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Predicting the Money Multiplier : The Indian Evidence Revisited

Partha Ray & T.P. Madhusoodanan*

In this paper, a comparison is made about the predictive performance of various time series models for forecasting money multiplier. In this context the paper investigates whether for a 'defined variable' like money multiplier, a 'disaggregative' model performs better. Though no generalised conclusion is discerned, linear Box-Jenkins models in their disaggregate form (i.e., using a component approach) have been found to perform better in a number of cases.

Introduction

Money multiplier relationship has an important policy dimension in the area of monetary management. Apart from the theoretical developments, which essentially stemmed from a monetarist paradigm, it has been a variable subjected to intense empirical investigation. Empirical investigations followed two distinct paths. There has been a class of models which tried to discern the economic determinants to money multiplier and its related components like currency-deposits and reserves-deposits ratios. On the other hand, there has been a fairly rich literature which contains time series models to comprehend the predictability of money multiplier. The present paper belongs to the latter class of models.

In this exercise, we investigated two specific questions in the context of forecasting. First, we made an attempt to see whether for a 'defined' variable like money multiplier, disaggregated information improves forecasts. Secondly, most of the earlier studies on forecasting money multiplier have applied Box-Jenkins technique. As there have been fairly recent advances in time series forecasting techniques during the last ten years, we tried to fit some of these non-linear models and checked their performance.

The format of the paper is as follows. Section 2 gives a brief resume of the relevant literature. In Section 3, we take the database and defini-

* Shri Partha Ray and Dr. T.P. Madhusoodanan are Research Officers in the Department of Economic Analysis and Policy and the Department of Statistical Analysis and Computer Services respectively. The authors wish to thank Dr. D. Ray for his guidance and suggestions during the preparation of the paper.

tional issues of money multiplier. Section 4 presents our forecasting results and a comparison between the alternate class of models.

2. Predicting Money Multiplier : A Survey of Literature

The first forecasting model for money multiplier was perhaps due to Burger, Kalish and Bobb (1971). Levin (1973) provided a survey of some of these earlier studies. However, the first significant contribution in this regard was due to Bomhoff (1977) whose concern was to predict the money multiplier for U.S.A. and U.K. (period 1957 - 1968) through the application of Box-Jenkins model. He found it to be satisfactory for both the countries.¹ However, his negligence to the existence of large autocorrelations at lags of ten and twenty months as statistical artifacts and the use of adjusted reserve money had been criticised by Johannes and Rasche (1979). They worked with a net reserve money concept that had been adjusted for reserves released or absorbed by changes in legal reserve ratio for U.S.A. (period January 1955 to March 1978). Further they for the first time used a component approach for predicting money multiplier. They favoured this component approach; however, this, as Hafer and Hein (1984) pointed out, had not been tested. Hafer and Hein (1984) virtually replicated the whole Johannes and Rasche exercise for U.S.A. (period 1959- 1979).² Based on one-step-ahead monthly forecasts for the period January 1980 to December 1982 their evidence indicated that the aggregate approach did equally well as the component method.

In the context of above disagreement, recently a debate had emerged in the forecasting literature. A variable like money multiplier is afterall a defined variable, i.e., defined as the ratio of money to monetary base; or at a more disaggregative level it can be shown to be dependent upon a number of ratios like currency-deposit or reserves-deposit ratio. What is then the appropriate method of forecasting - the direct univariate ARIMA model or using the same for the components followed by the utilisation of the implicit definition of the variable? Kang (1986) considered this issue in the context of forecasting of four 'defined' variables, viz., real rate of interest, real GNP, velocity of narrow money and money multiplier for U.S.A. (period 1960 - 1983). His results on comparison between direct and indirect forecasts showed that indirect forecasts often exhibited greater accuracy. However, Jones (1989) contradicted Kang's findings. Working for the same period and using a number of common variables, Jones' results clearly favoured direct forecasts. This difference in the conclusion had been sought to be explained in terms of the following factors, viz., (a) the method of deseasonalisation (i.e., using deseasonalised data as done by Kang or starting with unadjusted data and

getting them seasonally adjusted through some filters in the process of fitting seasonal ARIMA model), and (b) the difference in periods for off-sample forecasts. This debate is still in a state-of-flux and scores of examples or extensive Monte Carlo experiments are needed for any generalised results. However, a point of difference between both Kang and Jones the one hand and the present paper on the other may be noted in this connection - unlike both Kang and Jones, we preferred to work with a more detailed and disaggregative definition of money multiplier.

The Indian evidence on money multiplier, though very rich, mostly centred around the regression technique and consequently their major concern was to explain the inter-temporal behaviour of the variables rather than its forecasting. This is not to mean that the predictability aspect of money multiplier has been totally neglected in these studies. In fact, Chitre (1986) examined the predictability of money multiplier using regression model and arrived at quite affirmative results. As far as time series approach is concerned, perhaps Nachane and Ray (1989) offered the major meaningful attempt. In their taxonomic framework approach of four different models, viz., univariate time series, regression approach to components (i.e., decomposing money multiplier as the ratio between M_3 , and RM), partial adjustment with distributed lags, and VARMA model, they examined the relative performance of different models (period April 1973 to March 1985) on the basis of their forecasting evaluation. Their evidence indicated the relative superiority of the univariate Box-Jenkins and VARMA model over others. However, our approach differs from that of Nachane and Ray on the following three counts. First, we have followed a more detailed disaggregative approach. Secondly, we relaxed the assumption of linearity and fitted non-linear models. Finally, in the absence of any reliable time series data on adjusted reserve money, we preferred to work with the unadjusted one.

3. Database and Definitions

The money multiplier has usually been defined in the following manner, viz.,

$$M_i = mm_i \text{ RM} \quad \dots \quad (1)$$

where M_i = i-th measure of money supply, i.e., M_1 or M_3

RM = Reserve money or High powered money,

mm_i = i-th measure of money multiplier, i.e., associated with M_1 or M_3 .

That is to say, the money multiplier for a particular measure of money supply is simply the ratio between the relevant measure of money supply and the reserve money.

Given the above relationship, we arrive at the following two measures of money multiplier from the definitions³ of Narrow money (M_1), Broad money (M_3) and RM, viz.,

$$mm_1 = \frac{1 + C/DD + OD/DD}{C/DD + BR/DD + OD/DD} \quad \dots \quad (2)$$

$$mm_3 = \frac{1 + C/DD + TD/DD + OD/DD}{C/DD + BR/DD + OD/DD} \quad \dots \quad (3)$$

where,

C = Currency with the public

DD = Demand deposits with the Banks,

TD = Time deposits with the Banks,

OD = 'Other' deposits with the Reserve Bank of India,

BR = Bank Reserves, i.e., Bankers' deposits with the RBI + cash with Banks.

Before we proceed further, some observations about the nature of the identities (2) and (3) may be noted. First, though money multiplier identities are available in different formulations, we adopted this particular decomposition because of the fact that it, in a sense, gives the technically correct breakup of the measures of money supply in the Indian context. Secondly, though a number of researchers working on Indian data have preferred to assume away (or in some cases subsumed under some form of deposits) the concept of 'other' deposits⁴ with the Reserve Bank because of its relative unimportance, we made it a point to keep it. This is so because though 'other' deposits by its level may be insignificant, but over a particular month its variation may have (and in fact had for some months) significant impact on the money supply process. Therefore, its negligence or subsuming it under either DD or TD, in our opinion, limits the efficiency of any projective exercise. However, its wide variability (in relative terms) poses a serious problem for the purpose of forecasting. Finally, it may be noted that all the ratios in (1), (2) and (3) are defined as simply the quotient of the relevant out-

standing figures and not their increments. In other words, all the multipliers and ratios are 'averages' and not 'incrementals'.

Month-end data for all the variables for the period 1978-79 (i.e., April 1978) to 1989-90 (i.e., March 1990) have been used for the purpose of modelling. Monthly observations for 1990-91 have been utilised to compare the relative performance of the different models.

4. Different Models

In what follows, we explain different models used in this exercise.

4.1 Box-Jenkins Model

To start with we tried to fit an ARMA process to both the multipliers and the related ratios. To make the data stationary, the operator $(1-L)$ ($1-L^{12}$) was applied to the data (where L is the first order lag operator). Therefore, keeping in mind the principle of parsimony, the problem was reduced to a suitable choice of a_i 's, b_j 's, p and q for the following generalised version,

$$\begin{aligned} (1-L) (1-L^{12}) \left(1 + \sum_{i=1}^p a_i L^i \right) X_t \\ = b_0 + \sum_{j=1}^q (b_j L^j) e_t \quad \dots (4) \end{aligned}$$

where, $X_t = mm_1, mm_3, C/DD, T/DD, OD/DD$ and BR/DD .

Following Box-Jenkins (1976), we fitted ARIMA models to all the series. The relevant results are reported in Table 1 with the relevant summary statistics, viz., both Box-Pierce (Q_1) and Box-Ljung (Q_2) statistics. The rival models have been selected on the basis of AIC. Both the Q-statistics indicates that the residuals were reduced to "white-noise" process in all the cases. Also, the coefficients were statistically significant.

Though for the aggregative models, forecasts were directly obtained, for the disaggregative model, they were calculated through plugging the forecasts for the relevant ratios in equations (2) and (3), as the case may be. The relevant results are reported in Tables 1 and 5A.

4.2 Non-Linearity and its Testing

One basic assumption for fitting an ARIMA model was that the underlying data generating process is linear. In general, this may not be true. There is, however, no general test for 'global' non-linearity of a time series. This is due to the fact that test statistics are formed in relation to a particular type of non-linearity. Various tests have been proposed by several authors. In the present context, we apply the simplest among them, suggested by Granger and Newbold (1977) and applied by Maravall (1983). Granger and Newbold showed that for a linear process, the values of the autocorrelation function (ACF) of squares of the variable will be equal to the square of values of ACF of the original series for various lags⁵. That is to say, according to Granger and Newbold, for a linear series Y_t , we should have,

$$r_k (Y_t^2) = [r_k (Y_t)]^2 \quad \dots (5)$$

where, $k = 0, \pm 1, \dots$, and r_k denotes the lag k ACF. Therefore, non-linearity is tested through a comparison of ACF of the residual squared with the squared ACF of the residuals. In fact, Maravall has shown why it is preferable to use the above test on the white noise process after fitting an ARIMA process to the original series.

Accordingly, we examined the ACF of the six relevant series, viz., mm_1 , mm_3 , C/DD, BR/DD, TD/DD, OD/DD. The results are reported in Table 2. The ACF pattern indicates presence of non-linearity in all the series under consideration. Therefore, we turned to non-linear models.

4.3 Non-linear models

Once we discern the presence of non-linearity in the data, the obvious question is which model to fit. Though there is the possibility, in principle, of an infinite number of alternatives to linear model, the recent literature has focussed on four particular classes of non-linear model, viz., bilinear models (Granger and Andersen, 1978; Subba Rao, 1981), exponential autoregressive models (Ozaki, 1980; Haggan and Ozaki, 1981), threshold autoregressive models (Tong, 1983), and state dependent models (Priestley, 1980) which include the previous three as special cases. Recent applications of non-linear time series models to data are provided by Maravall (1983), Cartwright (1986). For application to Indian data, see, Ray (1988, 1991) and Ray and Jadhav (1991).

4.4 Bilinear model

The general bilinear model is a generalisation of the univariate ARMA model to include cross-product terms of lagged variables and errors. Granger and Andersen (1978) have considered a bilinear model of order (p, q, r, s) given by the expression,

$$X_t = \sum_{i=1}^p a_i X_{t-i} + \sum_{j=0}^q b_j e_{t-j} + \sum_{k=1}^r \sum_{l=1}^s c_{kl} e_{t-k} X_{t-l} \quad \dots \quad (6)$$

where, $b_0 = 1$ and e_t is a white noise. The method of estimating such a bilinear model is due to Subba Rao and Gabr (1984). Our present forecasts for all these six series, both for the aggregative and disaggregative models, employ their methodology with rival models chosen on the basis of AIC. The model and the forecast results are reported in Table 3 and 5B.

4.5 State Dependent Model

Priestley (1980) developed a general class of nonlinear models called state dependent model (SDM), which contained bilinear, threshold autoregressive and exponential autoregressive models as special cases. The principal advantage of SDM is its allowance of a general form of nonlinearity. Consider a simple linear AR(p) model,

$$\sum_{i=0}^p a_i X_{t-i} = a' + e_t \quad \dots \quad (7)$$

where, $a_0 = 1$, e_t is a white noise process and a_i 's and a' are constants. At any time, the future evolution of the process is determined by its values along with future values of the white noise term therein. Therefore, the vector, $\mathbf{x}_{t-1} = \{X_{t-1}, X_{t-2}, \dots, X_{t-p}\}$ is the state vector of the AR(p) process as given in (6). Thus in the SDM, a_i 's are all functions of $\mathbf{x}_{t-1}$, the state vector at t-1. Therefore the AR(p) type SDM has the form,

$$X_t + \sum_{i=1}^p a_i(\mathbf{x}_{t-1}) X_{t-i} = a'(\mathbf{x}_{t-1}) + e_t \quad \dots \quad (8)$$

which could be generalised to the case of ARMA (p, q) model.

For the purpose of forecast, we have used AR type SDM as given in (8). Kalman algorithm {Kalman (1960) and Kalman and Bucy (1961)} is used to estimate the parameters. The relevant model and forecast results are given in Tables 4 and 5C.

4.6 Combining forecasts

Apart from generating forecasts from the three different methods detailed above, we preferred to give a combination of these forecasts also. This is due to the fact that, as Bates and Granger (1969) demonstrated, in general, two unbiased forecasts can be combined to produce a new forecast which is more accurate than either of the components. In reality, however, the problem of a combined forecast essentially boils down to choice of weights that are to be assigned to different forecasts. We use the method suggested by Bates and Granger (1969).⁶ To be specific, we have combined the forecasts of Box-Jenkins, Bilinear and SDM on the basis of past performance of one year. The results are reported in Table 5D.

4.5 Comparison of forecasts

A look at Table 6 apparently is confusing. Afterall there are two types (viz., aggregative and disaggregative) of four models which are to be compared on the basis of six performance measures. Over and above, there are two variables. The models are compared on the basis of the usual criteria of mean absolute error (MAE), root mean square (RMSE) and Theil's first set of inequalities⁷, viz., U_m , U_c , U_s and U . However, not all performance measures are equally reliable and since sum of Theil's decomposed inequality coefficients is unity, not all of them can be minimum for a particular type of model. Thus among the three U 's, following Theil (1966), we have chosen U_m . Afterall, if it is large, this implies that the average predicted change deviates substantially from the average realised change. Thus the menu of performance measures shrinks to four, viz., MAE, RMSE, U_m , and U . Once this rationalisation is done, the exercise becomes comparatively easier. However, even among these four criteria a conflicting conclusion emerges though there is some order in it. As far as the most popular criterion RMSE, is concerned, Bilinear aggregative is the best for mm_1 , while Box-Jenkins disaggregative is the best for mm_3 . However, for the combination forecast and SDM, performance of U_m is distinctly better. Disaggregative Box-Jenkins model for mm_3 ranks the highest in so far as the other three criteria (viz., MAE, RMSE, and U) are concerned. In case of mm_1 , one may be indifferent between the Box-Jenkins disaggregative

and the Bilinear aggregative, with possibly the choice being tilted in favour of the latter. Therefore, our choice is in favour of the disaggregative version of Box-Jenkins model, as no linear conclusion is warranted. This conclusion is in line with Hafer and Hein (1984) and Kang (1986). This can be rationalised by the fact that for a disaggregative model, more detailed economic information is being used for forecasting. However, this can not be generalised; rather in case of non-defined variable with non-linearity, other models may well turn out to be better, as found in Cartwright (1985), Ray and Jadhav (1991) and Ray (1991).

Notes

1. Though for the Netherlands, Bomhoff's results was subject to the availability of proper data.
2. However, Hafer and Hein (1984) used the St. Louis adjusted reserve money data.
3. For India, the definitions are as follows :
 $M_1 = C + DD + OD,$
 $M_3 = C + DD + TD + OD,$
 $RM = C + BR + OD.$
4. 'Other' deposits comprise mainly deposits of quasi-Government and other developmental financial institutions, balances in the accounts of foreign central banks, accounts of various international agencies, and provident, gratuity and guarantee funds of the Reserve Bank staff.
5. For a formal proof of the result see Maravall (1983), p. 69.
6. That is to say, we have neglected the covariance part and hence our weightage pattern (w_i), for any variable X, for the combination rule may be given as,

$$w_i = \frac{\sum_{r=t-s}^{t-1} \{e_i^2(r)\}^{-1}}{\sum_{j=1}^k \left\{ \sum_{r=t-s}^{t-1} e_j^2(r) \right\}^{-1}}$$

where, e_j is the forecast error.

7. Thiel's inequality coefficient (U) is given by,

$$U = \left\{ \sum_i (P_i - A_i)^2 / \sum_i A_i^2 \right\}^{-1/2}$$

where, P_i and A_i are predicted and actual values respectively.

Three ratios from Thiel's first set of inequality are defined as follows, viz.,

$$\text{Bias Proportion } (U_m) = \frac{(\bar{P} - \bar{A})^2}{\sum_i (P_i - A_i)^2 / n}$$

$$\text{Variance Proportion } (U_s) = \frac{(S_p - S_a)^2}{\sum_i (P_i - A_i)^2 / n}$$

$$\text{Convariance Proportion } (U_c) = \frac{2 (1-r) S_p S_a}{\sum_i (P_i - A_i)^2 / n}$$

where, $\bar{P}$ and $\bar{A}$ are means, S_p and S_a are standard deviations and r is the correlation coefficient of the predicted and actuals respectively. For details, see Thiel (1966), pp.29-30.

References

- 1) Bates, J.M. and Granger, C.W.J. (1969) : The Combination of Forecasts, *Operations Research Quarterly*, 20, 451-468.
- 2) Bomhoff, Edward J. (1977) : Predicting the Money Multiplier : A Case Study of the U.S. and the Netherlands, *J. Monetary Economics*, 3, 325-345.
- 3) Box, G.E.P. and Jenkins, G.M. (1976) : *Time Series Analysis Forecasting and Control*, San Francisco, Holden-Day.
- 4) Burger, A.E., Kalish, L. and Bobb, C.T. (1971). Money Stock Control and its Implications for Monetary Policy, *Federal Reserve Bank of St. Louis Review*, 53, 6-22.
- 5) Cartwright, P.A. (1986). Forecasting Time Series : A Comparative Analysis of Alternative Classes of Time Series Models, *J. Time Series Analysis*, 6, 203-212.
- 6) Chitre, V.S. (1986). Quarterly Predictions of Reserve Money Multiplier and Money Stock in India, *Artha Vijnana*, 28, 1-123.
- 7) Granger, C.W.J. and Andersen, A.P. (1978): *Introduction to Bilinear Time Series Models*, Gottingen: Vandenhoeck and Ruprecht.
- 8) Granger, C.W.J. and Newbold, P. (1977) : *Forecasting Economic Time Series*, New York : Academic Press.
- 9) Hafer, R.W. and Hein, S.E. (1984) : Predicting the Money Multiplier : Forecasts from Components and Aggregate Models, *J. Monetary Economics*, 14, 375-384.

- 10) Haggan, V. and Ozaki, T. (1981) : Modelling Nonlinear Random Vibrations Using an Amplitude Dependent Autoregressive Time Series Model, *Biometrika*, 5, 92-93.
- 11) Johannes, J.M. and Rasche, R.H. (1979) : Predicting Money Multiplier, *J. Monetary Economics*, 5, 301-325.
- 12) Jones, J.D. (1989) : Univariate ARIMA Forecasts of Defined Variables : The Case of Real Economic Variable, *Socio-Economic Science*, 23, 227-234.
- 13) Kalman, R.E. (1960), A New Approach to Linear filtering and Prediction Problems, *J. Basic Engineering*, 82, 35-45.
- 14) Kalman, R.E. and Bucy, R.S. (1961) : New Results in Linear Filtering and Prediction Theory, *J. Basic Engineering*, 83, 95-108.
- 15) Kang, H. (1986) : Univariate ARIMA Forecasts of Defined Variables, *J. Business & Economic Statistics*, 4, 81-86.
- 16) Levin, F.J. (1973) : Examination of the Money Stock Control Approach of Burger, Kalish and Bobb, *J. Money, Credit & Banking*, 5, 924-938.
- 17) Maravall, A. (1983) : Examination of Nonlinear Time Series Forecasting, *J. Business & Economic Statistics*, 1, 66-74.
- 18) Nachane, D.M. and Ray, D. (1989) : The Money Multiplier : A Re-examination of the Indian Evidence, *Indian Economic J.*, 37, 56-73.
- 19) Ozaki, T. (1980) : Nonlinear Time Series Models for Nonlinear Random Vibrations, *J. Applied Probability*, 17, 84-93.
- 20) Priestley, M.B. (1980) : State Dependent Models : A General Approach to Non-linear Time Series Analysis, *J. Time Series Analysis*, 1, 46-71.
- 21) Ray, D. (1988) : Comparison of Forecasts : An Empirical Investigation, *Sankhya*, Series B, 258-277.
- 22) Ray, D. (1991) : Money Supply and State Dependent Model, Paper Presented in 28th Annual Conference of Indian Econometric Society Conference, North Bengal University.
- 23) Ray, D. and Jadhav, U.S. (1991) : Forecasting by Random Coefficient Autoregressive Models : An Application to Indian Economic Time Series, (unpublished).
- 24) Subba Rao, T (1981) : On the Theory of Bilinear Time Series Models, *J. Royal Statistical Society, Series B*, 43, 244-255.
- 25) Subba Rao, T. and Gabr, M.M. (1984): *An Introduction to Bispectral Analysis and Bilinear Time Series Models*, Springer-Verlag, New York.
- 26) Theil, H. (1966) : *Applied Economic Forecasting*, North Holland, Amsterdam.
- 27) Tong, H. (1983) : *Threshold Models in Non-linear Time Series Analysis*, Springer-Verlag, New York.

Table 1 : Equations for forecasting Money Multiplier : Box-Jenkins' Models

Variable	Model	Summary Statistics	
Aggregative Model			
mm ₃ :	$(1-L) (1-L^{12}) (1-0.23L^3-0.24L^9-0.50L^{12})mm_3 = 0.0927 + (1+0.72L)e_t$ (0.08) (0.08) (0.08) (0.08)	Q1 (12)=11.42 ; Var =0.017 ;	Q2 (12)=12.51 Mean=3.09
mm ₁ :	$(1-L) (1-L^{12}) (1-0.28L^3-0.29L^9-0.55L^{12})mm_1 = -0.14 + (1+0.71L)e_t$ (0.08) (0.08) (0.08) (0.08)	Q1 (12)=11.44 ; Var =0.0045 ;	Q2 (12)=12.48 Mean=1.164
Disaggregative Model			
C/DD :	$(1-L) (1-L^{12}) (1-0.25L^6-0.44L^{12})(C/DD) = 0.44 + (1+0.49L)e_t$ (0.08) (0.07) (0.07)	Q1 (12)= 5.30 ; Var =0.0077 ;	Q2 (12)= 5.67 Mean=1.422
BR/DD :	$(1-L) (1-L^{12}) (1-0.29L^3-0.29L^9-0.54L^{12}) (BR/DD) = -0.08 + (1+0.69L)e_t$ (0.08) (0.07) (0.08) (0.07)	Q1 (12)=10.26 ; Var =0.0169 ;	Q2 (12)=11.16 Mean=0.661
TD/DD :	$(1-L) (1-L^{12}) (1-0.44L^{12}) (TD/DD) = 2.27 + (1+0.46L)e_t$ (0.08) (0.07)	Q1 (12)= 8.69 ; Var =0.1277 ;	Q2 (12)= 9.40 Mean=4.052
OD/DD :	$(1-L) (1-L^{12}) (1+0.35L^4 +0.56L^{12}) (OD/DD) = 0.01 + (1+0.48L)e_t$ (0.05) (0.05) (0.07)	Q1 (12)= 7.62 ; Var =0.887 ;	Q2 (12)= 8.17 Mean=0.0186

Notes: (1) Figures in brackets indicate standard errors of the relevant co-efficient.

(2) Q1=Box-Pierce statistics, Q2=Ljung-Box Statistics.

