.1 billion purchase of government bonds. Call it the expansionary open market operations policy.

(D) $\Delta CO^g = .5, \Delta I^g = .5$. This is a policy in which the government increases each of its consumption and investment expenditure by Rs.0.5 billion. Call it the expansionary expenditure policy.

(E) $Y \Delta t_d = -.5$, $CO^p \Delta t_i = -.5$. This is a policy of a cut in both the tax rates such that the yield from each of the two kinds of taxes decreases by Rs.0.5 billion at the original level of income and private consumption. Call it the expansionary tax rate policy.

(F) $\Delta CO^g = .5, \Delta I^g = .5$, $Y \Delta t_d = .5$, $CO^p\ t_i = .5$. This equals policy D minus policy E. Call it the balanced budget policy.

The impacts of these six policy actions on the selected endogenous variables are exhibited in Table 5.

It is obvious from the tabl that although the Bank rate policy influences all the endogenous variables in the right direction, its influence on them is rather small. The balanced budget policy, as one would expect, also produces small impact multipliers. The other policies are quite efficient in terms of both financial and non-financial endogenous variables.

Table 5

Selected Impact Multipliers of Selected Policies

Endogenous Variable	Policy A	B	C	D	E	F (=D-E)
ΔER^{cb}	-.0003	.050	.019	-.021	-.017	-.004
ΔB^{cb}	.01265	.017	.013	.010	.010	.000
ΔCU^{p}	.0109	.206	.471	.386	.372	.014
ΔD^{b}	.0060	.255	.260	.152	.151	.001
ΔT^{b}	.0079	.234	.339	.179	.180	-.001
ΔLI	.0108	.359	.466	.436	.412	.024
Δi_T	-.0030	-.061	-.131	.049	.033	.016
Δi_g	-.0018	-.011	-.078	.021	.012	.009
ΔY	.0742	1.343	3.193	4.882	4.514	.368
ΔX	.0010	.016	.040	.031	.004	.027
ΔP_y	.0439	.796	1.892	2.924	2.728	.196
ΔBPD	.0059	.106	.251	.384	.395	-.011
ΔURM	-.0104	-.179	.497	.366	.358	.008
ΔT_d	.0020	.036	.084	.129	-.381	.510
$\Delta (T_i - S)$	.0078	.141	.336	.513	.028	.485
$\Delta [GS(\frac{i_g}{100})]$	-.0006	-.002	-.083	.008	.005	.003

It is interesting to note that in this model the balanced budget (as defined by policy F) impact multiplier on nominal income is only 0.368, which is very small as compared with a balanced budget (defined as total government expenditures = total tax yield) multiplier on nominal income of unity in the Keynesian model with exogenous tax yield.

In terms of its impacts on all the endogenous variables except ER^{cb} and B^{cb}, policy C is more efficient than policy B. Similarly, in general policy D is more efficient than policy E. The open market operations policy C in general is stronger than the expenditure policy D with respect to financial variables and real NNI, and quite the reverse holds true with respect to nominal NNI, price level, balance of payments deficit, etc. This suggests the use of policy C over all the other policies by the Indian government, which seeks maximum increase in real NNI with minimum increase in prices.

With respect to its impact on the money stock $(CU^p + D^b)$, policy C is 1.59 $\left(\frac{.471 + .260}{.206 + .256}\right)$ times as efficient as policy B. With respect to its impact on the nominal income, policy D is 1.08 $\left(\frac{4.882}{4.514}\right)$ times as efficient as policy E, and so on.

Significance of the Government Budget Restraint

To examine the significance of the government budget restraint (GBR) in the model, we have solved our model by omitting the GBR and treating unborrowed reserve money as an exogenous policy variable instead of an endogenous variable. The selected impact multipliers are reported in Table 6.

Table 6

Selected Impact Multipliers (Omit Government Budget Restraint)

Endogenous Variable	Exogenous Policy Variable								
	Δi_{Bl}	Δr_d^{cb}	Δr_t^{cb}	ΔGS	ΔURM	ΔCO^g	ΔI^g	$Y \Delta t_d$	$CO^p \Delta t_i$
ΔER^{cb}	.003	-.031	-.023	0	.038	-.034	-.034	.026	.034
ΔB^{cb}	-.0126	-.011	-.010	0	.026	.001	.001	-.0**	-.001
ΔCU^p	-.0124	-.176	-.186	0	.948	.039	.039	-.030	-.039
ΔD^b	-.0068	-.190	-.145	0	.523	-.042	-.037	.032	.041
ΔT^b	-.0089	-.181	-.162	0	.682	-.073	-.068	.055	.073
ΔLI	-.0123	-.275	-.231	0	.938	.086	.099	-.066	-.086
Δi_T	.0035	.053	.052	0	-.265	.145	.146	-.111	-.145
Δi_g	.0020	.011	.023	0	-.156	.078	.078	-.060	-.078
ΔY	-.0840	-1.144	-1.259	0	6.430	2.515	2.543	-1.916	-2.515
ΔX	-.0011	-.015	-.016	0	.081	-.030	.032	.020	.029
ΔP_y	-.0498	-.678	-.746	0	3.810	1.533	1.507	-1.180	-1.552
ΔBPD	-.0036	-.090	-.099	0	.506	.198	.200	-.232	-.198
ΔT_d	-.0022	-.030	-.030	0	.170	.066	.067	.953	-.066
$\Delta (T_i-S)$	-.0088	-.120	-.132	0	.676	.264	.267	-.309	.736