Table 2 : Autocorrelations of Residuals & Squares of Residuals

LAG	Autocorrelations of Squares of Residuals						Autocorrelations of Residuals					
	mm1	mm3	C/DD	BR/DD	TD/DD	OD/DD	mm1	mm3	C/DD	BR/DD	TD/DD	OD/DD
1	-0.02	-0.01	0.02	-0.05	0.24	0.17	-0.06	-0.01	-0.03	-0.03	-0.02	-0.02
2	0.16	0.34	-0.15	0.29	0.07	-0.05	-0.05	-0.09	0.01	-0.07	0.02	-0.09
3	0.09	0.03	0.10	0.01	0.00	0.04	0.04	-0.02	0.12	0.01	0.10	0.06
4	0.15	0.24	-0.05	0.28	-0.09	-0.04	0.06	0.10	-0.02	0.08	-0.05	-0.04
5	0.01	-0.11	-0.08	-0.11	-0.05	0.00	0.03	-0.01	0.10	-0.02	0.01	0.07
6	0.06	0.06	-0.06	0.11	-0.03	0.06	0.19	0.12	0.05	0.16	-0.16	-0.16
7	0.19	0.10	0.00	0.14	-0.04	0.00	-0.01	0.03	0.05	0.03	0.01	0.09
8	-0.04	0.06	-0.03	0.08	-0.15	-0.01	-0.09	0.10	-0.07	-0.10	-0.04	0.04
9	0.08	0.06	0.00	0.02	0.07	0.01	-0.01	0.04	-0.04	0.05	-0.03	0.04
10	0.15	0.14	-0.09	0.07	0.01	-0.01	0.14	0.20	0.06	0.17	0.12	-0.05
11	0.10	0.17	-0.02	0.22	-0.09	0.08	-0.02	-0.01	0.06	0.00	0.02	-0.08
12	0.09	0.03	-0.01	0.02	0.01	0.21	-0.14	-0.11	0.01	-0.08	0.02	0.02
Q1	17.11	30.39	6.45	31.75	12.89	10.35	11.48	11.43	5.29	10.25	8.69	7.62
Q2	18.12	31.61	6.69	33.20	13.36	11.06	12.50	12.47	5.66	11.15	9.40	8.17

Table 3 : Equations for forecasting Money Multiplier : Bilinear Models

Variable	Model
Aggregative Model	
mm_3 Q1 (12)=11.64; Q2(12)=12.73	$(1-L) (1-L^{12}) (1-0.25L^3) (1-0.28L^9) (1-0.54L^{12}) mm_3 = 0.77 + (1+0.77L)e_t + 0.012L^3 mm_3 L^9 e_t + 0.013L^9 mm_3 L^3 e_t$ (0.08) (0.08) (0.07) (0.06) (0.01) (0.01)
mm_1 Q1 (12)=12.03; Q2(12)=13.20	$(1-L) (1-L^{12}) (1-0.26L^3) (1-0.32L^9) (1-0.55L^{12}) mm_1 = 0.26 + (1+0.73L)e_t - 0.020L^9 mm_3 L^3 e_t + 0.014L^9 mm_1 L^3 e_t$ (0.08) (0.07) (0.08) (0.07) (0.01) (0.01)
Disaggregative Model	
C/DD Q1 (12)=7.33; Q2(12)=7.87	$(1-L) (1-L^{12}) (1-0.29L^6) (1-0.39L^{12}) (C/DD) = 0.64 + (1+0.50L)e_t + 0.028L (C/DD)L^{12}e_t + 0.032L^{12} (C/DD)L^6e_t$ (0.08) (0.08) (0.02) (0.02)
BR/DD Q1 (12)=8.98; Q2(12)=9.80	$(1-L) (1-L^{12}) (1-0.30L^3) (1-0.29L^9) (1-0.53L^{12}) (BR/DD) = 0.154 + (1+0.75L)e_t + 0.007L^3 (BR/DD)L^3e_t$ (0.08) (0.08) (0.08) (0.07) (0.003)
TD/DD Q1 (12)=9.33; Q2(12)=10.09	$(1-L) (1-L^{12}) (1-0.46L^{12}) (TD/DD) = 2.19 + (1+0.45L)e_t + 0.028L (TD/DD)L e_t$ (0.08) (0.08) (0.01)
OD/DD Q1 (12)=7.54; Q2(12)=8.03	$(1-L) (1-L^{12}) (1+0.34L^4) (1-0.53L^{12}) (OD/DD) = 0.012 + (1+0.46L)e_t + 0.15L (OD/DD)L^{12}e_t$ (0.06) (0.05) (0.09) (0.07)

Notes : (1) Figures in brackets indicate standard errors of the relevant co-efficient.

(2) Q1=Box-Price statistics, Q2 = Ljung-Box Statistics.

Table 4 : Equations for forecasting Money Multiplier : State-Dependent Models

Variable	Model
Aggregative Model	
mm ₃	$LL^{12}mm_3 = -0.23 - (0.39L + 0.24L^3 + 30L^9 + 0.44L^{12}) LL^{12} mm_3 + \epsilon_t$
mm ₁	$LL^{12}mm_1 = -0.07 - (0.38L + 0.29L^3 + 37L^9 + 0.59L^{12}) LL^{12} mm_1 + \epsilon_t$
Disaggregative Model	
C/DD	$LL^{12}(C/DD) = -0.14 - (0.47L + 0.19L^2 + 0.28L^6 + 0.31L^{12}) LL^{12} (C/DD) + \epsilon_t$
BR/DD	$LL^{12}(BR/DD) = 0.12 - (0.39L + 0.27L^3 + 0.36L^9 + 0.55L^{12}) LL^{12} (BR/DD) + \epsilon_t$
TD/DD	$LL^{12}(TD/DD) = -0.55 - (0.49L + 0.21L^2 + 0.29L^{12}) LL^{12} (TD/DD) + \epsilon_t$
OD/DD	$LL^{12}(OD/DD) = 0.24 - (0.36L + 0.49L^2 + 0.39L^{12}) LL^{12} (OD/DD) + \epsilon_t$

Table 5A : Performance of the Models (Box-Jenkins)

1990-91 Month	Forecasts										Actuals	
	Aggregative Model					Disaggregative Model						
	mm1	mm3	C/DD	BR/DD	TD/DD	OD/DD	mm1@	mm3#	mm1	mm3		
April	1.0639	3.0273	1.4047	0.8565	4.4182	0.0210	1.0629	2.9988	1.0588	2.9689		
May	1.0499	2.9708	1.4451	0.8837	4.4027	0.0173	1.0496	2.9262	1.0442	2.9106		
June	1.0740	3.0426	1.2953	0.8361	4.2265	0.0154	1.0763	3.0451	1.0817	3.0493		
July	1.0849	3.1402	1.3344	0.8162	4.3860	0.0224	1.0846	3.1030	1.0953	3.1532		
August	1.0656	3.1025	1.3502	0.8553	4.4768	0.0158	1.0651	3.0805	1.0486	3.0678		
September	1.0799	3.1405	1.2110	0.8366	4.2441	0.0151	1.0792	3.1368	1.0743	3.1124		
October	1.0532	3.0337	1.3368	0.8817	4.4277	0.0200	1.0528	3.0308	1.0356	2.9996		
November	1.0502	3.0101	1.3516	0.8868	4.4370	0.0114	1.0503	3.0225	1.1047	3.1547		
December	1.1066	3.1435	1.2192	0.7833	4.1447	0.0291	1.1067	3.1468	1.1025	3.1566		
January	1.1036	3.1746	1.3893	0.7732	4.5981	0.0346	1.1032	3.1960	1.0934	3.1377		
February	1.0675	3.0584	1.4189	0.8460	4.5582	0.0348	1.0670	3.0490	1.1274	3.2070		
March	1.1210	3.1705	1.3910	0.7353	4.4903	0.0629	1.1209	3.1720	1.1502	3.2501		

Notes : @ Derived from the relationship $mm1 = \{1 + (C/DD) + (OD/DD)\} / \{(C/DD) + (BR/DD) + (OD/DD)\}$

Derived from the relationship $mm3 = \{1 + (C/DD) + (TD/DD) + (OD/DD)\} / \{(C/DD) + (BR/DD) + (OD/DD)\}$

Table 5B : Performance of the Models (Bilinear)

1990-91 Month	Forecasts								Actuals	
	Aggregative Model		Disaggregative Model						mm1	mm3
	mm1	mm3	C/DD	BR/DD	TD/DD	OD/DD	mm1@	mm3#		
April	1.0618	3.0253	1.4048	0.8630	4.4264	0.0204	1.0599	2.9943	1.0588	2.9689
May	1.0483	2.9729	1.4497	0.8891	4.4103	0.0170	1.0471	2.9192	1.0442	2.9106
June	1.0727	3.0483	1.2983	0.8431	4.2276	0.0150	1.0728	2.0332	1.0817	3.0493
July	1.0832	3.1463	1.3379	0.8213	4.3939	0.0249	1.0818	3.0936	1.0953	3.1532
August	1.0638	3.1065	1.3551	0.8596	4.4821	0.0161	1.0629	3.0721	1.0486	3.0678
September	1.0797	3.1484	1.2211	0.8382	4.2478	0.0152	1.0780	3.1256	1.0743	3.1124
October	1.0535	3.0397	1.3395	0.8828	4.4332	0.0199	1.0523	3.0294	1.0356	2.9996
November	1.0507	3.0189	1.3507	0.8860	4.4421	0.0117	1.0507	3.0264	1.1047	3.1547
December	1.1050	3.1490	1.2560	0.7883	4.1449	0.0289	1.1021	3.1014	1.1025	3.1566
January	1.1031	3.1781	1.4061	0.7774	4.6151	0.0349	1.1003	3.1807	1.0934	3.1377
February	1.0706	3.0499	1.4463	0.8599	4.5691	0.0350	1.0598	3.0114	1.1274	3.2070
March	1.1214	3.1528	1.4017	0.7475	4.4933	0.0665	1.1140	3.1419	1.1502	3.2501

Notes : @ Derived from the relationship $mm1 = \{1 + (C/DD) + (OD/DD)\} / \{(C/DD) + (BR/DD) + (OD/DD)\}$

Derived from the relationship $mm3 = \{1 + (C/DD) + (TD/DD) + (OD/DD)\} / \{(C/DD) + (BR/DD) + (OD/DD)\}$

Table 5C : Performance of the Models (State-Dependent)

1990-91 Month	Forecasts								Actuals	
	Aggregative Model		Disaggregative Model						mm1	mm3
	mm1	mm3	C/DD	BR/DD	TD/DD	OD/DD	mm1@	mm3#		
April	1.0720	3.0395	1.3961	0.8397	4.4147	0.0237	1.0709	3.0248	1.0588	2.9689
May	1.0532	2.9572	1.4411	0.8757	4.3587	0.0132	1.0533	2.9240	1.0442	2.9106
June	1.0721	3.0033	1.2799	0.8381	4.2084	0.0173	1.0758	3.0467	1.0817	3.0493
July	1.0881	3.1395	1.3509	0.8099	4.3551	0.0218	1.0871	3.0825	1.0953	3.1532
August	1.0693	3.0872	1.3517	0.8465	4.4502	0.0147	1.0694	3.0804	1.0486	3.0678
September	1.0775	3.1347	1.1998	0.8426	4.2144	0.0113	1.0766	3.1287	1.0743	3.1124
October	1.0428	2.9997	1.3312	0.9008	4.3948	0.0162	1.0441	2.9989	1.0356	2.9996
November	1.0415	2.9888	1.3400	0.9032	4.4012	0.0137	1.0429	2.9930	1.1047	3.1547
December	1.1171	3.1680	1.2370	0.7651	4.1779	0.0380	1.1151	3.1630	1.1025	3.1566
January	1.1172	3.2193	1.4111	0.7406	4.6191	0.0256	1.1191	3.2406	1.0934	3.1377
February	1.0558	3.0350	1.4133	0.8644	4.5357	0.0406	1.0585	3.0150	1.1274	3.2070
March	1.1155	3.2288	1.3803	0.6890	4.4852	0.0582	1.1462	3.2544	1.1502	3.2501

Notes : @ Derived from the relationship $mm1 = \{1 + (C/DD) + (OD/DD)\} / \{(C/DD) + (BR/DD) + (OD/DD)\}$

Derived from the relationship $mm3 = \{1 + (C/DD) + (TD/DD) + (OD/DD)\} / \{(C/DD) + (BR/DD) + (OD/DD)\}$

Table 5D : Performance of the Models (Combination)

1990-91 Month	Forecasts								Actuals	
	Aggregative Model		Disaggregative Model						mm1	mm3
	mm1	mm3	C/DD	BR/DD	TD/DD	OD/DD	mm1@	mm3#		
April	1.064595	3.039389	1.399374	0.84054	4.41485	0.023179	1.0705	3.0213	1.0588	2.9689
May	1.049798	2.957322	1.443442	0.87615	4.35978	0.013918	1.0531	2.9214	1.0442	2.9106
June	1.072909	3.003650	1.286270	0.83818	4.20882	0.016934	1.0756	3.0410	1.0817	3.0493
July	1.084724	3.139551	1.345282	0.81028	4.35588	0.022056	1.0871	3.0874	1.0953	3.1532
August	1.065482	3.087349	1.352013	0.84696	4.45085	0.014915	1.0691	3.0795	1.0486	3.0678
September	1.079268	3.134804	1.205857	0.84239	4.21511	0.011988	1.0765	3.1224	1.0743	3.1124
October	1.051067	3.000010	1.333806	0.90003	4.39560	0.016876	1.0444	2.9974	1.0356	2.9996
November	1.048544	2.989032	1.344230	0.90250	4.40206	0.013304	1.0431	2.9909	1.1047	3.1547
December	1.108082	3.167849	1.236880	0.76597	4.17714	0.036389	1.1148	3.1631	1.1025	3.1566
January	1.106333	3.218977	1.405867	0.74204	4.61877	0.027234	1.1186	3.2420	1.0934	3.1377
February	1.066530	3.035118	1.420349	0.86397	4.53631	0.039570	1.0585	3.0106	1.1274	3.2070
March	1.119997	3.228211	1.386276	0.69120	4.48534	0.059258	1.1445	3.2437	1.1502	3.2501

Notes : @ Derived from the relationship $mm1 = \{1 + (C/DD) + (OD/DD)\} / \{(C/DD) + (BR/DD) + (OD/DD)\}$

Derived from the relationship $mm3 = \{1 + (C/DD) + (TD/DD) + (OD/DD)\} / \{(C/DD) + (BR/DD) + (OD/DD)\}$

Table 6 : Performance of the Models

Sample Stati-	Box-Jenkins Model				Bilinear Model				State-Dependent Model				Combination			
	Aggregative Model		Disaggregative Model		Aggregative Model		Disaggregative Model		Aggregative Model		Disaggregative Model		Aggregative Model		Disaggregative Model	
	mm1	mm3	mm1@	mm3#	mm1	mm3	mm1@	mm3#	mm1	mm3	mm1@	mm3#	mm1	mm3	mm1@	mm3#
ME	-0.00803	-0.01277	-0.00816	-0.02170	-0.00857	-0.01099	-0.01124	-0.03655	-0.00788	-0.01392	-0.00479	-0.01799	-0.00287	-0.01389	-0.00507	-0.02060
RMSE	0.02377	0.02269	0.02372	0.02177	0.02308	0.02348	0.02534	0.02510	0.02805	0.02365	0.02601	0.02556	0.02429	0.02503	0.02624	0.02638
MAE	0.01767	0.01790	0.01683	0.01600	0.01700	0.01847	0.01706	0.01812	0.02165	0.01832	0.01826	0.01696	0.01820	0.01831	0.01831	0.01693
Um	0.09210	0.03196	0.09549	0.09842	0.11135	0.02203	0.15777	0.20847	0.03207	0.03112	0.02681	0.04716	0.09380	0.00311	0.03030	0.06070
Us	0.16553	0.17936	0.16393	0.09188	0.17583	0.17845	0.17638	0.11248	0.00510	0.00844	0.00737	0.00003	0.13880	0.00900	0.00980	0.00000
Uc	0.74237	0.78868	0.74058	0.80970	0.71282	0.79952	0.66586	0.67905	0.96283	0.96044	0.96582	0.95281	0.76740	0.96000	0.95980	0.93930
U	0.02437	0.02306	0.02434	0.02232	0.02366	0.02389	0.02609	0.02584	0.02766	0.02546	0.02693	0.02674	0.02914	0.02543	0.02684	0.02698

Notes: @ Derived from the relationship $mm1 = \{1 + (C/DD) + (OD/DD)/(C/DD) + (BR/DD) + (OD/DD)\}$

Derived from the relationship $mm3 = \{1 + (C/DD) + (TD/DD) + (OD/DD)/(C/DD) + (BR/DD) + (OD/DD)\}$

The Dynamic Interrelationship between Fiscal and Trade Deficits in India: 1970-71 to 1990-91

M.S. Mohanty & Himanshu Joshi*

The purpose of this paper is to examine the nature and extent of linkage between the fiscal deficit and trade balance in India and to evaluate the effectiveness of fiscal policy in restoring external balance. Drawing upon the model of Mansur, the paper shows that a programmed reduction of fiscal deficit would lead to fall in trade deficit in the medium term. The empirical evidence shows that stabilising the proportion of fiscal deficit to nominal GDP at 6.4 per cent would lead to appreciable improvement in the trade balance in the medium term, even though this would be at the cost of recession in the growth of real output to some extent.

The balance of payment consequences of large fiscal imbalances in India have been a subject matter of debate for quite sometime in the context of the on-going macro-economic reforms. There has been a fair degree of consensus in both academic and policy making circles that a persistently large fiscal deficit is unsustainable from the point of view of inflation and balance of payment disequilibrium. Yet disagreement persists on the soundness of logic involved in the perceived relation between the fiscal deficit and for this purpose, whether it should be the deficit of the Central Government alone or that of public sector as a whole, and more importantly, on the long-run implications of a sustained reduction in deficit on the current account. It is in this context that the stabilisation programme and fiscal adjustments raise a number of crucial issues on the effects of fiscal deficit on aggregate demand and absorption and its consequential impact on external balance.

The purpose of this paper is to investigate the nature and extent of linkage between the fiscal deficit and external imbalance in India, and in this context to evaluate the effectiveness of fiscal policy to restore external imbalance. Because the problem of current account imbalance in India is essentially a problem of trade imbalance, the attempt here is to find an explanation for the movement of trade gap through changes in Government financial imbalances. Although the primary focus of the

* Shri M.S. Mohanty and Dr. Himanshu Joshi are Assistant Adviser and Research Officer respectively, in the Department of Economic Analysis and Policy.

current stabilisation programme is on Central Government deficit, the macro-economic implications of fiscal policy changes, in principle, would depend upon the fiscal balance of the entire public sector because of its intertemporal relation with the private sector's consumption and investment function, total absorption, output generation, and import linkage. The paper, thus considers the fiscal deficit of the public sector defined as the broad measure of resource gap of Centre, States and their public enterprises as the relevant policy variable for explaining the trade gap. The present paper drawing upon the model of Mansur (1989) shows that a programmed reduction of fiscal deficit would lead to a reduction of trade deficit in the medium-term. The organisation of the paper is as follows. Section I presents an overview of the fiscal and trade developments in India followed by a formal analysis of the linkage between fiscal deficit and external payment gap in Section II. Section III outlines the structure of the model while Section IV deals with the analysis of the empirical results and simulation experiments. The final section presents the concluding observation of the study.

Section I

An Overview of Fiscal Deficit and External Imbalances

Throughout the eighties the stance of fiscal policy became increasingly expansionary reflecting, in part, the conscious policy to stimulate domestic demand and output and partly the compulsions of socio-economic objectives. Not only deficits became chronic and large, the emergence of several structural rigidities in the revenue and expenditure spheres as also in financing of budgetary gaps brought about an unsustainable fiscal situation detrimental to external balance. At the bottom of the problem lay the failure of the public sector to generate adequate revenue of its own, an accelerated growth in public expenditure and the resulting resource gap to be met by borrowing and seigniorage. Total public sector expenditure (Centre, States and Plan expenditure of public enterprises) increased nearly five-fold between 1980-81 to 1990-91 and accounted for as much as 34 per cent of GDP in 1990-91 as against 27 per cent in 1980-81. Revenue receipts lagged far behind although as a proportion to GDP it moved up from 18.1 per cent in 1980-81 to 21.2 per cent in 1990-91. Reflecting this, the fiscal deficit of the public sector which moved within the range of 5 to 7 per cent of GDP till late seventies expanded to over 12 per cent by 1990-91.¹ As may

¹ The measurement of public sector deficit in this analysis is same as that in the Economic Survey which reflects the overall borrowing requirement of the Government sector and their public sector enterprises.

be observed from Statement 1 much of the increase in deficit stemmed from the Government sector and more particularly under the impact of soft budget constraint of the Central Government.

Growing public sector financial imbalance could be identified with three broad set of interrelated macro-economic imbalances having implications on the external sector. First, a substantial part of the Central Government deficit had to be financed by borrowings from RBI adding to the inflationary pressure in the economy. The proportion of monetised deficit to Central Government fiscal deficit remained as high as one-third on an average throughout the eighties and its ratio to reserve money was preponderantly high at 83 to 85 per cent. Given the fiscal stimulus to the money supply and inflation, the relative price shift made imports cheaper and exports less competitive *via-a-vis* the major competitive countries. Second, a major impact of the fiscal deficit on the trade account can be traced to the aggregate demand generating effect of the Government expenditure and its financing which changed in their composition over the past decade. It has by now been well recognised in the Indian context that the expansionary impact of the budgetary operation does not depend on the level of deficit alone but also on the size and composition of the budget as different elements of government expenditure and revenue generate different net increases to and withdrawals from demand (Rakshit 1987, 1991). In making a deficit of given amount an increase in government expenditure on goods and services will have a greater expansionary impact on aggregate demand than an increase in transfer payments which merely redistribute purchasing power among various private sector groups. Indeed this particular aspect of the government finances played a dominant role in India, as total expenditure of public sector on final consumption and investment grew at very high rate of 19.3 per cent between 1980-81 to 1988-89. Increased expenditure of the public sector on wages and salaries and net purchase of goods and services has been largely responsible for growing excess demand and the consequent import leakage.

Finally, the rising public sector deficit was associated with a pronounced fall in the saving rate of public sector particularly during the second half of eighties which also witnessed a substantial increase in its investment rate. As may be seen from Statement 2 the public sector saving-investment gap at its present level of 8 to 9 per cent to GDP roughly equals the household sector's domestic net savings. This had two opposing kind of effects on the financial balance of the private corporate sector which is supposed to be a more productive sector. On the one hand, absorption by the public sector of the entire household savings

has financially 'crowded out' the corporate sector whose savings almost stagnated below 2 per cent of GDP during the last decade. On the opposite side through various forward linkages public investment seems to have 'crowded in' corporate investment with the resulting spill over of savings-investment gap in the economy to the current account.

Although, a large part of the problem concerning external imbalances in India could be attributed to extraneous developments such as two oil-shocks during the last decade, growing protectionism and loss of competitiveness of exports due to adverse exchange rate movements, fiscal policy was no doubt a dominant factor causing deterioration in the trade balance. A casual look at the year to year movement in the public sector deficit and trade deficit as a percentage of GDP in Statement 3 indicates that, notwithstanding the fluctuations in the latter, the period of fiscal expansion coincided with the growing trade gap. The period 1970-71 to 1990-91 was, in fact, characterised by two distinct phases of internal and external balance. During much of the period beginning with 1970-71 till late seventies external trade account showed remarkable stable condition and the trade gap on an average remained within 1 per cent of GDP. During this period fiscal deficit of the public sector remained almost stable as a percentage of GDP. However, beginning with the second oil shock and the rapid deterioration in fiscal situation that followed in the eighties, the trade account experienced continuous pressures and the trade deficit shot up to an average of 3.4 per cent of GDP between 1979-80 to 1990-91.

The presumed link running from fiscal deficit to trade deficit can be better examined by subjecting them to more formal test of causality. Such a test carried out on the annual data with the help of three methods indicate that trade deficit is significantly correlated with the past values of public sector deficit and this relationship was found to be statistically significant.

The empirical estimates of the F test statistics corresponding to the three tests mentioned above are presented in the table below :

Tests of Causality (Fiscal Deficit to Trade Deficit)

Type of test	F-test	
	Degrees of freedom	F Statistic
1. Sim's test	(2,9)	7.64*
2. Geweke, Meese, Dent test	(2,9)	3.98**
3. Granger's test	(2,14)	5.76**

Note: * Denotes that the statistic is significant at 5%.

** Denotes that the statistic is significant at 6%.

The empirical estimates of test statistics in respect of the three different tests reported in the table prove that fiscal deficits do indeed cause trade imbalances. In other words, in the medium run, expanding fiscal deficits could be considered responsible for developments in the external account. In the short to medium run, therefore, fiscal compression could be considered as a viable stabilization strategy.

Section II

Linkage between Fiscal Deficit and Current Account Imbalance

Before examining the empirical validity of the perceived logic underlying the adjustment policy, it would be interesting to look at the formal analytical framework that attempts to establish the transmission of fiscal imbalances into the current account. Because fiscal policy forms a vital aspect of domestic economic policy, any change with respect to Government taxation, expenditure and financing requirement would significantly affect the complex behavioural interaction in the economy. The consequential impact on the balance of payment would depend on the degree of integration of the domestic economy with the world economy. Apart from this indirect effect, there could be a direct and immediate impact of change in budgetary policy on the current account. For example, increased expenditure on Government imports particularly defence and outflow on account of interest payment on external debt would worsen the current account balance while import taxes and external grants would improve it.

More important than the direct impact is the implication that fiscal expansion holds for trade balance through its effect on prices, aggregate demand, real output, private sector absorption and imports. It is this

aspect which forms the fundamental link in the adjustment programmes. Various theoretical and empirical models have been used in the literature for systematic analysis of the nature and extent of relationship between the fiscal deficit and the current account imbalances. These relate to Cambridge Economic Policy Group (1976), Milne (1976), Kelly, (1982), Bartoli (1989) and Mansur (1989).

In an open economy the macro-economic nature of the external imbalance can be presented in terms of the well known national account identity such as;

$$X + R - M = S_p - I_p + (T - G)$$

The current account deficit comprising the gap between exports (X) plus private international transfers (R) and imports (M) is equal to the excess of private sector savings (S_p) over investment (I_p) plus the Government's overall budgetary gap.² The term (T-G) relates to the entire public sector balance which in the Indian context represents the deficits of the Governments at all levels (Centre, States and Local) and that of departmental and non-departmental enterprises. The identity indicates that the deficit on the current account is the outcome of changes in policies affecting the overall deficit of the government and the deficit or surplus of the private sector.

The fiscal approach to balance of payment adjustment assumes full exogeneity of private sector in the determination of current account.³ Consequently, changes in current account is explained by the changes in the Government's financial balance. Private investment as well as consumption are lumped together into a single private expenditure function with private disposable income as the main explanatory variable. The causal structure of model involves determination of demand, output and employment in response to changes in fiscal policy, export and import propensities in a multiplier process. Export and import propensities are determined by world demand and relative prices of imports, respec-

2 The derivation of this basic identity is such that $Y-E=X-M$ where

$Y = C + I + G + (X-M)$ and E represents the aggregate spending or absorption by domestic residents denoted by $C+I+G$. Alternatively, by deducting net Taxes T from both sides of the second identity and adding net international transfers R to both the sides we obtain $Y + R - T = C + I + (G-T) + (X+R-M)$. Translating this into saving and investment identity we have $X + R - M = S - I + (T-G)$ where $S = Y + R - T - C$.

3 For example, the Cambridge Economic Policy Group (1976), Milne (1977) and Kelly (1982).

tively, where the domestic price is a function of several variables reflecting the cost structure and monetary conditions arising from the fiscal policy decisions.

In recent years, however, several new generation models have challenged the assumption of constancy of the private sector financial balance in the event of growing deficit and debt of the public sector. In these models the impact of fiscal policy on aggregate demand and its spill over to the external account is analysed in an intertemporal framework by establishing behavioural relations between the Government sector deficit and private sector consumption and investment demand. Government expenditure financed by debt is seen to be expansionary as the present generation expand their budget constraint in response to Government budget deficit. These models also highlight the negative impact of inflation tax (monetisation of debt) on the private savings and the 'crowding-in' effect of the Government capital expenditure on private investment.

In the light of the foregoing the emphasis of the stabilisation programme in 1991-92 and 1992-93 on demand management through fiscal restraint becomes fairly clear. The underlying causal link of the programme involves reduction in fiscal deficit to be pursued by cut down in expenditure that would in turn dampen the domestic demand and private sector absorption stemming from the income effect. Consequently, imports would fall in response to demand deceleration. This, along with reduction in monetisation of Government debt would bring down the price level and the relative price shift would improve the trade account by cutting down import demand and stimulating exports. The model presented in the following section attempts to test this causal path and considers Government, real, monetary and trade sectors simultaneously to assess the impact of fiscal operations on the external trade account.

Section III

The Model

The macro-economic model adopted in the study can be symbolically expressed as follows :

Price Functions

$$\log P_t = a_0 + \log M_t - a_2 \log Y_t - a_3 (\log M_t - 1/\log P_{t-1}) \quad 1$$

Tax Functions

$$\log TM_t = B_0 + B_1 (\log IMP_t + \log PRM_t) \quad 2$$

$$\log TD_t = r_0 + r_1 (\log Y_t + \log P_t) \quad 3$$

Import Demand Function

$$\log IMP_t = \Theta_0 + \Theta_1 \log AD_t - \Theta_2 \log (PRM_t/P_t) - \Theta_3 D_t \quad 4$$

where, $AD_t = ABSP_t + EXP_t + G_t/P_t$ is aggregate absorption

Real Income Determination Function

$$\log Y_t = W_0 + W_1 \log ADD_t + W_2 \log Y_{t-1} \quad 5$$

Private Sector Absorption Function

$$\log ABSP_t = n_0 + n_1 \log (Y_t - R_t/P_t) \quad 6$$

Identities

$$ADD_t = ABSP_t + EXP_t - IMP_t + G_t/P_t \quad 7$$

$$R_t = TM_t + TD_t + NONT_t \quad 8$$

$$DC_t = (G_t - R_t - DNB_t) + DC_{t-1} + (CP_t - CP_{t-1}) \quad 9$$

$$M_t = NR_t + DC_t - OTM_t \quad 10$$

$$TB_t = EXP_t - IMP_t \quad 11$$

Where

P	=	price level (GDP deflator)
TM	=	nominal import duty
TD	=	nominal domestic taxes
IMP	=	real imports
Y	=	real income
ABSP	=	real private sector absorption (derived from identity for AD)
ADD	=	aggregate real demand for domestically produced goods.
R	=	total revenue in nominal terms
DC	=	domestic credit
M	=	broadly defined supply of money

TB	=	trade balance, are endogenous variables; and
G	=	nominal government expenditure
PRM	=	import price index
NONT	=	non-tax revenue (nominal)
DNB	=	non-bank finance (nominal)
NR	=	net foreign assets (nominal)
OTM	=	sum of bonds and other items (net); are exogenous in the system.

The model outlined over Equation 1 through 11 consists of six behavioural functions and a set of five identities. This simple but instructive model, initially developed and estimated by A.H. Mansur for Philippines appears an equally plausible framework in the context of India.

Equation 1 is the price equation derived by inverting the general form of a money demand function and corresponds with the widely used approach in this context. The demand for real money balances equation adopted here is quite simple in that it includes real income and lagged real money balances (to allow for partial adjustment) as its core determinants. We do not include an opportunity cost variable (especially, the market rate of interest) for obvious reasons.

Equations 2 and 3 exhibit tax functions that eventually become the major determinants of Government revenues in the second identity. In equation 2, customs (or import) revenues are determined by the level of contemporaneous nominal imports while total domestic taxes in equation 3 is specified to be a function of nominal gross domestic product (GDP). Other taxes (especially, export taxes) and non-tax revenues are clubbed together and are assumed to be determined exogenously.

Equation 4 determines real imports based upon aggregate demand (as a sum of private sector absorption, real exports and real government expenditure), domestic prices relative to international prices and a dummy to capture out of way disturbances on account of oil shocks of the early and later seventies. Defining the import function this way enables one to draw a distinction between private and public sector contributions to absorption and import demand. An interesting feature of this specification is that since aggregate absorption includes government expenditure, it would become possible to disentangle the effects of excessive government expenditure on imports and its spill over onto the trade account.

Equation 5 helps in determining the contemporaneous level of real income depending upon the variations in the aggregate demand for domestically produced goods in combination with the lagged value of real income itself (which exemplifies short-run capacity constraints). This kind of specification also allows one to have variations in real output through demand management policies. Equation 6 is the private sector absorption function which is (that is, both consumption and investment expenditure) assumed to be dependent upon real disposable income.

Identities 7 through 11 are familiar relationships needed to close the system. Identity 7, viz., absorption of domestically produced goods is the sum of private absorption, real exports and real government expenditure adjusted for real imports. Identity 8 viz., government revenues are made up of import and domestic taxes as well as other exogenously determined taxes and non-tax revenues. Identity 9 links government fiscal operations to money supply. In other words, if the government deficit cannot be financed by non-banking sources then it is financed either by domestic borrowings from the Central Bank or from rest of the banking system; both of which increase domestic credit and hence, money supply. Identity 10 is an accounting identity. Ex-post, the broad money supply at a given point of time can be written as a sum of net foreign exchange assets of the banking sector and domestic credit adjusted for other monetary instruments not included in the definition of money (specifically, net non-monetary liabilities). Identity 10 is the trade balance.

The central focus of attention in our analysis will be upon the expenditure policy of the Government (which includes Central and State governments as well as state and central public sector enterprises). Specifically, we will study the transmission effects of reduced government expenditures (and therefore, fiscal deficit) upon the trade account in the external sector.

The model could be expected to operate as follows. Increased government expenditure leads not only to increased money supply (through its part financing by the Central Bank) but also raises the aggregate real domestic demand. This would eventually translate into higher level of real income, price and also real imports. Imports would be influenced through a combination of three factors viz., higher aggregate demand due to increased government expenditure, increased private sector absorption stemming from income effect and the relative price shift in favour of imports owing to domestic inflation. The data employed in estimating the behavioural equations 1 through 6 pertains to the period 1970-71 to 1990-91 and are presented in the annex to the paper.

Section IV

Empirical Estimates of the Structural Model

Each behavioural equation in the model was empirically estimated by the method of Ordinary Least Squares (OLS). It was felt that owing to the relatively small size of the sample period, the gain in consistency from using more sophisticated methods other than OLS would not compensate for the bias arising out of inadequate specification. The empirically estimated equations in the model are as follows:

1. Price Equation

$$\log P_t = 4.904 + \log M3_t - 0.5904 \log Y_t - 0.6785 \log (M_{t-1}/P_{t-1})$$

(2.57) (2.63) (5.51)

$$\bar{R}^2 = 0.99 \quad DW = 1.30 \quad SEE = 0.047906$$

2. Government Sector (Tax functions)

$$a) \log TM_t = -2.208 + 1.1266 (\log IMP_t + \log PRM_t)$$

(-5.18) (24.68)

$$\bar{R}^2 = 0.97 \quad DW = 0.44 \quad SEE = 0.18836$$

$$b) \log TD_t = -3.068 + 1.081 (\log Y_t + \log P_t)$$

(-17.28) (72.73)

$$\bar{R}^2 = 0.99 \quad DW = 1.06 \quad SEE = 0.0500$$

3. Demand for Imports

$$\log IMP_t = -10.5659 + 1.67626 \log AD_t - 0.2277 \log (PRM/p)_t - 0.1601 D_t$$

(-14.84) (27.82) (-2.73) (-3.20)

$$\bar{R}^2 = 0.98 \quad DW = 1.15 \quad SEE = 0.07186$$

where,

$$AD_t = ABSp_t + EXP_t + G_t / P_t$$

4. Real Income

$$\log Y_t = -0.1832 + 0.9627 \log ADD_t + 0.0575 \log Y_{t-1}$$

(-4.27) (36.95) (2.15)

$$\bar{R}^2 = 0.99 \quad DW = 1.11 \quad SEE = 0.00391$$

5. Private Sector Absorption

$$\log ABSp_t = 1.0422 + 0.8971 \log (Y_t - \{R_t/P_t\})$$

(5.17) (51.55)

$$\bar{R}^2 = 0.99 \quad DW = 2.41 \quad SEE = 0.01762$$

Identities

$$ADD_t = ABSp_t + EXP_t - IMP_t + G_t/P_t$$

$$R_t = TM_t + TD_t + NONT_t$$

$$DC_t = (G_t - R_t - DNB_t) + DC_{t-1} + (CP_t - CP_{t-1})$$

$$M_t = NR_t + DC_t - OTM_t$$

$$TB_t = EXP_t - IMP_t$$

The price equation derived from a simplified original demand for money function is statistically significant and all the estimated coefficients have the expected signs. The estimated coefficients indicate that an increase in real output and the stock of real money balances in previous period reduces the price level. The estimated elasticities in the tax functions with respect to taxes on trade and domestic activity are both equivalent to almost unity, showing that the growth in revenue from these sources move in tandem with their respective determinants.

The real output determination equation based upon the aggregate demand for domestically produced goods and lagged value of real output gives an excellent statistical fit. The merit of this specification is that it allows aggregate demand to influence real output which aids in tracing the direct impact of real government expenditure upon real output. The import demand determination equation has statistically significant estimators for the coefficients of log AD and the dummy variable; the coefficient

of the relative price term is also statistically significant with a correct sign. The dummy variable introduced to capture the shift in intercept due to oil shocks of the early and late 70's turns out to be negative but statistically significant. The estimated elasticity of imports with respect to the aggregate demand is more than unity exhibiting the relatively faster pace at which the variations in aggregate demand influence the demand for imports in the economy. The real government expenditure, being a part of AD is instrumental in affecting the demand for imports directly.

The private sector absorption determination function is also found statistically significant, with the elasticity of real absorption with respect to real disposable income being less than unity.

Simulation Exercises

The model adopted in the present study can throw a good deal of light upon the effects of different policy actions on key endogenous variables (those variables that evolve within the system). It can, for instance, show how trade balance, price level and output would behave under presumptions of different modes of financing (viz., whether the deficit is financed by seeking recourse to the domestic banking system or external sources) of the budget deficit. In the present context, and in view of the great need for eliciting responses in the wake of the ongoing stabilization programme, we concentrate on tracing the effects of reduced public sector deficit upon key variables such as real output, prices and the real trade balance. The estimated model consisting of six behavioural functions and five identities was subjected to simulation (Static and Dynamic (Gauss-Seidel method)) and the following goodness of fit statistics were obtained for selected endogenous variables.

India: Summary Statistics for Selected Endogenous Variables, Based upon Baseline Simulation Over Period 1971-72 - 1990-91

Endogenous Variables	Mean Absolute Error (%)		Root Mean Square Error (%)	
	Static	Dynamic	Static	Dynamic
log P	0.693	0.931	1.068	1.281
log TM	2.223	2.078	2.718	2.690
log TD	0.219	0.283	0.269	0.352
log IMP	0.619	0.866	0.754	0.982
R	1.449	1.717	1.920	2.335
log GDP	0.288	0.316	0.348	0.378
log ABSp	0.370	0.413	0.458	0.495
M3	0.689	1.953	0.894	2.480
ADD	3.467	3.805	4.183	4.593

From the results reported in the table above, it is noticed that the model fits the data very well and the goodness of fit statistics such as MAE (Mean Absolute Error) and RMSPE (Root Mean Square Percent Error) are all of acceptable orders of magnitude.

The tracking performance of the model can also be adjudged from the graphs appended at the end of the paper. Each of these graphs show three plotted trajectories - two correspond to the actual and estimated values arising out of the model and the third termed as experimental corresponds to the case when the fiscal deficit is experimentally pegged at 6.4 per cent of nominal GDP since 1978-79 for reasons given below. The estimated trajectory of most of the variables particularly price, taxes, output, domestic demand, credit and money supply closely follow their actual historical paths suggesting the excellent tracking performance of the model.

In the simulation experiment conducted in this study, we alter the path of government expenditure (which is an exogenous variable) in such a way that the resultant fiscal deficit as a proportion of nominal GDP is uniformly pegged at 6.4 of nominal GDP over the period 1978-79 to 1990-91. It is noteworthy that during this period the fiscal deficit showed signs of excessive expansion and was perhaps instrumental in creating a number of macro-economic imbalances. Incidentally the current programme of stabilisation underway envisages a medium-term target of fiscal deficit corresponding to the early part of the second half of

the seventies. This necessitates consistently large reductions in Government expenditures over the period so considered. The impact of experimentally pegging the public sector deficit at 6.4 per cent of the nominal GDP over the period mentioned above on key endogenous variables, especially, price level, real output, money supply, domestic demand, credit and the real trade balance is documented in the table presented below:

India: Effect of maintaining the public sector deficit uniformly at 6.4 per cent of Nominal GDP over 1978-79 to 1990-91

Major Endogenous Variables	Direction of Impact	Description
Price Level	+ve, -ve	Initially marginally positive (increase) for about one year and then consistently negative. (decrease).
Output	-ve, +ve	Initially negative for six years but positive thereafter.
Domestic demand	-ve, +ve	Initially negative for six years then positive throughout.
M3	-ve	Negative throughout.
DC	-ve	Negative throughout.
Trade Deficit	+ve, -ve	Initially positive (decrease) for 6 years then negative (increase) throughout.

Given the public sector deficit at 6.4 per cent of nominal GDP, the key endogenous variables, on an average, would have recorded the following alteration in their respective paths of growth.

- 1) Price level would have grown at a compound rate of 3.01 per cent annum over the period 1978-79 to 1990-91 as compared with 9.22 per cent per annum in the actual scenario.
- 2) While the real value of output over the first six years is observed to decline as compared with the original scenario, it recovers and remains higher in the remaining period of the concerned period. On the whole, the real cumulative value of output over the period

1978-79 to 1990-91 in the experimental scenario would have been about 3.9 percent more than that realised actually over the said period.

- 3) Just as in the case of real output, real aggregate domestic demand, too, would have grown slower over the first six years only to pick up later in the remaining years of the said period. On the whole, in the long run, it would have been cumulatively about 3.75 per cent more than that observed actually over the corresponding period in the original scenario.
- 4) The cumulative nominal value of broad money (M3) and domestic credit (DC) over the period 1978-79 to 1990-91 would have been observed to be about 21.5 percent and 18.2 percent less, respectively, as compared with that actually realised over the same period in the original scenario.
- 5) Finally, not the least, on the external front, the real trade balance appears to improve appreciably over the first six years only to deteriorate in the remaining period of the said period. Over the period as a whole, it is observed to deteriorate cumulatively by about 4.60 per cent as compared with the original scenario.

Section V : Concluding Observations

Reduction in Government expenditures with an objective to curtailing aggregate demand is certainly a good medium term policy prescription, especially, from the point of view of stabilising the external imbalance. The effects of fiscal compression brought about by reducing Government expenditures and, therefore, fiscal deficit works through the economic system as follows. Upon a reduction in Government expenditure, there occurs a reduction in domestic demand which, in turn, also depresses private sector absorption and, hence, overall import demand. This effect is further reinforced by improved relative prices of traded goods stemming from a reduced rate of domestic inflation as a sequel to a sharp reduction in domestic credit. The foregoing analysis proves that managing of the overall public sector deficit should be invariably of critical importance in the overall policy framework. Undisputedly, while the onus of achieving the desired degree of fiscal compression would rest with the Central Government, the complete success of the programme would also depend upon the expenditure policies of the State Governments and public sector enterprises which generate high demands in the system. In the longer run, however, the situation changes in response to a continuously decelerating tempo of prices. The rate of output growth

as well as aggregate demand move up owing to the increase in the rate of real private absorption coming in the wake of increased value of disposable income that the private sector obtains⁴. The increased activity in the economy then leads to the deterioration in the trade balance⁵.

The empirical evidence obtained in the study substantiates the above mentioned logic. Stabilising the proportion of fiscal deficit to nominal DGP at 6.4 per cent over the period 1978-79 to 1990-91 leads to an appreciable improvement in the trade balance in the medium run even though this comes at the cost of recession in the growth of real output to some extent. Such a conclusion proffers strong support for the thesis that excessive monetary expansion corresponding to an increased propensity of real absorption in the economy can and will spill over to the external account and, hence, underscoring the need for a sound fiscal and monetary policy for management of an economy's BOP account in the medium run. In the longer run, as discussed above, the strategy of continued fiscal compression may not succeed in stabilising imbalances.

In view of the fact that in the medium term the recession in the growth of real output does not seem to be overly pronounced, the general apprehension about the likely adverse fallout of following a policy of strict fiscal discipline on the actual growth in real output may not be viewed as serious under certain circumstances such as severe BOP crisis. In the context of the perception about the rate of inflation upon following such a course of action, it may be observed that the sensitivity of the same *vis-a-vis* the slated compression levels appears to be encouraging. Controlling inflation would, inter-alia, also require a supplementary programme of deterrence to stymie distortionary expectations. This requires supply management in certain important pockets as well as an effort at building of credibility of announcements by having well defined rules for the same.

4 This outcome is reminiscent of Ricardian behaviour. In essence, as Government absorption declines in keeping with its fiscal correction programme, net total absorption in the long run does not necessarily fall owing to the countervailing increase (crowding-in) in private sector absorption.

5 Sundarajan (1986) obtains a similar result and explains the outcome on the basis of 'negative liquidity' effect.

Statement 1 : Gross Fiscal Deficit as percentage to GDP

Years	Centre	States	Combined Govt.+
1970-71	2.9	2.1	4.2
1971-72	3.6	2.3	5.1
1972-73	4.9	2.6	5.0
1973-74	2.5	3.2	4.0
1974-75	2.9	1.7	3.8
1975-76	3.2	1.4	3.9
1976-77	4.1	1.7	4.9
1977-78	4.4	2.1	5.5
1978-79	5.1	2.5	5.4
1979-80	4.1	2.5	5.0
1980-81	6.1	2.7	7.9
1981-82	5.4	2.5	6.6
1982-83	6.0	2.8	6.2
1983-84	6.3	3.1	7.7
1984-85	7.5	3.5	9.5
1985-86	8.3	2.9	8.5
1986-87	9.0	3.2	10.5
1987-88	8.1	3.4	9.8
1988-89	7.8	3.0	9.1
1989-90	7.9	3.4	9.6
1990-91	8.4	3.6	10.1
1991-92 (RE)	6.1	3.3	7.9
1992-93 (BE)	4.9	3.0	6.6

Source : 1. Finances of Government of India, Reserve Bank of India Bulletin.

2. Finances of State Governments, Reserve Bank of India Bulletin.

+ Figures of combined deficits have been adjusted for inter-governmental transfers.

Statement 2 : Saving-Investment Gap in the Economy (as percentage of GDP at market prices)

	Household Sector			Private Corporate Sector			Public Sector			Total		
	S	I	Gap(-)/ Sur- plus(+)	S	I	Gap(-)/ Sur- plus(+)	S	I	Gap(-)/ Sur- plus(+)	S	I*	Gap(-)/ Sur- plus(+)
1970-71	11.3	8.2	3.1	1.5	2.4	-0.9	2.9	6.5	-3.6	15.7	16.6	-0.9
1971-72	11.8	8.5	3.3	1.6	2.8	-1.2	2.8	7.1	-4.3	16.2	17.3	-1.1
1972-73	11.2	7.2	4.0	1.5	2.6	-1.1	2.6	7.3	-4.7	15.4	15.9	-0.5
1973-74	13.8	8.0	5.8	1.7	2.6	-0.9	2.9	7.7	-4.8	18.4	19.1	-0.7
1974-75	11.8	8.5	3.3	2.0	3.7	-1.7	3.7	7.6	-3.9	17.4	18.3	-0.9
1975-76	13.4	8.5	4.9	1.3	2.7	-1.4	4.2	9.6	-5.4	19.0	18.8	0.2
1976-77	15.0	9.3	5.7	1.4	1.5	-0.1	4.9	10.1	-5.2	21.2	19.7	1.5
1977-78	15.3	9.2	6.1	1.4	2.4	-1.0	4.3	8.2	-3.9	21.1	19.5	1.6
1978-79	17.0	10.6	6.4	1.5	2.2	-0.7	4.6	9.5	-4.9	23.2	23.3	-0.1
1979-80	15.2	9.9	5.3	2.1	2.6	-0.5	4.3	10.3	-6.0	21.6	22.1	-0.5
1980-81	16.1	9.7	6.4	1.7	2.5	-0.8	3.4	8.7	-5.3	21.2	22.7	-1.5
1981-82	14.9	8.8	6.1	1.6	5.7	-4.1	4.5	10.5	-6.0	21.0	22.6	-1.6
1982-83	13.1	5.9	7.2	1.6	5.7	-4.1	4.4	11.3	-6.9	19.1	20.6	-1.5
1983-84	14.0	7.6	6.4	1.5	3.3	-1.8	3.3	9.8	-6.5	18.8	20.0	-1.2
1984-85	13.7	5.9	7.8	1.7	4.4	-2.7	2.8	10.8	-8.0	18.2	19.6	-1.4
1985-86	14.5	7.4	7.1	2.0	5.5	-3.5	3.2	11.1	-7.9	19.7	22.1	-2.4
1986-87	13.9	6.1	7.8	1.7	5.3	-3.6	2.7	11.7	-9.0	18.4	20.6	-2.2
1987-88	16.5	8.6	7.9	1.7	3.6	-1.9	2.2	10.4	-8.2	20.3	22.4	-2.1
1988-89	17.1	9.8	7.3	2.1	4.2	-2.1	2.0	9.9	-7.9	21.1	23.4	-2.3
1989-90	18.0	8.9	9.1	2.7	4.3	-1.6	1.6	10.2	-8.6	22.2	23.5	-1.3
1990-91	18.4	9.8	8.6	2.6	4.5	-1.9	0.9	9.7	-8.8	21.9	24.0	-2.1

* : Including errors & omissions

Notes : S and I stand for gross domestic saving and gross domestic capital formation, respectively.

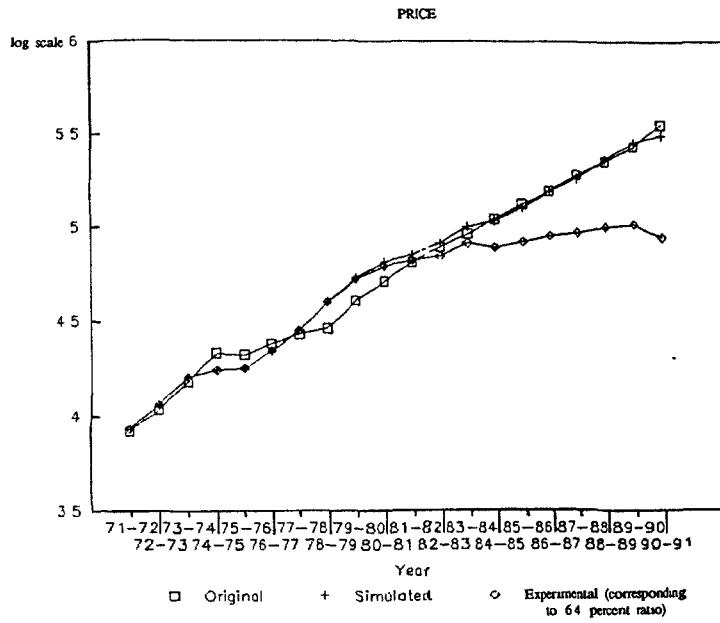
Source : National Accounts Statistics, CSO.

**Statement 3 : Fiscal Deficit, Trade Deficit, Current Account Balance
as percentage of GDP**

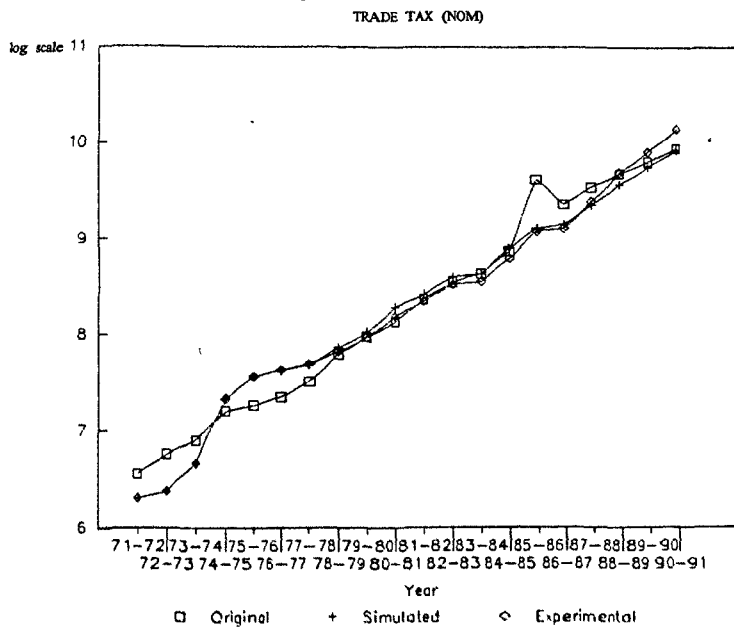
Years	Public Sector Fiscal Deficit	Trade Deficit	Current Account Balance
1970-71	5.3	1.0	-1.0
1971-72	6.6	1.0	-0.9
1972-73	6.2	0.3	-0.5
1973-74	5.3	0.8	+2.1
1974-75	5.4	1.8	-0.9
1975-76	6.1	1.5	+0.4
1976-77	6.4	0.4	+1.8
1977-78	6.3	0.6	+1.8
1978-79	7.3	2.1	+0.2
1979-80	7.5	3.0	-0.2
1980-81	9.0	4.6	-1.2
1981-82	8.3	4.1	-1.5
1982-83	9.5	3.8	-1.3
1983-84	10.0	3.3	-1.1
1984-85	11.1	2.9	-1.2
1985-86	10.4	3.7	-2.3
1986-87	12.3	3.2	-2.0
1987-88	11.6	2.8	-1.9
1988-89	11.2	3.4	-2.6
1989-90	12.2	2.8	-2.2
1990-91	12.7	2.6	-2.3
1991-92	10.6	1.2	-0.8
(Estimated)			

Source : 1. Economic Survey, Government of India,
2. Report on Currency and Finance, Reserve Bank of India.
3. Annual Report, R.B.I.