** less than .0005

The multipliers in Table 6 correspond to the respective multipliers in Table 4 with the difference that the former are obtained by omitting the GBR, and the latter are obtained by including the GBR with URM as an endogenous policy variable.

A comparison of the respective multipliers in Tables 4 and 6 indicates that

a) The impact multipliers of the Bank rate and the reserve requirement ratios on financial variaties are usually smaller in the model with GBR and URM endogenous than in the model without the GBR.

b) The impact multipliers of the four exogenous fiscal policy variables (ΔCO^g, ΔI^g, $Y\Delta t_d$, $CO^p\Delta t_i$) on interest rates are smaller in the model than in the model without the GBR.

c) The impact multipliers of the four exogenous fiscal policy variables on non-interest rate financial variables are usually greater in the model than in the model without the GBR.

d) The impact multipliers of the Bank rate and the reserve requirement ratios on non-financial variables (Y, X, P_Y, etc.) in this model are nearly one-half of those in the model without the GBR.

c) The impact multipliers of the four exogenous fiscal policy variables on non-financial variables in this model are nearly twice those in the model without the GBR.

These findings suggest that the omission of the government budget restraint from the model (which has GBR with URM as the endogenous policy variable), in general, underestimates the impact multipliers of exogenous fiscal policy variables and overestimates those of exogenous monetary policy variables. It should be emphasised that these comparative results are subject to our choice of URM as the endogenous policy variable and that they will vary with the choice of the other endogenous policy variable, given GBR. Since in a policy model the government budget restraint is important, the results of the model with GBR and an appropriate endogenous policy variable are the only acceptable ones.

Although the government in general uses all its instruments simultaneously towards attaining certain fixed targets, to test the validity of our econometric model, particularly of the coefficients of the policy sub-reduced form (i.e., policy impact multipliers), the relationships between the target variables and the instrument variables of Table 3 were also used to derive a few policy models, where targets were taken as fixed and the number of instruments equalled the number of targets.[25] In all these policy models, national income, price, and balance of payments deficit were taken as the three target variables, and different sets of three policy variables were used as the instrument variables. The resultant policy models, which are not presented here, did suggest the reasonableness of this model's impact multipliers in the Indian context.

25 For derivation of such models, see Tinbergen (1952).

CONCLUSION

A policy-oriented econometric model with an emphasis on the monetary sector has been constructed, estimated, and analysed. The impact multipliers of policy actions have been obtained and discussed, both individually and in certain groups.

Every effort was made to incorporate as many suggestions as possible of Brainard and Tobin[26] and of Christ[27], among others, to supply a monetary policy model free from most of the pitfalls in the financial model building. However, we are aware of the fact that our model is not perfect in all respects. The model is subject to limitations due to a small sample. The Indian economy is still in its developing stage and its structure can be changed by exogenous events. During this model's post sample period, a change has taken place in our economic (banking) structure by the nationalization of the major 14 commerical banks effective July 1969. In an atmosphere of changing structure of the economy, the parameter estimates of an econometric model cannot be taken to be exact. However, as long as the change is gradual, such estimates may be taken to hold good approximately at least for some years to come. For these reasons, our parameters and multipliers' estimates should be taken as suggestive rather than definitive.

It should be emphasised that our multipliers as reported in Tables 3, 4, and 5 are obtained on the assumption that government takes URM as a residual (endogenous) policy variable. The multipliers would be different if some other policy variable is regarded as the endogenous policy variable.

Our estimates of impact multipliers indicate that policy multipliers are high with respect to money magnitudes and prices, and rather low with respect to real magnitudes. Omission of the government budget constraint from the policy model approximately doubles the impact multipliers of monetary policy variables and halves those of fiscal policy variables. In general, private non-bank liabilities with the government sector (i.e., RBI's loans to private non-bank through the State cooperative banks) is the most efficient monetary policy variable, and open market operations are more powerful than government investment expenditure with respect to financial variables, while quite the reverse holds true with respect to non-financial variables.

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26 Brainard and Tobin (1968)

27 Christ (1969)

The study suggests that the RBI should go ahead in advancing loans to the agriculturists through the State cooperative banks, and though the government should continue its efforts to increase its investment expenditure, it should try to finance the same through increased indirect tax rate.

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