Dynamic Simulation

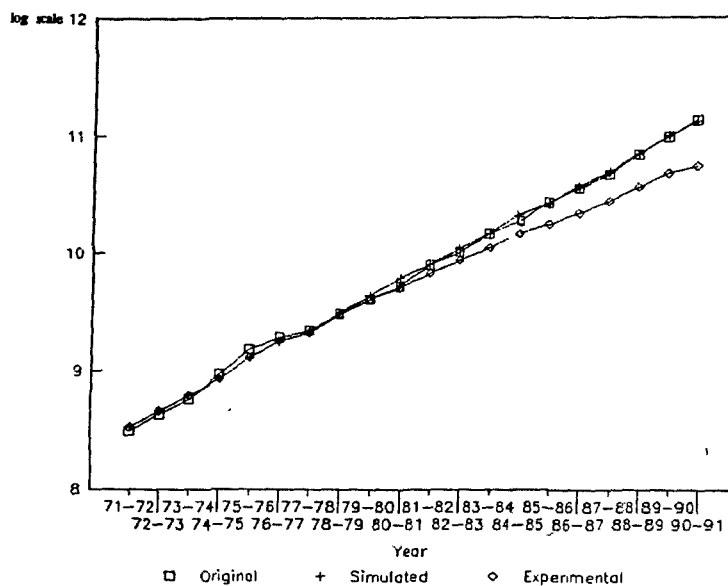


Dynamic Simulation



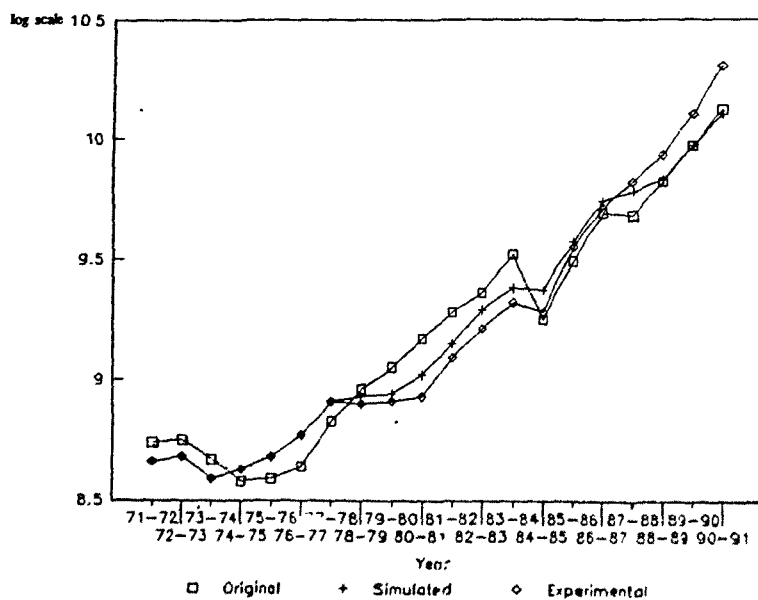
Dynamic Simulation

DOMESTIC TAX (NOM)



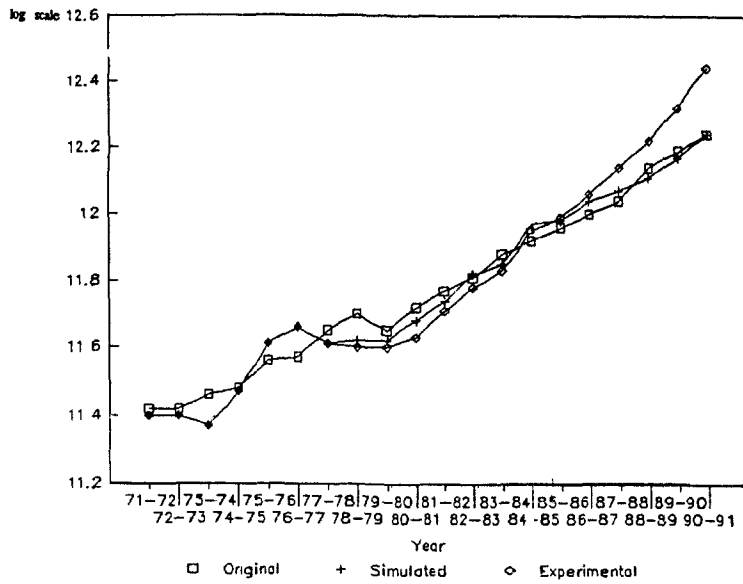
Dynamic Simulation

REAL IMPORTS



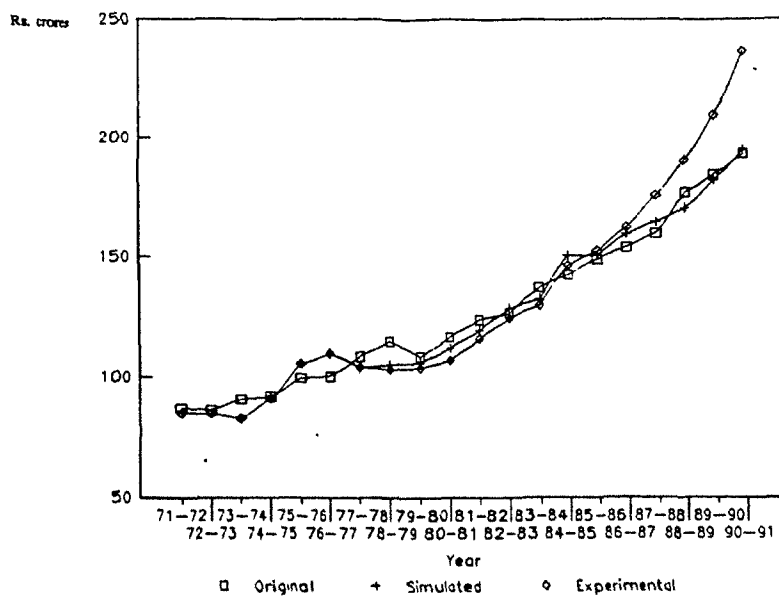
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REAL GDP



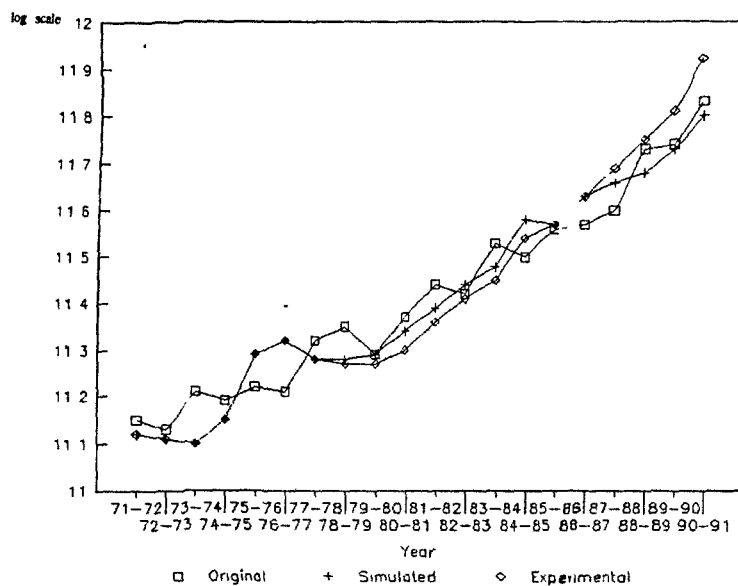
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REAL DOMESTIC DEMAND



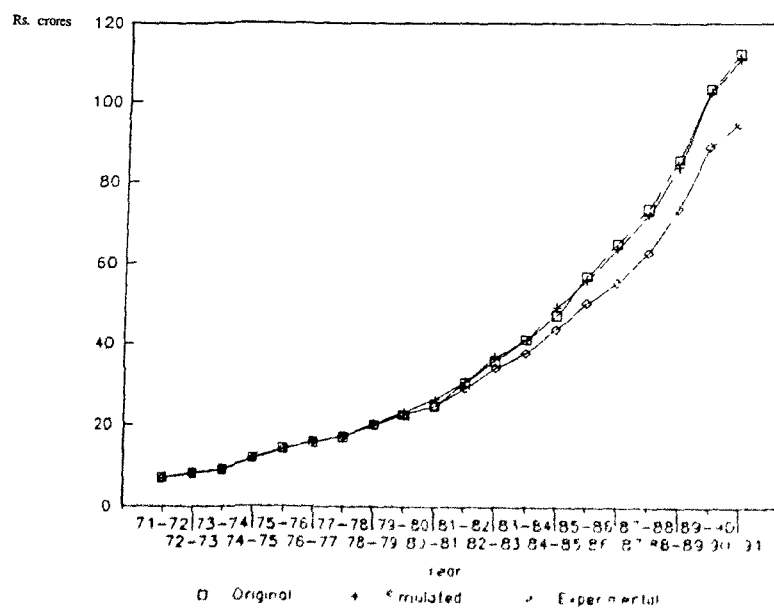
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REAL PRIVATE ABSORPTION



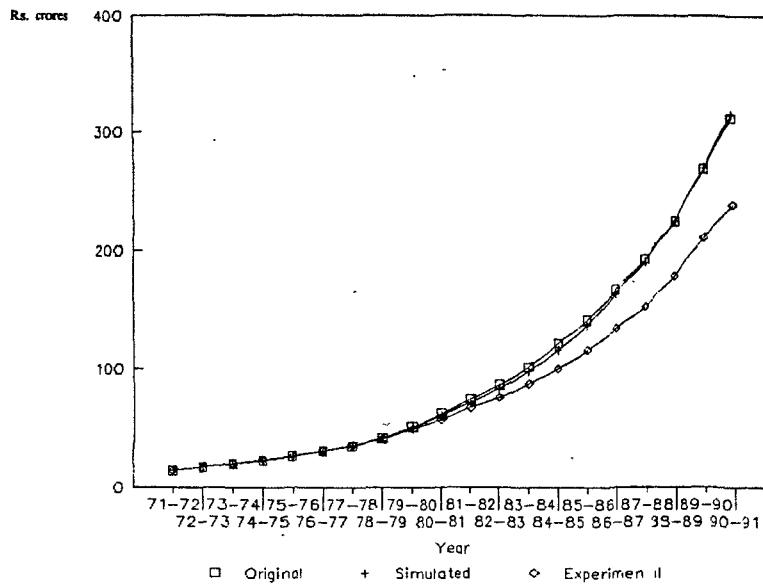
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NOMINAL REVENUES



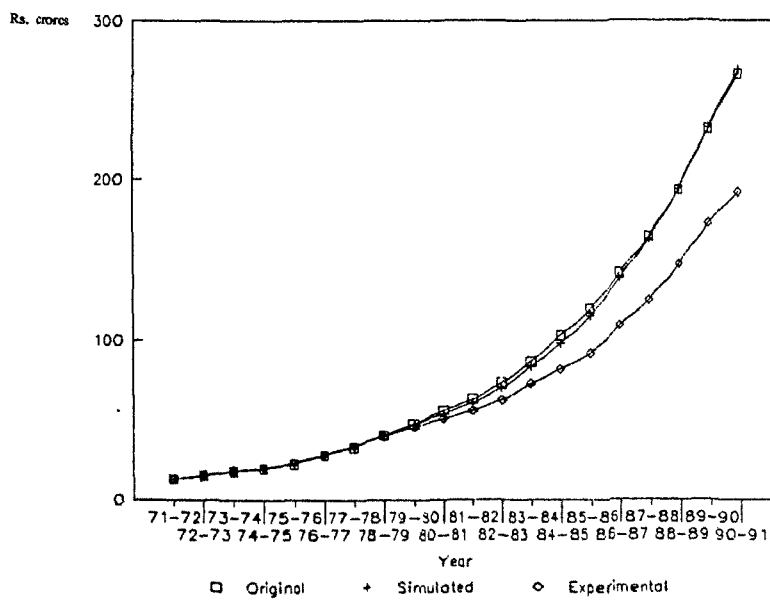
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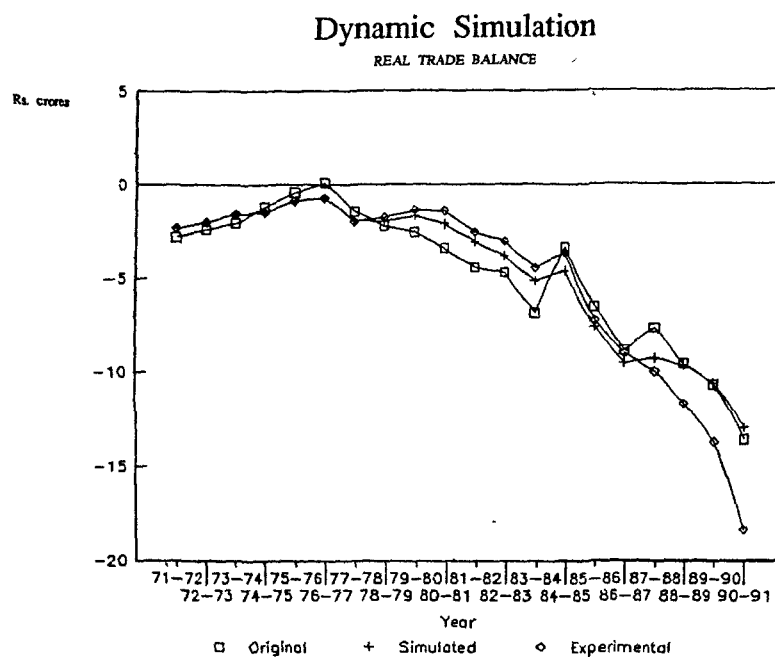
DOMESTIC CREDIT



Dynamic Simulation

BROAD MONEY





References

1. Bagchi Amaresh and Nayak, Pulin B (1990) : Public Finance and Planning Process, The Indian Experience, paper presented at International Seminar in Public Economics, New Delhi.
2. Bhattacharya B.B. (1992) : The Behaviour of Public Debt in India: A Macroeconometric Analysis, *Journal of Quantitative Economics*, Vol. 8 No. 1 (January 1992), 29-50.
3. Bhattacharya B.B. and S. Guha (1990) : Internal Public Debt of Government of India, Growth and Composition, *Economic and Political Weekly*, Vol. XXV No. 15 April 14.
4. Bartoli, Gloria (1989) : Fiscal Expansion and External Current Account Imbalances, *Fiscal Policy, Stabilisation and Growth in Developing Countries*, eds. Blejer I Mario and Chu Ke-Young. International Monetary Fund, September 1989.
5. Blejer M.I. and Cheasty A (1991) : Analytical and Methodological issues in the Measurement of Fiscal Deficit, *Economic Journal*, December 1991.

6. Cripps Francis and Godley Wynne (1976) : A Formal Analysis of the Cambridge Economic Policy Group Model, *Economica*, Vol. 43, No. 172, November, 1976.
7. Kelly R. Margaret (1982) : Fiscal Adjustment and Fund supported programme, 1971-80, *Staff Papers*, IMF Vol. 29, No. 4, December, 1982.
8. Kelly R. Margaret and Beveridge W.A. (1980) : Fiscal Content of Financial Programmes supported by Stand-by Arrangements in the Upper Credit Tranches, 1969-76, *Staff Papers*. IMF Vol. 27, No. 2 June 1980.
9. Mansur H.A. (1989) : Effects of a Budget Deficit on the Current Account Balances. The case of the Phillippines, *Fiscal Policy, Stabilisation and Growth in Developing Countries*, Eds, Blejer I Mario and Chu. Ke Young, IMF, September 1989.
10. Milne, Elizabeth (1977) : The Fiscal Approach to the Balance of Payments, *Economic Notes* (Siena) Mote dei Paschi di Siena, Vol. 6, (No. 1, 1977).
11. Mookherjee, Dilip (1992) : Indian Economy at the Crossroad, *Economic and Political Weekly* Vol. XXVII, Nos. 15 and 16, April 11-18.
12. Morrison K. Thomas (1982) : Structural Determination of Government Budget Deficits in Developing countries, *World Development*, Vol. 10, No. 6, 1982.
13. Rakshit, Mihir (1987) : On the inflationary impact of Budget Deficit, *Economic and Political Weekly*, Annual Number, Vol. XXII, No. 19, 20 and 21.
14. Rakshit Mihir (1991) : The Macroeconomic Adjustment Programme, A critique, *Economic and Political Weekly*, Vol. XVII, No. 34, August 24.
15. Sau, Ranjit (1992) : Making of a Payments Crisis: India 1991 *Economic and Political Weekly*, Vol. XXVII No. 33, August 15.
16. Sundarajan V. and Thakur Subhash (1980) : Public Investment Crowding out and Growth: A Dynamic Model Applied to India and Korea, *Staff Papers*, IMF Vol. 27, No. 4, December, 1980.
17. Sundarajan V (1986) : Exchange Rate Versus Credit Policy, Analysis with a Monetary Model of Trade and Inflation in India, *Journal of Development Economics*, Vol. 19.
18. Zietz J and Pemberton, D.K. (1990) : The U.S. Budget and Trade Deficit: a Simultaneous Equation Model, *Southern Economic Journal*, Vol. 57, No. 1.

ANNEXURE

Basic Data Employed by the Study

(Rs. crores, except indices)

Year	P	Y	GNP
1970: 1	43.9100	90426.0	89465.0
1971: 1	46.3000	91339.0	90281.0
1972: 1	51.0000	91048.0	89997.0
1973: 1	59.8000	95192.0	94395.0
1974: 1	69.6000	96297.0	95885.0
1975: 1	67.8000	104968.	104666.
1976: 1	72.0000	106280.	105996.
1977: 1	76.5000	114219.	113903.
1978: 1	77.9000	120504.	120302.
1979: 1	89.7000	114236.	114379.
1980: 1	100.000	122427.	122772.
1981: 1	110.200	129889.	129928.
1982: 1	119.200	133915.	133299.
1983: 1	128.200	144865.	143861.
1984: 1	138.620	150469.	149292.
1985: 1	149.090	156600.	155399.
1986: 1	159.210	162711.	160975.
1987: 1	173.050	170041.	167703.
1988: 1	187.360	187725.	185543.
1989: 1	200.150	197419.	195237.
1990: 1	224.630	206739.	204557.

Legend :

- 1) P = GDP deflator (Base 1980-81=100)
- 2) Y = Gross Domestic Product (real; 1980/81=100)
- 3) GNP = Gross National Product (constant prices; 1980/81=100)

Data Source :

Economic Survey, Government of India.

National Accounts Statistics, CSO., Report on Currency and Finance, RBI.

Basic Data Employed by the Study

Year	IMP	EXPT	UVI	UVE
1970: 1	1826.00	1404.00	.353000	.450000
1971: 1	2055.00	1580.00	.328000	.460000
1972: 1	2161.00	1994.00	.342000	.512000
1973: 1	2866.00	2356.00	.489000	.622000
1974: 1	4482.00	3195.00	.845000	.780000
1975: 1	5362.00	4180.00	.991000	.839000
1976: 1	5450.00	5135.00	.963000	.890000
1977: 1	6037.00	5440.00	.880000	1.00300
1978: 1	7806.00	5568.00	1.00000	1.00000
1979: 1	9753.00	6308.00	1.14100	1.05400
1980: 1	12877.0	6666.00	1.34200	1.08500
1981: 1	14260.0	7766.00	1.33100	1.24100
1982: 1	15856.0	9137.00	1.36300	1.32000
1983: 1	17093.0	10168.0	1.25800	1.51000
1984: 1	16860.0	11959.0	1.61700	1.69800
1985: 1	21164.0	11578.0	1.58800	1.70800
1986: 1	22669.0	13315.0	1.39400	1.79400
1987: 1	25692.0	16396.0	1.60000	1.95400
1988: 1	34202.0	20647.0	1.85500	2.32200
1989: 1	40642.0	28229.0	1.89800	2.62400
1990: 1	48320.0	33178.0	1.94100	2.92500

1) IMP = Nominal imports.

2) EXPT = Nominal exports.

3) UVI = Unit Value Index of Imports (Base 1978-79=100)

4) UVE = Unit value index of exports (Base 1978-79=100).

Basic Data Employed by the Study :

Year	NONT	TD	TM
1970: 1	1312.00	4228.00	524.000
1971: 1	1434.00	4879.00	696.000
1972: 1	1634.00	5584.00	857.000
1973: 1	1597.00	6393.00	996.000
1974: 1	2537.00	7890.00	1333.00
1975: 1	2913.00	9763.00	1419.00
1976: 1	3427.00	10778.0	1554.00
1977: 1	3870.00	11413.0	1824.00
1978: 1	4526.00	13104.0	2424.00
1979: 1	4862.00	14759.0	2924.00
1980: 1	4719.00	16435.0	3409.00
1981: 1	6283.00	19842.0	4300.00
1982: 1	8553.00	22123.0	5119.00
1983: 1	9464.00	25942.0	5583.00
1984: 1	11285.0	28772.0	7041.00
1985: 1	13506.0	33741.0	9526.00
1986: 1	15283.0	38065.0	11475.0
1987: 1	16509.0	43274.0	13702.0
1988: 1	18789.0	51119.0	15806.0
1989: 1	25422.0	59656.0	18036.0
1990: 1	22970.0	68503.0	20800.0

- 1) NONT = Non-tax revenue of the Government
2) TD = Domestic taxes.
3) TM = Trade taxes.

Basic Data Employed by the Study

Year	G	R
1970: 1	8352.00	6064.00
1971: 1	10068.0	7009.00
1972: 1	11256.0	8075.00
1973: 1	12244.0	8986.00
1974: 1	15750.0	11760.0
1975: 1	18933.0	14095.0
1976: 1	21196.0	15759.0
1977: 1	23127.0	17107.0
1978: 1	27692.0	20054.0
1979: 1	31124.0	22545.0
1980: 1	36845.0	24563.0
1981: 1	43738.0	30425.0
1982: 1	52747.0	35795.0
1983: 1	60829.0	40989.0
1984: 1	72825.0	47098.0
1985: 1	83961.0	56773.0
1986: 1	100790.	64823.0
1987: 1	112169.	73485.0
1988: 1	130048.	85714.0
1989: 1	158107.	103114.
1990: 1	179443.	112273.

Legend :

- 1) G = Government expenditure
- 2) R = Revenues earned by the Government.

Basic Data Employed by the Study :

Year	M3	DC	NR
1970: 1	11019.0	11976.00	551.00
1971: 1	12692.0	13989.00	619.00
1972: 1	15013.0	16738.00	583.00
1973: 1	17624.0	19730.00	663.00
1974: 1	19550.0	22730.00	414.00
1975: 1	22480.0	26244.00	939.00
1976: 1	27781.0	30654.00	2528.00
1977: 1	32906.0	34949.00	4445.00
1978: 1	40112.0	41462.00	5338.00
1979: 1	47226.0	51025.00	5343.00
1980: 1	55774.0	62359.00	4730.00
1981: 1	62752.0	74094.00	2768.00
1982: 1	73184.0	86419.00	1828.00
1983: 1	86525.0	101360.00	1646.00
1984: 1	102933.0	121296.00	3134.00
1985: 1	119394.0	141124.00	3872.00
1986: 1	141632.0	166761.00	4815.00
1987: 1	164275.0	191857.00	5672.00
1988: 1	193493.0	224357.00	6800.00
1989: 1	230950.0	268855.00	6818.00
1990: 1	265828.0	311962.00	8672.00

Legend :

- 1) M3 = Broad Money Supply.
- 2) TD = Total Domestic Credit.
- 3) TM = Net Foreign Exchange Assets of the Banking Sector.

Contemporary Issues in Indian Agriculture

Mridul Sagar*

This paper examines contemporary issues in Indian agriculture and provides a brief review of some of the existing studies on them. It also sets out an agenda for future research on the problems of Indian agriculture.

This paper seeks to: (1) examine issues in Indian agriculture which are of contemporary relevance, (2) provides a brief review of some of the existing studies seeking to address these issues, and (3) set an agenda for future research on Indian agriculture by distinguishing the issues which have been, relatively speaking, settled in the literature from the issues which are either neglected or required to be further probed into.

Part I of the paper gives a broad picture of the trends in agricultural production, including the emerging crop and regional imbalances. It *inter-alia* covers demand and supply projections over the medium-term as also the issue of supply response. Part II discusses some macro-economic issues and the links that macroeconomic aspects have with the agricultural sector. Terms of trade, pricing policy, fiscal policy, credit policy and the exchange rate policy are among the specific issues covered in this section. Part III of the paper addresses issues specific to the agricultural sector. Input supplies, marketing support including public procurement, stocking and distribution policies, irrigation systems are discussed in this section apart from the overall inadequacy of investment in the agricultural sector. Part IV raises the issues of technology, sustainability and institutional arrangements and covers themes such as land reforms, share tenancy, drought prone areas, ground water-resources.

* Shri Mridul Sagar is Research Officer in the Department of Economic Analysis and Policy. The author is indebted to Dr. S.L. Shetty and Dr. A. Vasudevan for their valuable suggestions on an earlier draft of this survey paper. Discussion with Dr. Madhura Swaminathan, Dr. Mahendra Dev and Dr. M.H. Suryanarayana on some of the issues were most helpful. Thanks are also due to Carol Patrick for her patient assistance with the manuscript.

I

Agricultural Production: Crop & Regional Imbalances

Overall, in the planning era, Indian agriculture has made some significant strides. Cereals production has increased at a rate higher than the population growth and has effectively negated the grim forebodings of the "Malthusian spectre of famine" or the famous Paddock brothers' forecast of starvation.¹ With the rise in cereals production the country was able to build up a sufficient level of food-stocks for buffer and operational needs, which together with the Public Distribution System (PDS) has provided a food security net to the poor. The per capita availability of some other essential commodities like sugar, edible oils, tea, eggs, milk and cloth has also improved.

Notwithstanding these achievements, the structural limitations of Indian agriculture have posed numerous problems. The long-term growth remains of the order of 2.6 percent which compares poorly with the performance of most Asian countries.² Crop and regional imbalances persist and continue to pose a major challenge to planning of the sector. Particularly disconcerting is the near stagnation in production of coarse cereals after the mid-sixties and the failure to step up production of pulses and oilseeds so as to eliminate demand-supply gap of these crops. Growth imbalances in these areas do not augur well for incomes of farmers in dryland/rainfed regions. They also have ramifications for nutritional status of the country's population. Regional imbalances continue to be a source of concern to planners. Breakthrough in rice production in Eastern India during the eighties has raised hopes for a more even dispersal of agricultural growth. However, stagnation of foodgrains output in Southern and Western regions for the large part of the eighties has posed a new challenge for the agricultural policy. While there is hope that crop imbalances could be corrected to some extent, the overall agricultural growth may continue to be below desired levels, since the aggregate supply response is known to be poor in Indian case. This opens up the possibility that demand-supply gap would persist and even accentuate in respect of some of the crops.

Trends in production*Overall growth :*

Agricultural growth in India is conventionally measured in terms of physical output aggregated as per Index Numbers of Agricultural Production (base Triennium ending 1969-70 = 100) published by the Directo-

rate of Economics and Statistics, Ministry of Agriculture. Ideally speaking agricultural growth should be measured in terms of growth of GDP in agriculture. But, researchers in India conventionally rely on index numbers, as crop-wise or region-wise disaggregated statistics on value added are not available for the agricultural sector. This is not a very satisfying situation, even though at an aggregate level the overall agricultural growth follows a trend rate of 2.6 per cent per annum, irrespective of whether GDP composition is used or the index number of all-crops is used. The results may alter significantly if the regional spread is considered. Even if the index number approach is to be persisted with, the base year for the Index Numbers of Agricultural Production should be revised from a distant triennium ending 1969-70 to a more recent one.³

It is now generally recognised that growth in agriculture prior to the introduction of new technology in mid-sixties came primarily from expansion in area under cultivation, and after the introduction of new technology came largely from improvement in yields. Therefore, comparison of production growth rates prior to the mid-sixties without reference to area and yield growth rates does not have much relevance in the context of appropriateness of new technology.

The hypothesis of deceleration in agriculture growth after the mid-sixties has been examined in several studies. Patnaik (1981) showed a marked deceleration in the production of foodgrains and total agricultural produce. The result, however, was not based on trend fitting exercise but on mere comparison of end-points. Ahluwalia (1985) found that growth has decreased slightly in post-green revolution period but the decline is statistically insignificant. Kannan (1984) presented evidence of deceleration in the case of non-foodgrains and no deceleration in case of foodgrains. This has been further confirmed by Sagar and Raghavan (1989).

The hypothesis that growth rates have not fallen after the introduction of new technology has also received some support in recent years. Srinivasan (1979) found that foodgrains output has neither accelerated nor decelerated over the period 1949-50 to 1977-78. Alagh and Sharma (1980) adopt 1969-70 as a cut-off point for new technology and showed that in many States as well as at an aggregate all India level, growth during 1969-70 to 1978-79 was faster than in the period 1960-61 to 1969-70. Samant (1983) found that foodgrains production growth of 2.2 per cent per annum for 1950-51 to 1967-68 increases to 2.5 per cent when the period is extended to 1980-81. Sharma and Gandhi (1990) also find some deceleration from the pre-green revolution period to the

first half of the post-green revolution period. However, they find that growth has picked up again since 1975-76.

Although an extensively documented literature exists in support of as well as against the hypothesis of deceleration, the issue is far from settled. Two main methodological issues continue to impart an indecisive edge to the debate. Foremost is the very question of what constitutes the new-technology period. Most economists believe it was the mid-sixties, leading to a widely accepted practice of taking 1964-65 as the terminal year of the pre-green revolution phase. The consensus breaks down here as official bodies, as also may individual researchers, take 1967-68 as the beginning year of post-green revolution period, ignoring the two intervening years on the ground that they were drought years. Saggar and Raghavan (1989) point out that this is a questionable practice. They point out that the post-green revolution period includes as many as eight years of drought of moderate or severe intensity, in contrast to only one drought year in the pre-green revolution period beginning 1949-50. Thus, the practice of excluding the initial two drought years of post-green revolution period, "removes the bias against deceleration hypothesis, but does not correct the bias in its favour". A discordant note on different grounds has been also sounded by Alagh and Sharma (1980), who point out that as HYV area increased to a sizable proportion only since 1969-70, that year should be adopted as a cut-off point. The question of what constitutes a break in period should also be studied by using many a structural break tests suggested in the econometric literature including the F-tests, the cusums method and cubic spline functions. However, in attempting to resolve the question a clear distinction should be maintained between weather-adjusted growth rates and pure trend growth rates. Also, attempt should be made to find out the structural break leading to a revival of the growth in the past decade or so as there is growing evidence that the trend deceleration may have been reversed.

A second methodological issue arise from the choice of the trend function used to compute growth rates. These issues have been dealt with in detail in Dandekar (1980) and in other contributions in the cited volume. However, while some attempts have been made to compute logistics and gompertz curves in recent literature, they have by far been motivated by the preditions for complex techniques. Others have continued to adopt the widely accepted practice of computing exponential growth rates citing *a priori* grounds. Both these positions are untenable as the trend fitting choice can be determined by the Box-Cox procedure.

Crop imbalances :

Across major crops, the benefits of new technology still appear to have been limited to wheat. Examining the trends, wheat was distinctly placed on a higher growth path after the mid-sixties with growth exceeding 5 per cent per annum (Table 1). Rice increased at an annual average compound growth rate of 3.3 per cent in the eighties, which is a significant improvement over the long-term trend growth rate of 2.6 per cent. However, the production of wheat decelerated during the eighties. In the case of coarse cereals, there was a marked decline in area at the rate of one per cent in the post-green revolution period. This trend has accelerated during the eighties and there has been almost no improvement in yield. Low levels of pulses production also continues to be a source of concern though of late its production has been stepped up. Among non-foodgrains, distinct breakthrough was achieved in case of oilseeds during the late eighties in terms of both, production and productivity while commensurate growth could not be achieved in case of fibres and sugarcane.

In studying the crop imbalances, a crucial constraint is the near absence of information on changes in cropping pattern. A recent attempt by Mruthyunja and Kumar (1989) show that area under paddy and wheat has continuously increased in many States at the cost of coarse cereals, millets, pulses and in some areas cotton. Green revolution appeared to have narrowed the base of agricultural production. Research impetus should be geared to deciphering the area shifts. An attempt could be made to discover the optimal cropping-mix from the national view-point that is consistent with the goals of regional spread and dispersed development. This is admittedly a difficult area of research, but one which can be of immense utility to planners.

Regional Imbalances :

Reduction in regional imbalance has been one of the avowed goals of Indian planning through successive Five Year Plans. As in the case of other sectors, regional imbalance in agriculture was also sought to be corrected through intervention. With this objective in view, a number of crop and area specific programmes were launched.⁴ While regional imbalance still persists, there is evidence that agricultural growth has been more evenly dispersed in recent years. Eastern India had been a source of concern in this respect. Slow growth was long perpetuated in this region by low public expenditures on irrigation (Ravishankar, 1990) and the peculiar topological problems, such as the problem of

managing surface irrigation in high rainfall areas (Berkoff, 1990). However, the breakthrough in rice production during the eighties on account of special attention being paid to the Eastern region since the Sixth Plan (Saggar and Raghavan, 1989) has helped to improve growth in this region. In contrast to the relatively faster growth in Eastern India in recent years, growth is slowing down in the traditionally fast growing Northern region. Furthermore, there was an absolute stagnation of foodgrains production in Southern India during the eighties. Bhalla and Tyagi (1989), studying the spatial pattern of agricultural production in 19 crops found evidence of falling share of output for all Southern and Western States except Andhra Pradesh.

While change in the regional dispersal of agricultural growth in recent years has been noticed, very little has been done to investigate the causes behind this change. Factors behind faster growth in Eastern India and stagnation in Southern and Western India during the eighties need to be fully identified to help evolving measures to address them.

Emerging imbalances

From a situation of import-dependency prior to the mid-sixties, the country has succeeded in increasing food production and attaining near self-sufficiency during the eighties. However, the medium-term demand projection made by the Planning Commission for foodgrains at 208 million tonnes in 1997, 240 million tonnes by the turn of the century and 283 million tonnes by 2007 AD has re-opened the possibilities of foodgrain shortage. The annual increments in foodgrains would have to be stepped up to about 3.5 per cent per annum in the remaining period of this century. If agricultural prices continue to rise at a rate above the general price level, as indeed has been the case in last few years, the target growth of 3.5 per cent would be consistent with the 4 per cent increase in value added in agriculture during the nineties (Parikh, 1991). This means that there can be no scope for complacency on the farm front as the present production trends indicate that deficit in the cereals market may emerge by the turn of the century.

Short supplies are also likely to persist in the case of pulses and oilseeds despite efforts being made to improve their production. The Eighth Plan estimates the oilseeds requirements at 23 million tonnes in 1997 and 37 millions tonnes by 2007 AD, requiring a high growth of 5 per cent per annum. It may be of particular interest to note that with increased support prices for some cash crops, there has been a diversion of area from cereals to some oilseed crops. This may be a short-sighted

Table - 1: All India Compound Growth Rates

	1949-50 to 1989-90			1949-50 to 1964-65			1967-68 to 1989-90		
	A	P	Y	A	P	Y	A	P	Y
1. All Crops	0.67	2.66	1.60	1.61	3.13	1.30	0.26	2.74	2.02
2. Foodgrains	0.59	2.67	1.76	1.41	2.96	1.43	0.20	2.74	2.18
3. Non-Foodgrains	0.99	2.65	1.23	2.52	3.54	0.93	0.48	2.72	1.69
4. Rice	0.83	2.58	1.73	1.33	3.49	2.13	0.57	2.74	2.19
5. Wheat	2.53	5.82	3.21	2.68	3.99	1.27	1.91	5.12	3.14
6. Coarse Cereals	-0.19	1.23	1.28	0.90	2.23	1.29	-0.98	0.57	1.50
7. Pulses	0.70	0.76	0.06	1.90	1.39	-0.23	0.59	1.44	0.85
8. Oilseeds	0.82	2.11	0.87	2.69	3.18	0.20	0.16	2.15	1.51
9. Cotton	0.22	2.33	2.11	2.47	4.56	2.04	-0.34	2.18	2.53
10. Jute and Mesta	0.63	1.47	0.83	3.86	4.20	0.73	0.05	1.89	1.57
11. Sugarcane	1.76	2.97	1.19	3.27	4.26	1.12	1.34	2.78	1.43

* Derived from exponential trends
A: Area; P: Production; Y: Yield.

policy and may entail considerable welfare loss on account of trade diversion. Sugarcane and cotton requirements are expected to increase at 4 per cent per annum over the medium-term, but the demand may be met in the case of these two crops. But in all these cases of projections of demand-supply balances, research efforts have so far been made largely in terms of trend extrapolations. A serious endeavour to forecast demand must however be based on a complete demand system and the supply side must be endogenously modelled by accounting for constraints. Also no effort has so far been made to estimate the possible welfare impact of any trade diversion. It is necessary to examine whether the objective of self-sufficiency can be made consistent with welfare objectives. It must be ensured that the current thrust on the oilseeds sector is made consistent with efficiency requirements.

Supply Response

The problem of planning to eliminate demand-supply imbalances emerge mainly from the poor aggregate supply response for Indian agriculture. Olson (1960), Khatkhate (1962) and Raj Krishna (1967) have argued that though the responsiveness may be positive and high for individual crops, in aggregate they turn out to be negative or around zero because the substitution of resources among farm enterprises is easy but between agriculture and non-agricultural sector is difficult. In case of individual crops too, Cummings (1975) through a straightforward application of Nerlovian model found that rice supply elasticity with respect to price in Gujarat, H.P., Kerala and Maharashtra were negative. Similarly, there was perverse supply response for cotton in case of Assam, Kerala and Tamil Nadu. For oilseeds and tobacco the perverse response was registered in as many as 10 out of 19 States and 4 out of 7 States, respectively. Bapna (1989) and Bapna, Binswanger and Quizon (1984) found positive and significant aggregate supply elasticities (ASE) but these elasticities were low in magnitude. Narayana and Parikh (1979), specifying the farm supply response as an ARIMA process, show that irrigation turned out to be an important variable in explaining acreage response but the results do not support price sensitivity. However, the study being at the all-India level, suffers from high degree of aggregation. In an interesting study, Nowshirvani (1971) developed a model of risk and uncertainty under expected utility maximization to show that the farmer responds positively to low variability in yield and that area price response is ambiguous under uncertainty. In sum, whether or not the aggregate supply response is perverse, it is sufficiently low to rule out policy optimism for high growth. The economy will then have to continue supply management policies through stock management and imports in order to maintain supplies of essential commodities like cereals, pulses, edible oils, sugar, etc.

The issue of ASE appears to have been over-researched and its low value appears to be an accepted result. However, supply responses at regional levels could still provide useful input for farm decisions. It would, however, be more useful if further research in this area seeks to study supply responses under alternative sets of assumptions about farm households and their expectations. The supply response of profit maximising peasants may differ from those of risk averse peasants. The value attached to leisure also differs from peasant to peasant and can affect the supply response. The supply response of a share cropping peasant could altogether be a different issue that has to be addressed in a different manner. Similarly, the responsiveness may differ depending upon whether the expectations are adaptive, quasi-rational or rational.

(II)

Macro-Economic Issues and Agricultural Development

Macro-economic policy measures that may not be directly aimed at agriculture sector, can nevertheless affect the sector in a big way altering the production as well as social relations. In this section, we look into the manner in which these policies have been affecting the Indian agriculture, particularly through movements in terms of trade and through pricing, fiscal, credit and exchange rate policies. These issues have recently acquired added importance because of the on-going structural adjustment process.

Terms of Trade

Movements in terms of trade have often been observed to analyse policy biases between agricultural and non-agricultural sectors. Thamara-jakshi (1977) found a shift in terms of trade in favour of agriculture from 1968-69 to 1973-74. More recent estimates by Kahlon and Tyagi (1983) combining farm gate prices with weights obtained from the 26th Round of NSS (1978) however, show that terms of trade are now moving against agriculture.⁶ Nalini Vittal (1986) has raised some vital questions on Kahlon and Tyagi's methodology but there is an emerging consensus that both, the barter and the income terms of trade, have indeed moved against agriculture after 1973-74 (Kane, 1990). This is recognised in official statements of the Government of India as well. For instance, Commission of Agricultural Costs and Prices (GOI, CACP, 1990) observes that, "the disparity ratio between per-capita farm and non-farm incomes, which was nearly 1:2.2 in 1970-71 has widened to 1:4.2 in 1988-89. This was the situation in 1988-89 which was the year of record agricultural production. In earlier years it was much worse."

From the analytical point of view it is of interest to examine whether public policy has contributed to the adverse movement in terms of trade.

The hypothesis that this is indeed true would be validated if in the event of all prices being freely determined in open markets and the rate of taxation being neutral across commodities, the value added in agriculture as a ratio of GDP turns out to be higher than it is in the current case of market distortions. A useful approach is to compute Effective Protection Coefficients (EPCs). Ideally this coefficient should be zero, but if it turns out to be negative, there is a case to believe that policy biases are working against agriculture sector. Negative effective protection would imply that :

$$[(P_a - P_a^*)/P] + S \cdot C_a/P < 0$$

where, P_a is the domestic price of agricultural commodity under distortion, P_a^* is corresponding free market price, P is the general price level, S is the per unit subsidy as a fraction of cost C_a for the agricultural commodity. While, information on these coefficients is not readily available, computations of the Agriculture Operations Division, India Country Department, Asia Region, World Bank, show that "agriculture has been disprotected (effectively taxed) in India and the Government policies have had a strong bias against agriculture and in favour of industry (World Bank, 1991)". Computations made by Gulati (1989) which has formed an input in the World Bank Report cited above has calculated four variants of protection coefficients - nominal (NPCs), effective (EPCs), effective subsidy (ESCs), and adjusted nominal (ANPCs) for wheat, rice, cotton and groundnut.⁷ While these efforts are notable, further evidence is required to have a final view on this issue.

Pricing

The issue of pricing has attracted considerable attention in recent years. Two major causes may be mentioned for this. Firstly, there has been a rise in the political power of the formidable farm lobby. Nadkarni (1987) points out that in recent period procurement prices have generally exceeded the 'comprehensive' cost of production. Dantwala (1990) states "it is obvious that the strong pressure to revise the methodology of the cost of production of crops is for the benefit of big farmers and not for the benefit of the entire farming community, much less for the benefit of the people living in rural areas." Rao (1992) cautions against the support prices based on margins of "fair" returns, since they may generate political pressure for their enhancement.

Agricultural economists, in general, have questioned the appositeness of the new cost formula adopted by CACP for determining the procure-

ment/support prices. Valuation of labour at statutory wage rate or the actual market rate, whichever is higher, in disagreement with the Hanumantha Rao Committee (1990), has introduced an inbuilt mechanism which tends to exacerbate inflation as also skewness in income distribution in rural sector. Notwithstanding a general agreement on this count, no empirical evidence has been provided to quantify the impact of the new price policy of the CACP.

The impact of increased support prices on general price level in the economy can be traced in *ex-ante* as well as *ex-post* fashion, using the elasticity relationship between support and wholesale prices and the input-output relationship between commodities. Also, no serious attempt has been made to study the distributional consequences of new price policy despite the availability of consumption expenditure data from the NSS. The only study of note in this respect is that by Radhakrishna and Ravi (1992) who calculated class-specific inflation rates for 1989-90 and 1990-91 to show that in the latter year inflation had strikingly hurt the poor more. However, they do not extend their analysis to see the relationship in terms of food pricing policy. It will be useful to establish a link between support prices and class-specific inflation or the true cost of living that may be estimated from the complete demand systems.

The second cause for propelling the pricing strategy to the forefront of debate on agricultural issues emanate from the strong macro-linkages which have a potential to significantly alter the result of the stabilization-cum-structural reform package in vogue. Kahlon (1992) points out, "macro linkages result not only in agricultural prices affecting development in other parts of the economy, but more so the reverse; the macro-economy policy actions directed to some overall aspects of the economy can have serious repercussions on agriculture and agriculture prices." Fiscal, monetary, exchange-rate and credit policies can sizably affect the agricultural price scenario and through a feedback relationship affect all the sectors of the economy, including agriculture. This is a potentially challenging area of research. The impact of price policy need to be traced through small two or more sector macroeconomic or applied general equilibrium models.

The dilemma posed by structural reform policies is that it may necessitate an upward movement in agricultural prices to correct deteriorating terms of trade. This in turn has the potential to affect the poor segment of the population to a great degree as following Engel's Law this segment allocates a much larger proportion of their consumption budget to the food basket. If Liberalization is an acceptable economic prescription,

there is no justification for excluding the agriculture sector from its purview. The attendant benefits must flow to the farm producers as well. This would mean a rise in food prices in the economy as the depressed domestic prices rise to world levels. It would accentuate the class-specific inflation rates for the classes with lower expenditure levels. It would also impoverish the poor further, deteriorating their nutritional status and increasing rural poverty. The positive relationship between prices and rural poverty has been established following Dharm Narain (Mellor and Desai, 1986). The dilemma is accentuated by near zero aggregate supply elasticity. Furthermore, Thamarajakshi (1969, 1990) and Saith (1981) show marketed surplus to be a function of output. Dantwala, Mitra and Dharm Narain cogently argued that high agricultural prices in absence of suitable technology cannot raise production in a significant way and that in any case such an approach will injure the poor (Vyas, 1986). Saggarr and Raghavan (1989) add that in a country where only a small section of the population possess reasonable purchasing power, the objective of improving farm incomes will have to be balanced by the need to keep farm prices in check. Also, Rao (1986) warns that, "rising food prices do not necessarily increase the amount of food sold by the country to the towns; low supply elasticities can conspire with strong income effects on food demand within agriculture to produce perverse effects." This refrain, reflecting the limitation of excessive reliance on price policy, is well covered in the existing literature.

A plausible approach to meeting the challenge posed by the pricing dilemma is to remove the present negative protection to the agriculture sector and let prices correct themselves through increases staggered over the next few years. But, while allowing for such increases, it is immensely important that the poor and the vulnerable sections of population are provided a meaningful and workable safety net. This can only be achieved through increased allocation to poverty alleviation and employment generation programmes and through strengthening the Public Distribution System (PDS) to a narrowly targeted population.

Fiscal Policies

In analysing the impact of fiscal policies on agricultural sector, a major problem arises from the failure of the standard tax literature to account for dual economy analysis. Diamond and Mirrles (1971) model suggests that fiscal policy should tax away all profits by imposing a 100 per cent land rent. However, the limitation of availability of tax instruments to achieve this end is obvious and fortunately recognised. Following Sah and Stiglitz (1984, 1987) and Newberry (1990), we now

have dual economy tax models which give important insights into the issues of agriculture taxation, pricing and terms of trade. The Preobrazhensky option is now explicitly recognised in economic literature. This refers to the possibility that the State can and should increase accumulation by moving the terms of trade against peasants, i.e., by increasing the size of scissors to finance industrialization.⁸ Sah and Stiglitz (1984) have shown that while this proposition is valid, the second Preobrazhensky proposition that such a policy will not deteriorate the position of worker does not hold. Nevertheless, Sah and Stiglitz (1987) show that sector specific price discrimination can be conducted in a Pareto improving manner. In a model where government controls supply of food to industrial sector through marketing boards, the authors show that there is a lower and an upper bound to prices for welfare optimization. This provides a justification for price stabilization. However, a major problem with this kind of newly emerging tax literature is that the analysis suffers from a high degree of aggregation and is not able to capture the wide income and consumption inequalities which exist within the agriculture or industrial sector. The literature also makes assumptions such as complete control of government over grains market, so that it is able to impose price discrimination at will.

Notwithstanding the theoretical arguments cited above, tentative evidence from the real world suggests that Preobrazhenski's proposition is not valid even for the early Soviet industrialization (Elbman, 1975), not to speak of the recent LDC experiences in this regard. Moody, Mundle and Raj (1982) in a comparative economic analysis show that resource flows from agriculture contributed significantly to industrialization in Japan during 1888-1937 but not in the case of India during 1965-70. Taylor (1984) analysing inter-sectoral resource flows using Social Accounting Matrices for about 20 LDCs concludes that while resource flows out of agriculture were positive, these flows accounted for only a small fraction of non-agricultural capital formation. There is scope for more investigation in this area but whether or not Preobrazhenski proposition is possible or not, its desirability will have to be addressed in the context of social equity - an issue which no egalitarian democracy can ignore.

In framing fiscal policies in the Indian context it needs to be recognised that while increased resource mobilisation from agricultural sector is possible, the policy would have to be framed so that the burden falls not on agricultural sector as a whole but on large farmers alone. Mitra (1963, 1977), Gandhi (1966), Shetty (1971) and Raj Committee (1972) have all argued in favour of such a policy. A politically sustainable policy would have to be evolved for this as there appears to be no

reason why those who have benefited the most from public investments made in the agricultural sector, should now be allowed to escape from their due in this regard.

Perhaps a useful policy option in this context is to reduce input subsidies, especially on fertilizers and electricity, which were estimated at Rs. 4,600 crore and Rs. 4,000 crore, respectively, by the end of the Seventh Plan. The benefits of these subsidies seldom go to small and marginal farmers. Even if these subsidies are slashed to half their levels, the benefits are likely to be more in terms of aggregate supply response as well as in terms of distributional objectives, provided the amount saved by cuts in subsidies are directly targeted to small and medium farmers. Food subsidies would, however, have to be retained at present levels though they need to be much more narrowly targeted. In reducing input subsidies the ability to pay of the farmers must become part of the decision function. Otherwise, the stagflationary potential of structural adjustment programme would come to be realised.

Exchange Rate

Overvalued exchange rates is a common phenomenon in most developing countries including India. This imparts an anti-export bias in State intervention. The objective of managed float should be to allow for sufficient currency depreciation to ensure competitiveness of the products having reasonable comparative advantage. The problem with exchange rate reforms generally is that the monetary authorities are either unable to ensure a significant fall in the real exchange rate so as to induce sizable additional export demand or, more frequently, the real exchange rate fails to remain depressed for a long enough time to permit expansion of supply.

The failure of agro-exports to immediately and sufficiently respond to currency depreciation should be expected in the Indian context because short-run elasticities of supply are substantially smaller than long-run elasticities. The rationale for this essentially emerge from the Nerlovian framework. A significant share of agricultural exports is accounted by tree crops such as tea, coffee, cocoa, etc., and the supply response can not be immediate as even if acreage shift takes place, the trees do not begin to yield output for many years. There is an increasing realisation in India that exchange rates should be in alignment with purchasing power parities. Therefore, a conscious effort has been made to adjust the rupee downwards in the eighties. A large adjustment of about 20 per cent was in fact made in mid-1991 for this purpose. It was recognised

that these adjustments were necessary for raising agricultural export volume. Even though it will be sometime before the full impact of depreciation is felt on the export market, available data indicates that agricultural exports have gained some buoyancy.

Export of agriculture and allied activities is projected at Rs. 50,235 crore during the Eighth Plan. Surprisingly, agricultural exports is a neglected theme in research on Indian agriculture. Particularly, very little has been done to project surpluses or estimate import and export demand elasticities. It is time to take a hard look at these issues and other related topics like the tariff structure, export incentives and market developments.

Credit

The importance of credit in monetary as well as real economy management is now being increasingly recognised. Balakrishnan (1992) states, "while monetary policy may be somewhat of a blunt instrument when required to deal with inflation not only in India but in most credit-based market economies, its ability to maintain steady growth of output and to anchor rates of return in the economy are substantial." If contractionary demand management aimed at reducing liquidity and inflation, increasing real savings and switching resources from public to private sector so that the former does not crowd-out the more efficient latter sector is pursued through credit ceilings and hiking of interest rates, the agricultural sector cannot be insulated from its impact.

For agriculture sector, the potential cost of credit ceilings can be enormous. They can critically damage input or crop marketing activities besides affecting the capital formation activities of the sector. Often the credit ceilings are fixed on a seasonal basis and this may affect procurement if crops turn out to be above projections. In countries where institutional arrangements are not very efficient this may even lead to delays in payments to growers, as indeed was the case with Kenyan coffee growers during 1985 and 1986. Even though this is unlikely in India, the credit squeeze can still affect output. Perhaps for this reason, the overall credit ceilings have prompted authorities to clamp on industrial credit more than food credit or credit for seasonal agricultural operations. Similarly, the policy of differential rate of interest for agriculture and non-agricultural sector, and for weaker sections within the agricultural sector has helped in providing a cushion to the agricultural sector from a general rise in the cost of credit as part of the contraction.

However, with rise in nominal interest rates in rest of economy

the agricultural sector cannot expect nominal interest rates on its funds to remain unchanged; nor would such a policy be desirable. As credit can be made available to finance the increasing cost of cultivation and marketing, the continued policy of cheap credit may hamper supply of credit to the sector. The interest rates, even while being concessionary, will have to bear relation to economic realities.

The problems of organising rural credit remain to be addressed. The Khusro Committee Report (1989) provides a detailed account of these problems. The core of the problem, however, is that high and growing incidence of overdues is progressively eroding the credit cycle. This has raised doubts about the sustainability of the present agricultural credit regime. On the one hand, the institutional credit is made available even without sufficient backing of collaterals and, on the other, the informal credit market continues to charge high rates of interest even with a collateral backing. The true amount of credit subsidies from institutional channels is understated as interest rates in formal credit market should follow the Lender's Risk Hypothesis. On the other hand, the Default Hypothesis appears valid in informal credit markets as the risk in collateral backed loans is typically borne by borrowers not lenders.

The high incidence of default poses such a grave threat that it has become necessary to undertake serious research in this area on the magnitude, causes and remedies of the problem. Some such effort has been made in an interesting paper by Rajashekhar and Vyasulu (1991). The authors adopt a familiar banking terminology of "half-life of credit" to denote the time required for 50 per cent of the loaned funds to be eroded in the form of overdues. Using the framework of this concept, they conclude that refinance cannot be a desirable solution to prolonging the half-life of credit and there is no alternative to reducing the proportion of 'non-performing' assets in banks' portfolios.

Revitalising the rural credit structure is important for agriculture growth as money lenders still appear to be an important source of credit. It is, therefore, understandable that informal credit and usury practices have attracted considerable attention in recent literature. Issues at stake include definition, structure, size, functioning and interlocking of the informal credit markets. Understanding the determination of implicit interest rates has received due importance following Bhaduri (1983) and Basu (1984). The extent of segmentation in the market and the practice of collateral undervaluation under these market imperfections has been discussed in Swaminathan (1991). Since market segmentation is an accepted fact, considerable research must proceed at micro-level and therefore,

generalisations in the absence of such micro-level research may be erroneous. The research undertaken till now has raised issues of immense relevance for rural credit. The size of the informal credit market has also been a matter of debate. Official sources base their estimates on RBI's All India Debt and Investment Surveys (AIDIS). As per these sources, the share of institutional credit has risen from about 4 per cent in 1951 to 61 per cent of the total debt owned by the rural households in 1981. However, Clive (1990) has expressed doubt on the official statistics citing village level studies of ICRISAT and independent survey by the World Bank itself. It is true that the AIDIS, 1981 suffers from the possibility of large non-sampling errors.⁹ However, it would be wrong to discard the AIDIS findings as the alternative surveys have a more limited coverage. For example, the ICRISAT study is based on only 40 households in 6 villages in semi-arid tracts of Andhra Pradesh, Madhya Pradesh, Bihar and Punjab.

It nevertheless appears that there is a need to study the factors affecting the access of institutional credit to small farmers. While the existence of capital market imperfections has engaged the attention of a number of economists, the micro-level investigations into their causes remain limited. One such useful study has been conducted using original survey data drawn from six villages in Orissa. This study by Sarap (1990) confirms that average transaction cost decreases with an increase in the size of holding and the size of loan. This means that small and marginal farmers have to incur extra costs in obtaining formal credit. Also, notwithstanding the availability of credit supply to small farmers, their lower bargaining strength *vis-a-vis* large farmers, the bureaucratic and procedural formalities and asset-based lending policies of financial institutions coupled with corruption effectively inhibits the small farmers' access to formal credit. Also, an interesting observation of Sarap which runs counter to Ghatak (1977) is that incidence of wilful default is high among large farmers as 42 per cent of the outstandings in this class were outstandings of more than 5 years. Sarap makes a case for strong punitive measures against wilful defaulters.

Besides the size of the formal credit market, its efficiency should also be the focus of future work. It is important that credit delivery is made timely and is regulated to efficient productive channels. Reform of credit institutions should touch all levels of co-operative as well as commercial banking sector. The long-standing problem of unviable Regional Rural Banks (RRBs) also needs to be resolved.

(III) Issues Specific to Agriculture Sector

In this section, we examine the issues concerning input supplies, marketing arrangements including the buffer stock management and PDS. The overall inadequacy of investment in this sector is at the root of many of these dimensions.

Financial Resources

A decline in the share of agriculture sector in plan outlays and expenditure and the consequent stagnation in the rate of capital formation is the most worrisome portent for future growth prospects for Indian agriculture. Rath (1989) and Shetty (1990) have pointed out that the trend is particularly disconcerting in recent years. Rath notes that "trends of investment and income in agriculture show that during the last 15 years there has been no significant increase in the rate of fixed capital formation and the Sixth Plan records an effective decline. The steady decline in public investment in agriculture has been in hard investments like irrigation; the compensating increase in private investment has been in IRDP". Furthermore, "private investment in agriculture, increasingly financed from bank loans, has been geographically very unevenly distributed". Rath concludes that, "it appears unlikely that without greater public sector investment and other appropriate policy measures, the vast regions characterised by poor agricultural growth can come up and use institutional credit to a greater extent.

Shetty points out that the fall in agriculture's share in investment is sharper than its share in government expenditure. Furthermore, private investment has not gained any momentum even during the eighties. He traces the paradox of sluggish private investment despite rapid expansion of institutional finance to four main reasons: (1) institutional credit substituting own savings and usurious non-institutional sources, (2) diversion of institutional credit to consumption and repayment of debt, (3) constraints of inappropriate land tenure and ownership and other infrastructural bottlenecks hindering exploitation of formal credit by the less endowed regions and (4) statistical discrepancies in valuation of capital assets. Constancy of real gross domestic investment in agriculture during the eighties is now an established fact. The primary cause for this has been traced to falling real public investment in agriculture which declined by about 18 per cent over the decade. In contrast, total real public investment rose by 35 per cent. Since private investment is likely to be complementary to public investment, at least in regard to the agriculture sector,

Table - 2: Agriculture in Public Sector Plan Outlays/Expenditure

(in Rs. crore)

Five Year Plans	Agriculture (including Co-op.) ¹		Rural Dev. (excl. Co-op. & Spl. Areas Prog.) ²		Irrigation (includ- ing flood control) ³		Agril. Irrigation & Rural Dev. (incl. Spl. Areas Prog.) ⁴		All Sectors (i.e. Total Public Sector Plan)	
	Outlay	Expenditure	Outlay	Expenditure	Outlay	Expenditure	Outlay	Expenditure	Outlay	Expenditure
First (1951-52 to 1955-56)	238	211	116	79	469	434	823	724	2377	1960
	(10.0)	(10.8)	(4.9)	(4.0)	(19.7)	(22.1)	(34.6)	(36.9)	(100.0)	(100.0)
Second (1956-57 to 1960-61)	275	216	227	219	486	515	988	950	4800	4600
	(5.7)	(4.7)	(4.7)	(4.8)	(10.1)	(11.2)	(20.6)	(20.7)	(100.0)	(100.0)
Third (1961-62 to 1965-66)	591	528	322	288	837	937	1750	1753	8099	8576
	(7.4)	(6.2)	(4.0)	(3.4)	(10.3)	(10.9)	(21.6)	(20.4)	(100.0)	(100.0)
Annual (1966-67 to 1968-69)	664	547	67	97	732	794	1463	1438	6665	6625
	(10.0)	(8.3)	(1.0)	(1.5)	(11.0)	(12.0)	(22.0)	(21.7)	(100.0)	(100.0)
Fourth (1969-70 to 1973-74)	2059	1649	115	115	1641	1191	3815	3675	15902	15779
	(12.9)	(10.5)	(0.7)	(0.7)	(10.3)	(12.1)	(24.0)	(23.3)	(100.0)	(100.0)
Fifth (1974-75 to 1978-79)	3356	3217	412	604	4432	4752	8650	8741	39322	39426
	(8.5)	(8.2)	(1.0)	(1.5)	(11.3)	(12.1)	(22.0)	(22.1)	(100.0)	(100.0)
Sixth (1980-81 to 1984-85)	6440	7323	4754	6297	12160	10930	24834	26130	97500	109299
	(6.6)	(6.7)	(4.9)	(5.8)	(12.5)	(10.0)	(25.5)	(23.9)	(100.0)	(100.0)
Seventh (1985-86 to 1989-90)	10524	10864*	8906	15097*	16979	16475*	39213	46017*	180000	220216*
	(5.9)	(4.9)	(4.9)	(6.9)	(9.4)	(7.5)	(21.8)	(20.1)	(100.0)	(100.0)
Eighth (1992-93 to 1996-97)	22467	--	34425	--	32525	--	96168	--	434100	--
	(5.2)		(7.9)		(7.5)		(21.0)		(100.0)	

* Provisional

1 Includes crop husbandry, soil and water conservation, animal husbandry and dairying, fisheries, management of natural disasters, investment in agriculture financial institutions, co-operation, agriculture research and education, forestry and wild life, agricultural marketing and rural godowns, food storage and warehousing and food processing and plantation.

2 Includes land reforms, IRDP and related special employment programmes, NREP, RLEGP and IREP.

3 Includes major and medium irrigation, minor irrigation, CAD and Flood control and anti-sea erosion.

4 Special Areas Programme includes Hill Areas and Border Area Development Programmes, Western Ghat Development Programmes, Development of Backward Areas, Tribal Areas, North-Eastern Council and Other Area Development Programmes.

the absolute magnitude of overall shortfall in investible resources must, therefore, have been significantly large.

Over the plan periods the share of agriculture (including co-operation) has declined from 12.9 per cent of total public sector plan outlay during Fourth Plan to 8.5 per cent during Fifth Plan, 6.6 per cent during Sixth and merely 5.9 per cent during Seventh Plan. It further fell to merely 5.2 per cent in Eighth Plan. There has been a commensurate fall in realised expenditure as well (Table 2). Likewise, there has been a fall in the outlay share for irrigation from 12.5 per cent in Sixth Plan to 9.4 per cent in Seventh and merely 7.5 per cent in Eighth Plan. The only redeeming feature is a substantial increase in the outlay share for rural development to 7.9 per cent for the Eighth Plan from 4.9 per cent in the Seventh Plan (in terms of actual expenditure during the Seventh Plan the share of rural development was already 6.9 per cent). Increased funds for rural development are required to provide a safety net to the population segment which is most vulnerable to any structural adjustment measures that are undertaken during the Eighth Plan period.

The relative efficiency of expenditure under various heads of agriculture, rural development and irrigation should be carefully studied so that maximum benefit can be attained amidst resource crunch by striking the right mix. Also, the overall decline in plan outlay for the agriculture sector must be read in conjunction with the constraints facing the financial institutions in stepping up credit to the agriculture sector, particularly in terms of their profitability. There is also a need for suggesting innovative ways to provide additional funds to the sector, including recourse to capital markets.

Input Supplies

The Government's strategy for stimulating agricultural growth depends heavily on its ability to provide required inputs and support services. Resource gap may continue as a binding constraint in adequate availability of inputs but even if required fiscal support is provided the logistic angle will also require due attention.

On the resources side, the options are difficult as total subsidies to agriculture sector were estimated at Rs. 16,367 crore in 1989-90. The composition is as follows:

Subsidies to Agricultural Sector (1989-90)

BUDGETARY		(in Rs. crore)
Direct		
i)	Fertilisers	4,601
ii)	Irrigation	2,350
iii)	Electricity	4,100
Indirect		
iv)	Food	2,476
OFF-BUDGET		
v)	Credit	2,840
Total (1 to 5)		16,367

Such a level of subsidies is unsustainable due to considerations for fiscal prudence. At the sametime a drastic cut will have a perverse liquidity affect, contracting agricultural output over the medium term. Gulati (1989) has shown that most of the input subsidies are cornered by a few states, particularly Tamil Nadu, Punjab, Haryana and Andhra Pradesh. In framing a policy on input supplies, it should be noted that over a half of the fertilizer subsidies represents a transfer payment to inefficient fertilizer manufacturers through the Retention Price Scheme (RPS) which guarantees an annual 12 per cent after tax returns to these plants. Furthermore, fertilizer use is concentrated in a few crops and few regions and is skewed in favour of rich farmers. Therefore, the benefits of these subsidies to farming community is highly skewed. The Government will have to reduce these subsidies in a phased manner. In doing so, it may be worthwhile to index these subsidies more progressively to efficiency norms for fertilizer plants. The efficiency norms can be based on computation of Domestic Resource Cost (DRC) of producing specific fertilizer on a plant specific basis. Also, the relative pricing of the NPK fertilizers should be such as not to cause any distortions in consumption which can otherwise open up the possibility of allegations of regional bias in State policy besides leading to economic inefficiencies.

As for the farmer it appears essential that cuts in fertilizer subsidies are made good by enhancing procurement/support prices of main fertilizer consuming crops. This appears reasonable as Gulati (1990) has shown that crop-fertilizer price ratios would have been better for the farmers under free trade scenario than under government intervention, implying that farmers are 'net-taxed' and not 'net-subsidized'. However, the logic can be extended to the case of fertilizer producers also as G.V.K. Rao Committee (GOI, 1987) has accepted that controlled prices of main inputs

like naphtha or gas raises the cost of fertilizer production. At present the high input costs only increase the fertilizer subsidy burden and does not effect the manufacturers who are assured of returns under RPS. While, in principle, it may be accepted that cost-plus pricing under public monopolies affect the cost-economics of user industry, it needs to be pointed out as is done in Gulati and Kalra (1992), that the gas pricing norms as suggested by Kelkar Committee (1990) are very reasonable and not biased against fertilizer units. While more evidence is required to understand the full dimensions of fertilizer economics, available evidence does suggest that the right policy will be one which seeks to reduce fertilizer subsidies by indexing and at the same time compensating farmers by granting higher support prices.

Such a policy gets additional mileage from the growing evidence that increasing irrigation investment is a more efficient way to raise agricultural output than subsidizing fertilizers (Quizon, 1985; Parikh and Suryanarayana, 1989). While this appears *prima facie* true, supplementary evidence in this regard would be most welcome as some doubts persist over the estimates on per hectare cost of irrigation used in these studies. Quizon used an estimate of Rs. 18,713 at 1980-81 prices while Parikh and Suryanarayana place the estimate at a still lower figure of Rs. 10,000 at 1989 prices. Since results can be sensitive to cost figures, a more authentic estimate on the cost of irrigation would go a long way in resolving the issue beyond any legitimate doubt.

The issues related to irrigation are important in themselves. The percentage utilisation of major and medium irrigation potential has declined sharply from 90 per cent in Fourth Plan to 84 per cent in Sixth and Seventh Plan. Further, the link between irrigation and stability and equity of agricultural production need to be explored further (Vaidyanathan, 1987). It is now widely accepted that irrigation plays a critical role in raising intensity of cropping in monsoon climates. Dhawan and Datta (1992) have used pooled cross-section, time-series regressions to show that intensity of cropping at an all-India level is closely related to irrigation. However, further research is required to assess the comparative impact of the type of irrigation on cropping intensity and the regional variations therein.

Low levels and poor collection of water charges, unsatisfactory maintenance and burgeoning establishment have plagued the functioning of irrigation systems in the country. Revenue from water charges exceeded government expenditure on operation and maintenance plus imputed interest on investment in irrigation at the start of the planning era but this

trend has been reversed with the present subsidy level well above Rs. 2,000 crore mark. Similarly, electricity subsidy to agricultural sector has become an important part in financial losses of the electricity boards. In addition, off-budget credit subsidies are put at nearly Rs. 3,000 crore by conservative estimates. This threatens to erode the credit cycle in the face of credit ceilings deployed as part of monetary measurement.

In short, a major shift in strategy is called for, necessitating adjustment through indexing subsidies to efficiency norms in all areas. In doing so, it is required to skilfully maintain the rate of addition to productive capacities and this can be done even while the fiscal burden of subsidies is reduced in a phased manner. The food subsidy, however, becomes essential in any programme of structural reforms. These will have to be maintained as a buffer to ensure food security.

On the logistics side of input supplies, the focus of attention need to be on adoption of improved seeds conducive to local needs. There is a wide difference in adoption rates of HYVs or other certified quality seeds across regions and across crops. It remains to be studied whether the National Seeds Policy launched in 1988 has in anyway reduced the disparities in the adoption rate of HYVs. While continued emphasis will have to be given to plant breeding and research systems, strategies for complementary supply side incentive for commercial production will have to be carefully framed. Also, incentives on the demand side through agricultural extension programmes will have to be enhanced. Particular attention needs to be paid to dryland/rainfed regions. The technology for these regions now exists; its dissemination, however, will have to be worked out through an appropriate input supply programme.

Agricultural Marketing

Despite sizable government support to agricultural marketing activities, market systems remain inefficient and even primitive to some extent. Price support operations are biased in favour of wheat and rice crops and even in these crops they are almost non-existent in case of deficit States. Market intervention programmes exist for sugar and cotton also but are inefficiently conducted. The Monopoly Procurement Scheme for Maharashtra cotton growers has adversely affected the incentive for the farmers besides affecting the interests of mills throughout the country. Levy procurement of sugar has had a stabilizing effect on sugar economy but has failed to ensure remuneration to farmers who often have to face mounting arrears in payment of dues accruing to them. In case of oilseeds and edible oils, NDDB's market intervention has failed to make the

desired impact on prices in the absence of sizable stocks with NDDB. Among cereals no effort has been made towards developing coarsegrain marketing networks though such networks are viable on a regional scale or at least at a district level.

There is some scope for further privatization of foodgrains trade, but it should be ensured that it does not jeopardize food security in any way. As a step in the direction, forward market could be allowed to develop in an organised manner with tight monitoring in the initial phases. Hedging is a legitimate economic activity and would not necessarily be speculative. Since agricultural production has become somewhat resistant to adverse climatic conditions, forward trading can be encouraged in foodgrains and other select crops. A legalised move in this direction would stymie the growing unorganised option deals being struck in the grains market.

At the sametime, research evidence suggests that one has to be cautious in commercialising Indian agriculture, as it may unduly benefit the endowment-rich regions. Marketing structures in backward districts do not quite function in a commercial way. It is important to understand the dynamics of class relations and marketing practices in backward regions. Some useful information on this was compiled in Raj et.al, eds (1985), but surely there is far more scope for research in this area.

Food Stock Operations

The Government's policy of procuring grains, maintaining buffer and operational stocks and distributing them through PDS has helped maintain food security and cope the imbalances during drought years. Notwithstanding the reasonable success achieved in this direction, the food stock operations need to be reviewed. Over the years these operations have taxed the resource position enormously. There has been a sharp increase in economic cost of foodgrains handled by the Food Corporation of India (FCI). The problem is compounded by the increasing gap between economic cost and procurement prices indicating a steep rise in procurement and distribution incidentals. In addition there is an element of credit subsidy to the FCI that is not explicitly accounted for in its cost.¹⁰

The problem of mounting food subsidies has been by and large intractable so far because ensuring food security is a paramount concern of any government. The solution to the problem will necessarily require restricting PDS coverage to a narrowly targeted group. This may be

achieved by adopting indirect targeting where income levels are by and large co-terminus with geographical locations. PDS can be strengthened in low income regions and debilitated in high income regions. Furthermore, direct targeting can also be adopted by a set of income and asset criteria.

Restricting PDS coverage will reduce operational needs. But this in itself would not be sufficient in face of an open-ended procurement policy. The PDS issue prices need to be linked to procurement prices. An upward revision in procurement prices should immediately trigger a rise in PDS issue prices, while the issue prices to Roller Flour Mills and open market sales should bear a relationship with open market prices.

The problem posed by what Tyagi (1990) has described as "choking of markets" also needs to be addressed. The arrivals of grains in markets are increasingly getting concentrated within a few weeks of raising the crops. For instance, in case of wheat in Punjab, 65% of the total marketed surplus arrives in the market in the month of May alone. This taxes the infrastructure capacities of FCI. A suitable scheme of incentive to stagger arrivals needs to be institutionalised.

More importantly, procurement by public agencies has been much below expectations in the last two years. This is indeed a matter of concern, since it is partly generated by expectations of higher support prices in coming seasons. In this regard a two fold strategy of firstly, curbing the expectations and secondly, encouraging the principle of national sharing in procurement operations needs to be implemented. States facing identical demand/supply balances have fared differently in taking on the burden of using their machinery to boost procurement. This is an unwelcome trend that may render food management difficult.

A key issue in food stock operations is the optimal level of stocks that the public agencies need to maintain. Very little effort has been made to systematically compute the optimal stock levels. Reutlinger (1978) made one such attempt but the study appears to be biased against food-security considerations. Stock management in practice has been based on certain norms prescribed following the Technical Group constituted first in 1975. These norms have been revised from time to time. The present norms in operation since January 1991 have been fixed following the recommendations of Mahajan Technical Group Report. The norms so fixed are a marginal downward revision over the earlier norms fixed by the Gangopadhyaya Technical Group. The reason for the downward revision is not quite clear as the Mahajan Group Report lacks

a sound theoretical basis. The newly set norms require another look. The question needs to be examined *de novo* in an integrated framework of not only the stock level, but also the procurement and off-take policies. A decision to restrict PDS off-take to a narrower target group must precede the exercise of setting stock norms.

(IV)

Technology, Sustainability and Institutional Issues

Technology and Sustainability

There are several dimensions to the issue of technology absorption, land use and sustainability of agricultural growth. First and foremost is the need to take up dissemination of dryland technology on a priority basis that matches the thrust mission taken up earlier for certain crops or for certain areas. In a recent study on dryland agriculture in Karnataka (Rao, 1991), it has been pointed out that growth is neither assured nor sustained by mere availability of technology or through price support. A conglomeration of adverse factors such as poor and neglected land base, low priority to development of infrastructure, inefficient research and extension services and overall inability of dryland regions to compete with more dynamic parts of agriculture constitute a formidable barrier in dissemination of dryland technology. Investments will, therefore, have to be made not only in technology but also in removing attendant constraints, so that growth in these areas become sustainable over the medium and long-term.

In another interesting study, Dev (1991) examines the characteristics of 100 low yield districts and show that moisture stress, low soil quality and concentration of tribal population acts as constraints on agricultural productivity. He suggests diversification of economic activities along with improved technology. The author points out that 85 out of 100 low yield districts are located in five states, viz., Rajasthan, Maharashtra, Karnataka, Gujarat and Madhya Pradesh.

It may be added that perhaps the Agro-climatic Regional Planning (ACRP) provides a suitable framework as dryland technology is area specific in nature. However, no serious study has been undertaken to our knowledge, which has examined the issue of optimality of the delineation of the 15 agro-climatic zones in the country.

Secondly, the sustainability of irrigation system needs to be emphasised. A specialised programme needs to be evolved (by the Ministry of

Water Resources in collaboration with the Ministry of Agriculture and Planning Commission) to support the maintenance of irrigation systems, as also to monitor the quality of construction of water-works. Concomitantly, environmental impact particularly through waterlogging and salinization, should be placed high on the agenda of planning irrigation strategy.

While it is now generally accepted that there is a need to shift investment priority from major and medium to small irrigation projects, a serious threat to food-security appears to be emerging from overutilisation of ground water itself. The area for potential irrigation from ground water resources at 33 million hectares is approximately the same as the potential created under major and medium irrigation. But, a rapid growth of wells and pumpsets has resulted in a sharp drop in water tables. Saline intursion has also affected the exploitable quantum of groundwater, most though not exclusively, in coastal areas. Overdevelopment of ground water resources is being increasingly accepted by researchers (Bandyopadhyay, 1987; Pant, 1987; Moench, 1992). However, more importance need to be given to two aspects in this regard. First, it is essential to have reliable estimates on extraction and recharge of ground water resources. Dhawan (1990) and Moench (1991) have pointed out that data on ground water levels are not widely published or made available outside the official central or state-level water organisations and whatever estimates are available are highly biased and unreliable in any case. Secondly, it is important to understand the social implications of management options regarding the pattern of ground water use. Moench (1992) points to a sharp pro-urban bias in groundwater usage besides inequitous distribution in the rural areas itself. In view of credit constraints, the option of tapping this common property resources is foreclosed to the poor farmer. In this context, it becomes essential that the NABARD levelises its funding in such a way that funds are distributed equitably among all districts and also that funds are readily diverted to well-development where ground water is abundantly available. The funds need to be disbursed in a manner that resource-limited section of the society can undertake capital investment to tap their share of common property.

An important sustainability question arises in respect of drought prone areas. Combating drought is essential to maintain ecological balance. The drought management strategies being implemented have made a beneficial impact on soil moisture conservation in dryland regions. However, Jodha (1991) points out that these management techniques have adversely affected the farmer's traditional cropping strategies, including its components such as people's participation and collective sustenance. Effectiveness of the modern drought management needs to be judged

by its overall impact on the farming system, including that on farmers. Admittedly drought-prone areas are now richer in terms of infrastructure, productivity and market linkages and have become more resistant to output shortfalls in the event of drought. But institutionalisation of drought management strategies have had a detrimental effect on sub-marginal lands, common property resources and community interactions which form a collective defence against monsoon failures (Walker and Jodha, 1985). Furthermore, Walker et.al. (1983) and Jodha and Singh (1989) have highlighted the adverse impact of state - sponsored programmes on the bio-mass availability and on diversification strategies. Changing farming pattern with a shift away from fodder-fuel production to dryland crops (eg. pulses, oilseeds) has led to dwindling of community pastures, forests and fallow lands which are crucial for sustainability of agro-forestry systems. These are issues of great importance which will require sustained interest from the research community. It is necessary to examine how far promotion of social forestry and silvi-pastoral systems offers a solution to the trend of shrinking bio-mass base.

The problem of sustainability is bound to become important as efforts are made to put agriculture on a high growth path. Deforestation, submergence of forests, waterlogging of soil and chemical residues will pose a hazard and necessary measures on these fronts will have to be taken. If necessary measures are taken the environmental consequences of a 4% annual growth in value added in agriculture in the present decade are not likely to be serious (Parikh, 1991).

Institutional Arrangements

A renewed thrust on land reforms can form the core of the structural adjustment process. Literature shows that more often than not, farm size has inverse relationship with farm productivity.¹¹ If this were true as indeed is the case, then the land reform measures would be justified from production as well as equity aspects.

With the passage of time, a section of researchers and policy-makers have tried to sublimate the issue of land reforms. For example, Binswanger and Elgin (1990) state, "land reform is unlikely to be a major tool for improving the welfare in developing countries. Even where it would make a lot of economic sense, it will not happen, because the beneficiaries cannot pay for land reforms, implying the need for confiscating, appropriating or imposing large tax costs, neither of which is politically palatable." Bitter medicines are seldom palatable but become inevitable to correct the malice. Bagchi (1982), advancing the normative argue-

ments for land reforms, points out that there exists a bias in state-intervention which since '60's has "tended to increase the degree of inequality between perennially irrigated regions and regions mainly dependent on rainfall cultivation." Lipton (1989) adds that the effect of modern varieties of staple food crops on poverty is still not fully understood. "These varieties fundamentally alter the structure of society, of ownership and of power". The bias in state-intervention is a sufficient cause for compensatory intervention in the form of land reforms.

Inter-regional differences in agrarian reforms, including those on land tenures, continue to be of topical interest. Some recent studies (eg., Ghose (ed), 1983; Bardhan, 1989) have greatly improved our understanding on the issue. However, the agenda set by Joshi (1975) has still not lost its relevance. Investigations into the land reforms issue should seek to delineate areas of absentee landlordism and open or disguised non-cultivating landlordism. Similarly, areas of changeover from non-cultivating landlordism to commercially oriented landlordism or of transfer of land from landlords to a section of peasantry need to be identified. Also, it would be helpful to distinguish areas of landlessness from areas of wage labour or both these areas from areas where self-employed small and medium peasant is predominant. Information on nature of land-tiller relationship can smoothen policy action.

There has been a sizeable increase in the number of small and marginal holdings of less than 2.0 hectares from 19.9 million in 1960-61 to 74.1 million in 1985-86. These holdings now account for 76.3 per cent of the total number of holdings and 29 per cent of the total area operated. Official statistics show that fragmentation of land is proceeding at an alarming rate. Immediate steps for land consolidation and improvement of land records will be required. Simultaneously, distribution of surplus land should be expedited. Of the 7.23 million acres of land declared surplus, only 4.65 million acres were distributed by the end of Seventh Plan, leaving 2.58 million acres still in surplus. Adequate employment opportunities will have to be generated through small rural enterprises so that surplus and disguisedly unemployed labour in farm sector is employed in the non-farm sector.

A great deal of literature has come up in recent years, seeking to address the issue of employment, wages and contractual arrangements affecting agricultural labour. The issue of share tenancy has been reopened in the process. Otsuka and Hayami (1988) provides a comprehensive survey on this issue. The authors have shown latent contradictions in traditional Marshallian theory, which asserts that share tenancy is ineffi-

cient because of disincentive effect of crop sharing on tenant's work effort. Incorporating aspects of risk and uncertainty following Cheung (1969), the authors explain the choice of share contract on risk sharing under conditions of relatively efficient contract enforcement. Since existence of share tenancy is common in many agrarian communities and the practice may, in theory, be consistent with efficient contracts, it has become important to empirically test the efficient contract hypothesis. Some insight on this issue and many other vital theoretical issues, is provided in Bliss and Stern (1982). The novel approach of the authors of judging seemingly complex theoretical issues by micro-level evidence has opened new vista for research in agriculture. The scope for research on agriculture labour contracts is enormous. Dynamics and flexibility of labour market characteristics, institutions and arrangements affecting these markets, heterogeneity of labour, particularly as evidenced by sex difference in employment, geographical dispersion of wages, labour mobility, monopoly and monopsony power and its sources are some of the important areas for research. Binswanger and Rosenzweig (1984) may also be cited on these issues.

Some other institutional arrangements may also be suggested for structural reforms in agricultural sector. On the credit side there is a need for appropriate institutional mechanisms to enhance lending for both production and long-term investment purposes. The crop insurance scheme may be re-cast by enhancing its coverage and including more remunerative cash crops in order to cross-subsidize its operations. On the marketing side, steps may be initiated to improve marketing network for coarse cereals on a regional basis for distribution operations and for this NAFED needs to be treated on par with FCI for all practical purposes. A special programme for maintenance of irrigation system and another for dissemination of dryland technology on an area specific basis is also required. Lastly, it may be stressed that agricultural labourer, though landless, forms the backbone of agricultural economy. Therefore, institutional measures for an effective monitoring of minimum wage legislation and for distributing surplus land among these labourers is a *sine qua non* of agricultural production plans and relations.

It must be stated that in recent times institutional reforms are not getting their due place in research on Indian agriculture. At the same time, during these years relatively speaking, resource endowment and technical change has proceeded at a rapid rate. Ruttan (1989) has effectively made out of a case that shifts in the demand for institutional change are induced by changes in endowments and technology. Supply, on the other hand, responds to changes in cultural endowments and social scien-

ce knowledge. Ruttan's theory poses a stiff challenge to social science researchers in India. Is it that social science knowledge is not progressing at a desired rate and in desired direction or, is it that cultural endowments suffer from rigidities? Even if latter is the case, the question which would continue to haunt many is about the role the social scientists can play in conjunction with the policy-makers and NGOs in taking measures to improve cultural endowments so as to remove supply side constraint to institutional innovations for overall development of Indian agriculture.

Some of the issues concerning Indian agriculture raised in this paper are relatively over-researched, while some other themes are either neglected or in need of supplementary evidence. To make matters easy, we present a summary table with view of setting a research agenda for the future.

'A Summary Statement of Issues in Indian Agriculture'

Topic	Generally Accepted Propositions	Issues unresolved
Trends in Production	i) Growth has not accelerated after introduction of new technology. ii) Area growth has decelerated, while yield growth has accelerated.	i) Whether growth has decelerated or is maintaining its long-term trend. ii) The cut-off point for pre and post green revolution periods. iii) Identification of structural breaks in late '70s or in '80s leading to a return to high growth path. iv) Appropriate choice of trend functions for computation of growth rates.
Crop Imbalances	i) Green revolution largely limited to wheat and to some extent rice.	i) Changes in cropping pattern and its causes. ii) Demand-Supply projections for major crops over the medium-term and estimating the extent of emerging supply gaps. iii) Whether the new oilseeds policy is trade diverting and whether it entails welfare losses in static and dynamic terms.
Regional Imbalances	i) Some improvement in regional dispersal of agricultural growth, largely because of breakthrough in rice production during '80s.	i) Causes behind rapid increase in foodgrains production in Eastern India and stagnation in Southern and Western India during '80s.

Continued.

Topic	Generally Accepted Propositions	Issues unresolved
Supply Response	i) Aggregate supply response is not encouraging even if it is not perverse; ASE is close to zero.	i) Supply response for various crops and regions. ii) Supply response under alternative assumptions about farmer's attitude towards risk and about his expectations.
Terms of Trade	i) Terms of trade which may have moved in favour of agriculture till 1973-74 have decisively moved against agriculture thereafter.	i) Whether public policy has contributed to the adverse movement in terms of trade for agriculture.
Pricing Policy	i) Rise in the political power of farm lobby has contributed to an upward pressure on food prices. ii) Agriculture sector cannot be left out of the economy-wide liberalization, stabilization and structural adjustment process.	i) Quantifying the impact of increased support prices on general price level in the economy. ii) Distributional consequences of the new price policy in terms of class-specific inflation rates. iii) Simulation of the potential impact of macro-economic adjustment through fiscal, monetary, exchange-rate and credit policies on the agricultural sector and agricultural prices.
Fiscal Policies	i) Possibility of financing industrialization by increasing the size of the scissors; i.e., increasing accumulation by moving the terms of trade against agriculture. ii) Desirability of imposing agriculture tax.	i) Desirability of the Preobrazhensky option of financing industrialization through adverse terms of trade movement for agriculture. ii) Politically sustainable methods to tax agricultural sector.
Exchange Rate	i) Desirability of exchange rate policy to ensure competitiveness of products having reasonable comparative advantage. ii) A relatively slower response of agro-exports to currency depreciation because short-run elasticities are smaller than long-run.	i) Potential of agro-exports for India and the impact of the rupee depreciation in recent times on these exports.

Contd....

Topic	Generally Accepted Propositions	Issues unresolved
Credit Policies	i) Importance of credit in maintaining output growth in the economy. ii) Need to improve the efficiency of the rural credit delivery system.	i) Impact of credit and interest rate policy on crop production and marketing and on investment in agriculture sector. ii) The causes, impact and remedies for high incidence of default as reflected in shortening of 'half-life' of credit. iii) Size, structure, functioning and inter-locking of informal credit markets and their impact on farm sector. iv) Factors affecting access of small farmers to institutional credit.
Financial Resources	i) Declining rate of investment in agricultural sector during the '80's both in public and private sector. ii) Falling share of agriculture in plan outlay and expenditure over the Plan period.	i) Overall degree of resource constraint facing the agriculture as a result of fall in plan outlay and the 'crowding-in' impact on private investment; as also the institutional credit cycle. ii) Available alternatives to bridge the emerging resource gap.
Input Supplies	i) Unsustainability of the present level of subsidies on agricultural inputs. ii) Need to reduce fertilizer subsidies while at the same time seeking to improve efficiency of fertilizer plants.	i) How to distribute the cut in subsidies across input like fertilizers, irrigation, electricity seeds, credit, etc. ii) Impact of cut in subsidies on input supply and consequently on output over the medium-term. iii) Optimal NPK mix and fertilizer pricing. iv) Logistics of input supplies.
Agricultural Marketing	i) Primitiveness of the market systems in Indian agriculture.	i) Efficiency and bias in market intervention operations for various crops. ii) Desirability for greater privatization of foodgrains trade, including possible impact of developing forward market. iii) Impact of commercialization of Indian agriculture on marketing structures and class relations in backward districts.

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Topic	Generally Accepted Propositions	Issues unresolved
Food-Stock Operations	i) Policy intervention through buffer and operational stocks having immensely contributed to food security in the country.	i) Optimal level of food-stocks to be maintained by public agencies.
	ii) Need to restrict PDS coverage to those in need of a security net.	ii) Economically viable food security system and its consistency with an open-ended procurement policy.
Technology and Sustainability	i) Availability of technology for dryland agriculture.	i) Infrastructural constraints in dissemination of dryland technology.
	ii) Role of drought management strategies in maintaining ecological balance.	ii) Impact of institutionalisation of drought management techniques on traditional cropping strategies.
		iii) Estimation of extraction and recharge of ground water resources.
		iv) Distribution of common property resources and the role played by credit in this.
		v) Impact of shrinking bio-mass on ecological balance.
Institutional Arrangements	i) On an average an inverse relationship between farm size and productivity.	i) Inter-regional differences in nature of land-tenure systems.
	ii) Need for land reforms.	ii) Micro-level evidence on efficiency of share tenancy.
	iii) Share cropping can be theoretically consistent with efficient contract enforcement.	iii) Supply-side constraints in institutional reforms.

Concluded.

Notes:

1. William Paddock and Paul Paddock (1969) author of *Famine 1975* had made a case against food aid to India on the ground that increase in foodgrains supplies through production, imports and food aid will not match the population growth and will result in large scale starvation. They suggested the application of 'Triage' principle adopted in Military Hospitals on a war front. The principle is based on the practice of saving those who can be saved and not wasting limited resources on those who cannot be saved.
2. During 1968-88, the trend growth in agriculture for select Asian countries was as follows: Burma (4.8 per cent), China (4.3 per cent), Pakistan (3.6 per cent), Malaysia (4.0 per cent) and Thailand (4.0 per cent).

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3. The Ministry has revised series available with base Triennium ending 1981-82 which accords due weight to some of the crops which have become more important in recent times. However, the revised series is yet to be officially accepted.
4. They include Intensive Agricultural District and Intensive Agricultural Area Programmes, Special Rice Production Programme (SRPP), Special Foodgrains Production Programme (SFPP), National Pulses Development Programme (NPDP), Intensive Cotton District Programme (ICDP), Special Jute Development Programme (SJDP), National Oilseeds Development Project (NODP) and Oilseeds Production Thrust Project (OTPT).
5. Foodgrains imports touched a record level of 10.3 million tonnes or 16.6 per cent of domestic production in 1965-66. But, subsequently there was a secular decline in these imports with periodic aberrations.
6. Spatial differences may alter results for some of the regions. For instance, Singh (1988) has shown that technology improvements, subsidies and price support operations have contributed to income terms of trade remaining favourable for agriculture in Punjab.
7. NPC is defined as ratio of domestic price to import/export parity price depending upon whether the commodity is imported or exported. EPC is the ratio of value added at domestic prices to value added at international prices. ESC is EPC adjusted for subsidy/tax on non-tradables. ANPC is NPC adjusted for overvalued exchange rate assuming a premium (of 25 per cent.)
8. Scissors denote the movement in retail prices of agricultural and industrial goods, which during April, 1992 to March, 1994 were found to resemble a pair of scissors in the former Soviet Union. The scissors promoted the Soviet industrialisation debate in which Preobrazhensky argued for taxing agriculture to finance industrialization by moving the terms of trade against agriculture.
9. The share of National Sample Survey Organisation's (NSSO) own fully trained investigators has declined from 90 per cent in AIDIS, 1961 to less than 50 per cent in AIDIS, 1981. Furthermore, there has been a shift in sampling strategy from few villages and many households to more villages but fewer households.
10. The BICP in its report on operations of FCI submitted to the Government in June 1990 suggested far reaching changes in the entire food stock operations to make the FCI functioning viable. It observed that it may not be prudent to dismantle the PDS in its entirety.
11. An intense debate on the farm size and productivity engaged the agricultural economists during the sixties. A.K. Sen, A.M. Khusro, G.R. Saini and Hanumantha Rao expounded the hypothesis of inverse relationship. However, Ashok Rudra A.P. Rao, Krishna Bhardwaj and Usha Rani maintained that the relationship was indeterminate. Subsequently, Sen and Rudra (1980) in a synthesis stated that inverse relationship is more often confirmed than rejected though no generalisation was possible.

References :

1. Ahluwalia, I.J. (1985), *Industrial Growth in India: Stagnation Since the Mix-sixties*, Oxford University Press.
2. Alagh, Y.K. and Sharma, P.S. (1980), "Growth of Crop Production : 1960-61 to 1978-79 - Is it Decelerating?", *Indian Journal of Agricultural Economics*, Vol. XXXV, No. 2, April-June.
3. Bagchi, A.K. (1982), *The Political Economy of Underdevelopment*, Cambridge University Press.
4. Balakrishnan, P. (1992), *Monetary Policy, Inflation and Activity in India*, DRG, Study No. 2, Reserve Bank of India.
5. Bandyopadhyaya, J. (1987), "Political Ecology of Drought and Water Scarcity," *Economic and Political Weekly*, XXII (50).
6. Bardhan, P. (1989), *The Economic Theory of Agrarian Institutions*, Oxford University Press.
7. Basu, K. (1989), "Implicit Interest Rates, Usury and Isolation in Backward Agriculture", *Cambridge Journal of Economics*, Vol 8, pp. 145-159.
8. Berkoff, D.J.W. (1990), "Irrigation Management on the Indo Gangetic Plain", *World Bank Technical Paper*, No. 129, (Washington D.C. : World Bank.)
9. Binswanger, H.P. and Elgin, M. (1990), "Reflections of Land Reforms and Farm Size", in C.K. Eisher & J.M. Staaz, eds, *Agricultural Development in Third World*, The John Hopkins University Press.
10. Binswanger, H.P. and Rosenzweig, eds (1984), *Contractual Arrangements, Employment and Wages in Rural Labour Markets in Asia*, Yale University Press.
11. Bhaduri, A. (1983), *The Economic Structure of Backward Agriculture*, London: Academic Press.
12. Bhalla, G.S. and Tyagi, D.S. (1989), "Spatial Pattern of Agricultural Development". *Economic and Political Weekly*, June 24.
13. Bliss, C and Stern. N.H. (1982), *Palanpur: The Economy of an Indian Village*, Oxford: Clarendon Press.
14. Cheung, S.N.S. (1969), *The Theory of Share Tenancy* (University of Chicago Press).
15. Clive, B. (1990), "Interactions between Institutional and Informal Credit Agencies in Rural India", *World Bank Economic Review*, Vol.4, No.3, September.

16. Cummings, J.T. (1975), "The Supply Responsiveness of Indian Farmers in the Post - Independence Period", *Indian Journal of Agricultural Economics*, Vol. 30, No.1, January-March.
17. Dandekar, V.M. (1980), "Introduction", *Indian Journal of Agricultural Economics*, Vol 35, No. 2.
18. Dantwala, M.L. (1990), "Agricultural Prices under Political Pressure", *Economic and Political Weekly*, September 22.
19. Dev, M. (1991), "Constraints on Agricultural Productivity: A District Level Analysis", *Economic and Political Weekly*, September, 28.
20. Dhawan, B.D. (1990), "How Reliable are Ground Water Estimates?", *Economic and Political Weekly*, March 28.
21. Dhawan, B.D. and Dutta, H.S. (1992), "Impact of Irrigation on Multiple Cropping", *Economic and Political Weekly*, March 28.
22. Diamond, P.A. and Mirrles, J.A. (1971), "Optimal Taxation and Public Production", *American Economic Review*, Vol. 61.
23. Ellman, M. (1975), "Did the Agricultural Surplus Provide the Resources for Increase in Investment in the U.S.S.R. during the First Five Year Plan", *Economic Journal*, Vol. 85, pp. 844-864.
24. Gandhi, V. (1966), *Tax Burden on Indian Agriculture*, Harward Law School.
25. Ghatak, S. (1977), "Rural Credit and the Cost of Borrowing: Inter-State Variations in India", *Journal of Development Studies*, Vol. 13, No. 4, pp. 102-24.
26. Ghose, A.K. ed (1983), *Agrarian Reform in Contemporary Developing Countries*. London: Croom Helm.
27. Government of India (GOI), (1972), *Report of the Committee of Taxation of Agricultural Wealth and Income*.
28. GOI, BICP (1991), *Report on the Operations of Food Corporation of India*.
29. GOI, CACP (1990), *Report on Price Policy for Kharif Cereals for the 1990-91 season*.
30. GOI, Department of Food (1982), *Technical Group on Buffer Stocking Policy (Under Chairmanship of Shri Gangopadhyay)*.
31. GOI, Department of Food (1982), *Technical Group Report on Buffer Stocking Policy Under Chairmanship of Shri Mahajan*.
32. GOI, (1987), *Report of the High Powered Committee on Fertilizer Consumer Prices*, Chairman: GVK Rao.

210 RESERVE BANK OF INDIA OCCASIONAL PAPERS

33. Gulati, A. (1989), "Structure of Effective Incentives in Indian Agriculture - Some Policy Implications", *Economic and Political Weekly*, September 30.
34. Gulati, A. and Kalra, G.D. (1992), "Fertilizer Subsidy: Issues related to Equity and Efficiency", *Economic and Political Weekly*, March 28.
35. Jodha, N.S. (1991), "Drought Management: Farmers' Strategies and Their Policy Implications", *Economic and Political Weekly*, September 28.
36. Jodha, N.S. and Singh, R.P. (1989), *Crop Rotations in Traditional Farming System in Selected Areas of India*, ICRISAT.
37. Joshi, P.C. (1975), *Land Reforms in India: Trends and Perspectives*, Institute of Economic Growth, Delhi.
38. Kahlon, A.S. (1992), "Macro-Economic Policies and Agriculture", *Economic Times*, 2nd June.
39. Kahlon, A.S. and Tyagi, D.S. (1983), *Agricultural Price Policy in India*, New Delhi: Allied Publishers.
40. Kanc, C. (1990), *Trade Issues Affecting Agriculture*. World Bank.
41. Kannan, R. (1984), "Growth Rates of Foodgrains Production in India (1950-51 to 1982-83)", *Reserve Bank of India Occasional Papers*, June.
42. Khatkate, D.R. (1962), "Some Notes on the Real Effects of Foreign Surplus Disposals in Underdeveloped Economics", *Quarterly Journal of Economics*, Vol. 76.
43. Lipton, M. (with Longhurst, R.) (1989), *New Seeds and Poor People*, London: Unwin Hyman.
44. Mellor, J.M. and Desai, G.M. eds (1986), *Agricultural Change and Rural Poverty*, Delhi: Oxford University Press.
45. Mitra, A. (1963), "Tax Burden as Indian Agriculture", in Braibanti R. ed, *Economic Development in India*, Dukep.
46. Mitra, A. (1977), *Terms of Trade and Class Relations*, London: Frank Cass.
47. Moench, M. (1991), "Sustainability, Efficiency and Equity in Ground Water Development: Issues in the Western U.S. and India", mimeo, The Pacific Institute for Studies in Development, Environment and Security, Berkeley.
48. Moench, M. (1992), "Drawing Down the Buffer: Science and Politics of Ground Water Management in India", *Economic and Political Weekly*, March, 28.
49. Moody, A. Mundle, S. and Raj, K.N. (1982), *Resource Flows from Agriculture and Industrialization: A Comparative Analysis of Japanese and Indian Experiences*. International Development Centre of Japan, Tokyo.

50. Mruthyunjaya and Kumar, P. (1989), "Crop Economics and Cropping Pattern Changes", *Economic and Political Weekly*, December, 23.
51. Nadkarni, M.V. (1987), *Farmers' Movements in India*, Delhi: Allied Publishers.
52. Narayana, N.S.S. and Parikh, K. (1979), "Agricultural Planning and Policy in Draft Sixth Plan: Will Farmers Fulfil Planners Expectations?", *Economic and Political Weekly*, Vol. 14, August.
53. Narayanan, N.S.S., Parikh, K. and Srinivasan, T.N. (1991), *Agriculture, Growth and Redistribution of Income: Policy Analysis with General Equilibrium, Model*, North Holland.
54. Newberry, D.M. (1990), "Agricultural Pricing and Public Investment", International Seminar on Public Economics, New Delhi.
55. Nowshtrivani, V.F. (1971), "A Modified Adaptive Expectations Model", *American Journal of Agricultural Economics*, Vol. 53, February.
56. Olson, R.O. (1960), "Discussion: Impact and Implications of Foreign Surplus Disposal on Underdeveloped Countries", *Journal of Farm Economics*, Vol. 42.
57. Otsuka, K. and Hayami, Y. (1988), "Theories of Share Tenancy: A Critical Survey", *Economic Development and Cultural Change*.
58. Pant, N. (1987), "Ground Water Depletion", *Economic and Political Weekly*, March 28.
59. Parikh, K. (1991), "4% Growth Rate in Agriculture over 1990's - Policy Implications and Environment Consequences", IGIDR Discussion Paper No. 51.
60. Parikh, K. and Suryanarayana, M.H. (1989), *Food and Agricultural Subsidies: Incidence and Welfare Under Alternative Schemes*, Discussion Paper No. 14, IGIDR, Bombay.
61. Patnaik, P. (1981), "An Explanatory Hypothesis of Industrial Stagnation", in Bagchi, A.K. and Banerjee N. eds. *Change and Choice in Indian Industry*, Calcutta: Bagchi and Co.,
62. Quizon, J.B. (1985), *An Economic Appraisal of Withdrawing Fertilizer Subsidies in India*, Agriculture and Rural Development Deptt., World Bank.
63. Radhakrishna, R. and Ravi, C. (1992), "Does Inflation Hurt the Poor More", *Economic and Political Weekly*, January 25.
64. Raj, K.N., Bhattacharya, N. Guha, S. and Phadi, S., eds (1985), *Essays on the Commercialization of Indian Agriculture*, Oxford University Press.
65. Rajshekhar, D. and Vyasulu, V. (1991), "Half-Life of Credit: Stimulating Funds Flows in Priority Sector", *Economic and Political Weekly*.

66. Ramachandran, V.K. (1990), *Wage Labour and Unfreedom in Agriculture: An Indian Case Study*, Oxford University Press.
67. Rao, J.M. (1986), "Agriculture in Recent Development Theory", *Journal of Development Economics*, Vol. 22, pp. 41-85.
68. Rao, V.M. (1991), "Growth in the Context of Underdevelopment: The Case of Dryland Agriculture", *Economic and Political Weekly*, March 30.
69. Rao, V.M. (1992), "Fixing Agricultural Prices: Issue and Experiences", *Economic and Political Weekly*, March, 28.
70. Rath, N. (1989), "Agricultural Growth and Investment in India", *Journal of Indian School of Political Economy*. January-June.
71. Ravishankar, V.J. (1990), *Public Expenditure in Agriculture*, World Bank.
72. Reserve Bank of India (1987), "All India Debt and Investment Survey: 1981-82", Reserve Bank. Bombay.
73. Reserve Bank of India (1989), *Agricultural Credit Review Committee*, Chairman: A.M. Khusro, Reserve Bank, Bombay.
74. Reutlinger, S. (1978), "The Level of Stability in India's Foodgrain Consumption", in M.S. Ahluwalia, et. al. *India: Occasional Papers, World Bank Staff Working Paper*, No. 279.
75. Ruttan, V.M. (1989), "Institutional Innovation and Agricultural Development", *World Development*, Vol. 17, No. 9, pp. 1375-1387.
76. Saggarr, M.K. and Raghavan, V.S. (1989), "Planning for Agricultural Transformation: Review and Prospects for Indian Agriculture", *Reserve Bank of India Occasional Papers*, Special Issue on Planning, Vol. 10, No. 4, December.
77. Sah, R.K. and Stiglitz J. (1984), "The Economics of Price Scissors", *American Economic Review*, March.
78. Sah, R.K. and Stiglitz, J. (1987), "The Taxation and Pricing of Agricultural and Industrial Goods in Developing Economics", in Newberry and Stern, eds., *The Theory of Tax Design in Developing Countries* World Bank.
79. Saith, A. (1981), "Production, Prices and Poverty in Rural India", *Journal of Development Studies*, 17, January.
80. Samant, D.S. (1983), "Investigation of Hypothesis of Deceleration in Indian Agriculture", *Indian Journal of Agricultural Economics*, October-December.
81. Sarap, K. (1990), "Factors Affecting Small Farmers", *Access to Institutional Credit in Rural Orissa, India, Development and Change*, Vol. 21, pp. 281-307.

82. Sarma, J.S. and Gandhi, V. (1990), *Production and Consumption of Foodgrains in India: Implication of Accelerated Economic Growth and Poverty Alleviation*, IFPRI, Research Report No. 81 Washington DC: IFPRI.
83. Sen, A.K. and Rudra, A. (1980), "Farm Size and Labour Use: Analysis and Policy", *Economic and Political Weekly*, February.
84. Shetty, S.L. (1971), "An Inter-Sectoral Analysis of Taxable Capacity and Tax Burden", *Indian Journal of Agricultural Economics*, July-September.
85. Shetty, S.L. (1990), "Investment in Agriculture: Brief Review of Recent Trends", *Economic and Political Weekly*, February, 17.
86. Srinivasan, T.N. (1979), "Trends in Agriculture in India", *Economic and Political Weekly*, August.
87. Swaminathan, M. (1991), "Segmentation, Collateral Undervaluation and the Rate of Interest in Agrarian Credit Markets", *Cambridge Journal of Economics*, June.
88. Taylor, L.J. (1984), *Resource Transfers from Agriculture*, mimeo MIT.
89. Thamarajakshi, R. (1966), "Intersectoral Terms of Trade and Marketed Surplus of Agricultural Produce: 1950-51 to 1965-66", *Economic and Political Weekly*, June.
90. Thamarajakshi, R. (1977), "Role of Price Incentive in Stimulating Agricultural Production in a Developing Economy", in Ensminger, D. ed., *Food Enough or Starvation for Millions*, New Delhi: Tata MacGraw Hill.
91. Thamarajakshi, R. (1990), "Intersectoral Terms of Trade Revisited", *Economic and Political Weekly*, March 31.
92. Tyagi, D.S. (1990), *Managing India's Food-Economy - Problems and Alternatives*, New Delhi: Sage Publication.
93. Vaidyanathan, A. (1987), "Presidential Address - Irrigation and Agricultural Growth", *Indian Journal of Agricultural Economics*.
94. Vittal, N. (1986), "Inter-Sectoral Terms of Trade in India: A Study of Concept and Method", *Economic and Political Weekly*, December.
95. Vyas, V.S. (1986), "Poverty Agrarian Structure and Policy Options: A Note", in Mellor, J.M. and Desai G.M. eds., *ibid*.
96. Walker, T.S. and Jodha, N.S. (1985), "How Small Farmer Households Adapt to Risk?" in P. Hazell et.al., eds., *Crop Insurance for Agricultural Development: Issues and Experience* Baltimore: John Hopkins University Press.
97. World Bank (1991), *Agriculture - Challenges and Opportunities: 1991 Country Economic Memorandum*, Vol. II.

BOOK REVIEWS

Multinational Enterprises in Less Developed Countries, edited by Peter J. Buckley and Jeremy Clegg, Macmillan 1991, pp. xvi + 353, Price \$ 45.

The volume under review contains a collection of papers encompassing a wide spectrum of issues which include, *inter alia*, appropriateness of trade policies of LDCs *vis-a-vis* multinational enterprises (MNEs), the transmission of entrepreneurial culture from source country to host country and the impact of foreign direct investment (FDI) on welfare and income distribution in the host country. The unique feature of the volume lies in the adoption of interdisciplinary approach. The papers have thrown up a good deal of input immensely useful for policy making.

Issues relating to inward FDI in LDCs have been extensively spelt out in the very opening chapter. The concept of technology has been widened to include the soft technology provided by service MNEs apart from the conventional technology. The most important policy conclusion emerging from the papers which has got significant relevance for LDCs is that the import substituting FDI generates far greater local linkage than export-oriented (manufacturing and extraction) FDI. The decade of eighties is characterised by renewed interest evinced by LDCs in encouraging optimal type of inward FDI. The significant policy conclusion emerging from the volume is that policies intended specifically for attracting FDI through short-term measures have not been successful in the long term.

Contributions by Buckley and Casson and Weiernair (chapters 2 and 3) have set out analytical framework and agenda for further research. The paper by Buckley and Casson (chapter 2), has delineated rather succinctly the role played by MNEs in transmitting both the technology and the entrepreneurial culture of the developed countries to the LDCs. Buckley and Casson have identified cultural factors responsible for the persistence of underdevelopment in LDCs and have explored the role of MNEs in transmitting entrepreneurial attitude to host countries. Thus, it implies that the availability of conventional economic resources such as raw materials and capital are necessary but not sufficient for develop-

ment. Nevertheless, the hypothesis relating to the impact of cultural factors on economic development is rather nebulous and calls for further empirical test because of its significant welfare implications. Chapter - 3 attempts to evaluate the performance of Japanese MNEs *vis-a-vis* their European and/or North American counterparts. Interestingly, apart from performing the function of multinational intermediation, MNEs have also ventured into labour-intensive manufacturing activities in the LDCs. This is in tune with the factor endowment of LDCs such as India which have comparative advantage in the production of labour-intensive products. What is more, MNEs have been successful in transmitting entrepreneurial culture and managerial techniques to their operations in LDCs due to their inbuilt flexibility.

Graham has introduced in chapter-4 the economics of learning. In the context of the operation of multinational enterprises the dynamic scale economies emanate from the inculcation of source country cultural attitudes. Graham has attempted to expose the flaws with the trade policy of LDCs by pointing out that inward - looking trade policy retards the learning process as MNEs try to curtail output to earn monopoly profit. While this adjustment has much merit, the author should have perhaps examined the contribution of MNCs to the balance of payments of the host country. The contribution of foreign controlled rupee companies in India, for instance, to the balance of payments has been negative. The influence of market rivalry on the technology transfer decisions of the MNCs has been spelt out in chapter - 5. This influence is too pervasive to impact on even the technology transfer decisions of the MNCs. The paper by Katrak has dealt with the debate concerning the capital-intensity of the MNE production in LDCs. This is a crucial issue due to its impact on foreign exchange reserves and employment generation within the host country. He has, however, cautioned that the validity of his conclusions relating to capital-intensity is confined to import-substituting production and not to export-oriented FDI. However, Indian experience suggests that his conclusions are equally valid for export-oriented FDI as well. The subsequent chapter has analysed the differences in the behaviour of foreign subsidiaries and local firms in respect of technology, marketing and trade. As the picture emerging from such cross-section studies is confusing, there is a need for case studies of specific industries. Jenkins has, however, concluded that if local firms and MNEs are in direct competition they will adopt the same degree of capital intensity.

The chapter on 'Countertrade : Theory and Evidence', as the title suggests, describes the different variants of the countertrade, *viz.*, counter-

purchase, buyback arrangements, production sharing, etc. The regression results based on cross-section data suggest that counterpurchase helps in managing risks and in overcoming liquidity problems, while buyback arrangements are generally useful in transfer of technology and industrialisation. The thrust of the analysis of countertrade is on the limited role of counterpurchase in the promotion of exports. However, an analysis of the role of countertrade in reducing the instability in export earnings of LDCs might have made the analysis more penetrative. Also, the basic issue whether the countertrade poses a threat to multilateralism or not could have perhaps been discussed. Countertrade is estimated at 3000 billion dollars and accounted for nearly one-fifth or one-fourth of global trade in 1989. This has assumed added importance in the context of emerging trading blocs. Lecraw (chapter - 8) has employed multiple regression technique using the World Bank data for 27 countries covering the 13-year period from 1974 to 1986 to capture the factors determining the inward FDI in a developing country. The regression analysis suggests that inward FDI is a function of several locational factors which include, *inter-alia*, the rate of growth of the labour force, the perceived country-risk, the real exchange rate, the rate of growth of consumption, the tariff rate, the tax rate and the openness of the country's foreign investment incentive system. Some of the factors are beyond the control of the Government while some are under direct control of the Government. The regression analysis has limitations because of the omission of certain crucial variables such as the development of capital market and the credit-rating of the concerned country by the international credit rating agencies. The importance of price-earning ratio in attracting foreign equity participation is yet another variable that needs to be considered.

Part V of the book consists of five empirical studies on FDI in LDCs. The methodology adopted by these papers are more inductive than deductive. The paper by John Cantwell has thrown certain interesting ideas on the role of FDI in African countries. The sectors having potential for attracting FDI identified are : wood and paper products, textiles and clothing, metal products and food processing. The contribution of Arisien, Rojce and Svetlicic has brought to the surface some interesting issues such as the determinants of minority investments and the problems generally encountered by firms from one institutional and legal environment investing in others. The paper by Raj Aggarwal and Pervez Ghauri corroborates the applications of product cycle model of foreign operations of Swedish firms in Asia. Important inferences emerging from this study are, however, exploratory in nature. Jim Hamill has surveyed the involvements of foreign multinationals in the development of textile industries of Mediterranean. The concluding chapter has examined the role of service sector MNEs in the developing countries. The author, however,

has not discussed the significant gains that would accrue to the service MNEs following the extension of national treatment to FDI through the removal of trade restrictions and distorting investment measures. This aspect assumes added importance in the context of the likely acceptance of Dunkel draft relating to trade related investment measures (TRIMS). These significant concessions are likely to adversely affect the bargaining strength of most LDCs *vis-a-vis* multinational corporations.

The performance of FDI in LDCs needs to be evaluated in terms of employment creation, transfer of usable technology and skill and saving and earnings of foreign exchange. The papers offered here have not attempted an indepth analysis of performance of multinationals from the viewpoint of the aforesaid objectives. It may be recalled that Paul Streeten and Sanjaya Lall had concluded in their 1973 study that in the late 1960s, net positive effect of MNEs on the balance of payments was negligible; about half of the firms out of the 100 covered by the study were found to export more foreign exchange than they earned. A study undertaken by Nagesh Kumar in 1990 has brought out that there was no statistically significant difference between the export performance of MNCs and that of domestic enterprises.

An aspect which escaped the attention of contributors is lack of comprehensive treatment of joint ventures. A more widely used policy stance for effecting transfer of technology has been LDCs' insistence that foreign investors acquire local partners by forming joint ventures with local firms. These requirements have popularly come to be known as 'saturation laws' whereby it is mandatory for MNEs to sell a specified per cent of equity in each project to citizens of host country. It must also be recognised that the operations of MNEs could have adverse implication, especially in terms of impact on domestic entrepreneurship particularly in industries where LDCs have the potential to become internationally competitive. In cases where MNCs are in a position to exercise monopolistic or monopsonistic powers, this negative aspect becomes particularly serious. It is worth recalling that in the middle-sixties Korea had no comparative advantage in steel production but it acquired dynamic comparative advantage in steel in an astonishingly short span of time. Nevertheless, this should not detract us from the fact that the present volume is an invaluable addition to the swelling literature on the role of MNEs in LDCs. The book is immensely useful for economists, planners, policy makers and researchers.

D. Singh*

* Dr. D. Singh is Assistant Adviser in the Department of Economic Analysis and Policy.

Financial Instability and the International Debt Problem: George Mckenzie and Stephen Thomas, 1992 Macmillan Academic and Professional Ltd., Britain, pp. ix + 219, Price £ 40.

The book, a revised version of research report prepared by the authors for the United Nations Conference on Trade and Development in 1983, falls in the category of books which focus on risk analysis and which attribute the external debt problems of early 1980s to insufficient attention paid by commercial banks to risk management. The authors look at the international debt problem from the angle of financial institutions as lenders in financial markets. The 'theme' of the book is that the financial institutions fail to make distinction between temporary and fundamental changes and are unable to take full cognizance of the impact of 'systemic' risk arising as a result of changes in broader macro-economic environment on returns from investment opportunities. Although portfolio diversification may be viewed as one way of safeguarding against risks, the authors indicate that this would help only when risks on various investments are uncorrelated or unsystematically related. The focus of discussion remains on commercial debt issues and on market-based approaches to the international debt problem.

The book is organised in three parts. Part one of the book, with three chapters, focuses on theoretical issues in the area of risk management. It provides alternative explanations of the behaviour of financial intermediaries extending from traditional 'behavioural' theories to the 'modern theory of finance' and emphasises the fact that risk assessment is subjective. Part two of the book has two chapters which describe the evolution of the debt crisis and concentrate on debt restructuring exercises which were undertaken to safeguard the financial system. Part three which has two chapters is actually an extension of the earlier part with its focus on experimentation with debt-equity swaps and other innovative instruments and critical evaluation of the BIS capital adequacy norms.

Chapter 1 presents factual information indicating decline in the proportion of new lending to LDCs from a peak of 43.4 per cent in 1979 to 8.1 per cent in 1986. Its focus is on the fact that the market mechanism in general, and the financial markets in particular, are highly fragile and is on how governments have contributed to increased market fragility either by way of monetary policy decisions or by way of providing short and long-term lender of last resort facilities.

Against the backdrop of the fact that all bank investment and funding activities inevitably involve subjective decision making, Chapter 2 provides an analysis of objective risk assessment, using the probability distribution approach. Chapter 3 begins with Keynesian and Classical views of financial markets. The Keynesian viewpoint attributes fragility of markets to non-availability of sufficient information to investors and their inability to make distinction between random (and unsystemic) shocks and more fundamental changes in economic conditions. It, therefore, suggests intervention by government to correct the market failure by offsetting the errors that may otherwise occur systematically in the financial sector. On the other hand, Milton Friedman and many new classical economists believe that any instability in markets arises from the unwarranted and unnecessary intervention of government. Criticising the orthodox theory, the authors emphasise that it is difficult to quantify uncertainty in objective terms and present a case for behavioural view of financial markets. According to the authors, certain behavioural characteristics e.g. the herd instinct, disaster myopia, misuse of information, etc. introduce an element of systematic risk or uncertainty and contribute to financial market fragility and failure.

After having explained theoretical aspects of the risk analysis, attention is drawn to the factors which led to international debt problem in early 1980s. The international banking system could absorb the first oil price shock because there was a reduction in risks on the funding side following recycling of large surpluses by oil producers with the banking system. In pursuance of the interest-rate targetting approach the major industrial countries accommodated increased credit demands resulting from higher oil prices and real interest rates remained either low or even negative. In the 'seventies the banks lent to developing countries not only because economic activity levels in these countries expanded but also because the banks attempted to improve their competitive position. But as the risk involved in extending credit to developing countries surfaced, the financial system became fragile. As a result, there occurred a clear change in risk perception and 'herd-instinct' of banks leading to market segmentation and decision not to lend medium-term credits on any terms to countries which were considered high risk (pp. 96). There was also a monetary policy shift as the objective of price stability assumed more importance than in the 'seventies which fortunately exploded the myth of the invincibility of the Phillips Curve.

In Chapter 5, the authors highlight the fact that the use of various innovative instruments particularly securitisation of activities undertaken by banks as part of restructuring of their portfolios and profit-motive

may prove to be even more riskier than their lending activities of the 1970s. Pointing out the shortcomings in comparing the rate of growth of exports with the rate of interest as an indicator of debt position of a country (pp. 131), the authors suggest the use of alternative indicators *viz* (i) the deficit on goods, services, and private transfers, less interest payments (ii) the current account deficit, less interest payments and (iii) the external financing requirements, less interest payments. An improvement in debt position of a country would depend on whether surplus generated in terms of any of the three indicators is greater than interest payments. The chapter also covers the efforts of international organisations particularly the IMF, the World Bank and the BIS, debt restructuring exercises, the Baker Plan, introduced in September 1985, and the use of new financial modalities such as currency redenomination, interest retiming, onlending and relending, trade facilities, cofinancing, debt-conversions and improved terms for the debtors including the 'menu approach'. As it so happens, the debt crisis lingered on till almost the end of the 'eighties and it is only after it was clearly recognised that debt reduction and interest reduction are essential to face the problem could the international financial community and the highly indebted countries see the light at the end of the tunnel when the Brady Plan came into being. The Plan, based on the use of a market-based, case-by-case menu options negotiated between the indebted countries and their Bank Advisory Committees, included official support for debt and debt-service reduction besides voluntary debt forgiveness.

Chapter 6 continues the discussion on the emergence of secondary market and use of debt swaps in restructuring exercises. In their analysis of economic issues raised by debt swaps, the authors point out the inflationary impact of debt swaps and mention that a debt-equity swap may not always attract additional investment. While pointing out the fact that the case-by-case rescheduling approach of the 1982-87 period was obviously only a fire-fighting operation, they do see scope for use of swaps if viable projects exist and local governments are flexible. Indeed swaps did play a role in attenuating the debt problems. Debt conversions have gone beyond debt-equity swaps to debt-for-nature or debt-for-health swaps and been extended to privatisation which involve exchange of assets and avoid monetary expansion.

Chapter 7 focuses on the role of international bank regulators in a rapidly changing world. Discussing the international norms as developed by the BIS the authors point out that the BIS approach focuses on credit risk rather than on interest or investment risk which are equally important as the debt problem has shown. Yet another shortcoming of

the BIS approach is its concentration on only those risks which arise on the asset side of the balance sheet. Funding risks are not taken into account and cross-holding of capital by banks is also not eliminated. However, capital-adequacy norms, by increasing the need for higher provisioning against loans to LDCs, have also encouraged reduction in exposure of banks to these countries.

The data coverage in the book does not go beyond 1986-88. Discussion on Maturing Debt Crisis is also upto 1987 and does not cover further developments in the area of market-based debt strategies particularly the ones based on debt and debt-service reduction. Nevertheless, the analysis of international debt problem, though viewed primarily from the point of view of financial institutions, is interesting, and is a reiteration of the need to guard against 'systemic' risks. Recently, the financial sector is passing through another phase of self-correction and balance-sheet adjustments but this time it is because of over-lending to customers in the markets of major industrial countries. It is again shift in the monetary policy stance which has contributed to recessionary conditions, increased number of defaults and delinquencies, reduced the value of bank assets and equity capital and forced the banking system to attempt to rebuild capital, to reduce the pace of lending and to diversify in favour of assets with low risk weighting. The "debt-deflation" process has affected returns on bank assets and equity capital in the same direction, an indication indeed of systematic risk factor. In terms of the risk analysis, the conflict between the interests of debtors and creditors is going to exist. The risk and creditworthiness considerations would continue to determine the access of developing countries to private capital markets but it is well worth the emphasis that improved external environment is an important determinant of creditworthiness and developed countries can play an important role in this regard.

Balbir Kaur*

* Ms. Balbir Kaur is Assistant Adviser in the Department of Economic Analysis and Policy.

Foreign Trade Policy Changes and Devaluation: Current Perspective by Bibek Debroy, B.R. Publishing Corporation, Delhi (1992). Pages vi+134, Price Rs. 75.

'Adjustment of exchange rate to realistic level' or simply devaluation of domestic currency has always been an important component of any economic liberalisation programme, particularly if it receives financial support from International Monetary Fund (IMF). India's recent economic liberalisation programme is no exception to this rule. Though the external value of the rupee is linked to a basket of currencies and, notwithstanding the gradual slide in the external value of the rupee since mid-eighties, there were two sharp downward revisions in the exchange rates, the first on July 1, 1991 and second on July 3, 1991. These revisions in the exchange rate were called the 'second devaluation', the first having taken place on June 6, 1966. The extent of the first devaluation amounted to 57.50 per cent in terms of the U.S. Dollar, while that of the second devaluation varied with the currency, ranging from 20.45 per cent in respect of French Franc to 23.04 per cent in terms of the U.S. Dollar. Along with these devaluations, extensive changes were effected in the foreign trade policy measures. The book under review is about the crisis that had led to these changes in general, and the second devaluation in particular, and about the issues arising from these changes.'

The book is divided into eight chapters. In the first chapter, innocuously titled 'Trends in India's Foreign Trade', Debroy draws out some unexpected conclusions from the official statistics. These data revealed that the present external crisis was not necessary due to deterioration in trade balance. On the contrary, our performance on the export front had been quite encouraging, specifically since 'eighties. Such phenomenon was also evident even during 'fifties, 'sixties and early 'seventies, notwithstanding the then prevailing inward orientation.

In the second chapter, which is named 'The Balance of Payment Crisis and Solutions,' Debroy notes the recent sharp reduction in the foreign exchange reserves. He explains the phenomenon in terms of larger amortisation payments in the face of stagnant invisible receipts. He also identifies the downgrading of India's credit rating by certain credit rating agencies and the consequent difficulties in raising new loans/obtaining roll-over facilities of existing loans on the international capital markets (including banks) as the precipitating factors of the crisis. According

to the author, there is a virtual unanimity among the economists on the need for structural reforms to solve the present crisis but they are divided in their prescription to overcome the crisis, the division being purely on ideological considerations. Broadly, two strands are visible: the Structuralists leaning on the 'left' and the neo-Classicals on the 'right'. A brief recapitulation of the main postulates of each of these schools, their rationalisation, and substantiation completes this chapter.

The third chapter explains the 'Liberalisation in the 1980s'. It points out that the trend towards liberalisation was initiated even at the beginning of 'eighties. Various committees had suggested different liberalisation measures in industry, foreign trade and financial sector. There were, however, arguments, based mainly on the experiences of other countries, in favour of (and against) such liberalisation measures.

The fourth chapter is a brief narration of major 'Trade Policy Changes' that had accompanied the devaluation in July 1991. The withdrawal of Cash Compensatory Support, the introduction of Exim Scrip, special incentives for Export Oriented Units, changes in direct foreign investment policy, and the fiscal impact of these changes are documented in this chapter.

Chapters 5 and 6 deal with devaluation. 'The 1966 Devaluation and Effects of a Devaluation' are the subject matter of the former chapter. After explaining the relevant elasticities, Debroy accepts the empirical estimates of a study by Virmani [Demand and Supply Functions in India's trade, *The Economic and Political Weekly*, February 9, 1991] and concludes that Marshall-Lerner condition is satisfied in India. Therefore, devaluation has a positive effect on trade performance and this has been confirmed by the past trends. Between 1961-62 and 1970-71, exports/imports ratio had risen by 55.0 per cent. Besides, between 1985-86 and 1990-91, trade deficit, after adjustment for effective exchange rate, had declined. The next chapter - 'More General Effects of a Devaluation' - starts with the Keynesian macro identity and moves into neo-Classical partial equilibrium analysis in an attempt to theorise the effects of devaluation on output and prices. Markets selected for this purpose are the export sector and home sector (both in traded and in non-traded goods). Quoting extensively the data contained in a study by Deardorff and Stren, [*The Michigan Model of World Production and Trade*, MIT press, 1986]. Debroy concludes that the first devaluation had been beneficial to India.

Chapter 7, titled 'Sectoral Issues', discusses the export performance of engineering goods, effects of the withdrawal of Cash Compensatory

Support (CCS) on various products, and the inadequacy of Exim Schemes to compensate for the withdrawal of CCS.

By way of 'Concluding Remarks', the last chapter lists the familiar but unanswered/unanswerable questions :

- (i) will exports rise fast enough to avoid further devaluation following price increase? (The recent devaluation of over 1.0 per cent would imply that the answer is in the negative).
- (ii) will the slow down in imports contribute to recession?
- (iii) can fiscal deficit be contained following the lowering of import duties?
- (iv) will monetary squeeze lead to recession?
- (v) will industrial policy be changed to counteract recession? and
- (vi) will foreign investment adequately react to enable India's exports to take off?

The book ends with an extensive quote from the May 1991 issue of *The Economist* characterising 'India is a tiger caged' and sounding that there could be no reversal of the process of reform.

According to the author, the book is meant for the student, the lay person, and the businessman. The objective is to make the changes in trade policy, particularly devaluation, and their rationale more transparent to these target groups. One should congratulate the author for achieving the objective though one could argue that, perhaps, the author is biased towards the 'right'. The book is immensely readable for its clarity of analysis and for the usage of simple style of language.

Perhaps, however, one could argue on some aspects. Even within the target group, discerning audience is likely to pose a few uncomfortable questions to the author. If we had been performing well on foreign trade front, as Debroy had shown with official/unofficial data in chapters 1 and 3, where was the need for devaluation to improve trade balance? According to the author, all indicators point to the encouraging performance of exports. There has been diversification (both commodity-wise and region-wise); both net barter terms of trade (ratio of export prices to import prices), which indicates our gain from trade, and income terms

of trade (value of exports divided by import price), which reflects our capacity to import, had improved; in terms of effective exchange rate (i.e., nominal exchange rates adjusted for export incentives, import duties, and rates of inflation), trade deficit had narrowed; and effective exchange rates had been declining. All these factors are substantiated by the author himself at several places in several pages and would argue against devaluation. If the author takes the defence on the need to speed up the trend in the improvement, the J-curve approach, which postulates initial deterioration on trade account and is tacitly accepted by him (p. 104-05), would be inconsistent with such defence.

Professional economists, even those who are not on the 'left' are likely to have some reservations on the basic approach because of the apparent inconsistency in the arguments of Debroy. If the present external economic crisis is more of a balance of payments problem, as has been stated (p.21), devaluation shall aggravate it since the outgo, in terms of domestic currency, on amortisation payments would be high. Since most of the debts are on Government account in India, in this scenario, the Government should mobilise more funds to meet its obligations. It can borrow more or tax more. In either case, the rate of inflation gathers momentum, exportable commodities lose price advantage at the international markets, and these developments would defeat the basic purpose of devaluation. In this scenario, reducing fiscal deficit is also impossible. Hence, if we accept Debroy's contention that the present external crisis is a balance of payment problem, the compatible solution would not be devaluation of the currency.

Another aspect relates to Debroy's application of Marshall-Lerner condition. Even after assuming, for argument's sake, that this condition is realistic and hence is acceptable, the method of its application in the present form raises questions. The author discards Devi Singh's estimated elasticities [*Economics of Exchange Rate management*, Criterion Publications, 1986], because 'They do seem to be on the lower side' without substantiating the conclusion. Nor did he offer any reason for his acceptance of Virmani's co-efficients. The only plausible inference for his acceptance of the latter elasticities could be that they enable him to substantiate the fulfilment of the Marshall-Lerner condition.

Similarly, some would find two major lacunae in the analysis. They would argue that the net performance of foreign trade is a product of complex factors and hence singling out changes in foreign exchange rate as the important (if not only) reason for the better performance of exports during the 'eighties is highly simplistic. Further, explaining changes in

foreign exchange reserves in terms of total foreign trade is misleading because, first, trade with rupee payment area, which is neither in foreign currency nor balanced, should have been excluded since our exports to this area were high and imports low; if adjusted for this factor, the trend could be even contradictory (of course, that would have also contradicted the author's claim that the present external crisis is not a foreign trade problem); and, second, external assistance has also been a major determinant of foreign exchange reserves since the 'sixties. Hence, trends in foreign exchange cannot be explained in terms of trade balance alone. Notwithstanding the fact that the book is intended for the layman, one would expect Debroy to indicate these aspects at least as foot notes to caution the readers.

Despite these observations, it should be conceded that the book has broadly achieved its objective of explaining, quite satisfactorily, to the layman about the origins and the nature of the crisis on the external front and the objectives of devaluation in general though one may not fully concur with his views. The back cover of the book carries the plea 'Save Indian Publishing: Buy Indian Books'. If books of this standard are published, there will be no need to plead with buyers in this manner; they will buy on their own.

N. Nagarajan*

* N. Nagarajan is Joint Chief Officer in the Department of Banking Operations and Development.