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A SHORT-TERM MODEL TO FORECAST MONETARY AGGREGATES — INTERIM RESULTS

D. C. Rao, T. R. Venkatachalam and A. Vasudevan*

I. Introduction

Monetary forecasts are required for a variety of purposes. Decisions on monetary policies such as cash reserve ratios and refinancing of commercial banks by RBI must clearly be based on an analysis not only of monetary aggregates of the recent past but also of future prospects. The same applies to measures concerning the structure of interest rates and the assessment of commercial banks' credit budgets. Forecasts of growth of bank deposits play an important role in the estimation of resources available for the financing of investment, and particularly of plan outlays in the public sector.

The purpose of the forecast has a bearing on the time horizon over which the forecast is to be made, and, hence on the methodology to be used. For instance, in the estimation of financial resources available for Plan outlays, one of the components is based on a projection of the growth of bank deposits. For this purpose, it is enough to base the projection of deposit growth on an analysis of the demand for deposits, given a projected rate of inflation. This approach is valid because it can be assumed that, in the long run, the supply of bank deposits will have to align itself with its demand, and can be made to do so by the adoption of suitable monetary policy measures from time to time. For short-term analysis related to monetary policy decisions, the problem is that of assessing the imbalance between the forces of demand and supply of money and knowing how to remedy the imbalance

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in the interests of price stability. Thus, for short run analysis, the role of monetary policy instruments clearly has to be made more explicit.

Short run monetary analysis must, therefore, go beyond analysis based only on the balance-sheet approach or on the assumption of a stable multiplier relationship between reserve money and money supply. In the balance-sheet approach, bank deposits, reserve money and currency are separately estimated and these estimates are not necessarily consistent with each other, except in that they conform to the balance-sheet constraints. In the money multiplier approach it is assumed that the multiplier for each period is stable after making the requisite adjustments for changes in the cash reserve ratio applied by RBI to commercial banks. In fact, the money multiplier is not very stable as can be seen by an examination of the marginal multiplier i.e. the ratio of annual changes of M_3 to changes in reserve money and the variations cannot be explained solely on the basis of changes in the statutory cash reserve ratio. (See Table below) :

Incremental Money Multiplier

Last Friday of March	Increases in (Rs. crores)		Incremental ratio of M_3/H
	M_3	High Powered Money (H)	
1970-71	1,319	423	3.1182
71-72	1,732	567	3.0547
72-73	2,343	635	3.6898
73-74	2,538	1,243	2.0418
74-75	1,886	128	14.7344
75-76	2,829	345	8.2000
76-77	4,993	1,812	2.7556
77-78	5,626	1,397	4.0272
78-79	6,985	2,775	2.5171
79-80	6,934	2,749	2.5224

An algebraic decomposition of the proportionate changes in the marginal multiplier shows that fluctuations in the ratio of currency to deposits rather than changes in the reserve-deposit ratio are responsible for the bulk of the variation in the money multiplier. Thus, for short run analysis relevant to policy making it is necessary to use a consistent forecasting methodology that goes beyond the balance-sheet and multiplier approaches and takes account of the forces of both the demand for and the supply of money and credit.

Such an approach must take into account the portfolio behaviour of the public and the commercial banks to the extent possible.

A brief overview of the structure of the present version of the model is given in the following section. Section III discusses the data base and some of the problems encountered in generating a time series for the purposes of econometric estimation of behavioural relationships. Section IV contains a detailed and technical presentation of the model as estimated, and a discussion of the rationale of the structure of the model both in terms of the individual equations and in terms of their interaction to generate model forecasts. The predictive performance of the model both in the sample period and for one year outside the sample period is shown in Section V. The final section discusses the weakness of the present model as perceived by the authors and identifies areas in which further refinements of the model are contemplated.

II. An Overview of the Model

The model's forecasts of monetary aggregates are derived by a simultaneous solution of 4 behavioural equations and 4 identities or statistical relationships. Each of the behavioural equations represents demand or supply relationships for the relevant aggregates and the simultaneous solution procedure ensures that the forecast satisfies both the demand and supply relationships. The individual relationships have been estimated by regression over the period 1970-71 to 1979-80 using annual data for the last Friday of March. The relationships covered by the main equations are as follows:

1. Currency demand, which is estimated as a function of nominal national income, foreign remittances, food procurement credit, an index of prices of sensitive commodities and deposit interest rates.
2. The supply of bank liabilities, which is estimated as a function of bank reserves, the cash reserve ratio, the call money rate and the composition of bank deposit liabilities.
3. National income at current prices, which is estimated as a function of real income, money supply, and the level of national income deflator in the previous year and share of non-agricultural income in national income. This equation may be regarded as a reformulation of the traditional equation for the demand for money.

4. The demand for time and demand deposits, which are estimated mainly as a function of nominal national income, share of non-agricultural income to total income in nominal terms, interest rates and the previous year's inflation rate.

In addition to the above equations, there are definitional and statistical relationships to derive estimates of total bank reserves, deposits and the price level.

In this model, the main exogenous variable, whose values are taken as given are: reserve money, real income, food credit, cash reserve requirements, and interest rates on time deposits. The endogenous variables, whose values are estimated by the model, are: currency with the public, demand deposits, time deposits, total bank liabilities, bank reserves and the implicit deflator for national income.

The basic structure of the model can be grasped by following the process by which the model generates the forecasts of endogenous variables, given the values of exogenous variables. (A flow chart is discussed in greater detail in Section IV). The key exogenous input to the model is the estimated change in reserve money. The first step in the model is to estimate the public's demand for currency. Deducting this currency drain from the previously estimated change in reserve money, the model arrives at an estimate of the reserves available to banks for the expansion of their liabilities. Given the statutory cash reserve ratio and other variables influencing the banks' reserve holdings, the model is then able to estimate the supply of deposits. On the assumption that the supply of currency is identically equal to its demand, this estimate of the supply of money is then faced by an estimate of the demand for money. The essence of the model is that the supply and demand have to be equilibrated, which is done by allowing for changes in nominal income (given an exogenous forecast of real income) which, in turn, affect the estimates of the demand for currency and deposits. The forecasts of money supply are derived by an iterative solution of the entire model, which means that all the relationships specified in the model have to be simultaneously satisfied.

III. Data Base

The data used for this forecasting model are drawn from two basic sources: assets and liabilities of RBI and the commercial banks which are periodically published by RBI using information

received in various statutory returns; and time series on national income at current and constant prices, wholesale price indices, inflow of foreign remittances etc. which have been drawn from the relevant official publications, mainly by the Central Statistical Organisation. The scope of the model and the precise specifications of the equations must abide by the limitations imposed by the availability of data, its definition and the timeliness of its publications.

While the data on financial variables are generally available in great detail, reasonably reliable figures pertaining to non-scheduled commercial banks and co-operative banks are received only with considerable delay. Hence, the model's relationships are defined only in respect of scheduled commercial banks, with crude assumptions being made in respect of other banks, where absolutely necessary, to satisfy definitional identities. This restriction in the scope of the model is not a serious drawback because scheduled commercial banks dominate the banking system anyway in terms of both absolute size and growth. As of March, 1980, the end of the sample period of the model, other banks held only about 9 per cent of aggregate deposits of the banking system.

The absence of quarterly or semi-annual national income estimates puts a serious limitation on monetary analysis which is inherently short run in nature. Because real national income is such a crucial variable in the analysis of the demand for money, this model has had to be specified on an annual basis, ignoring the possibility of inter-relationships of shorter duration between the financial and real variables or even among the financial variables alone.

The restriction of the model to annual data imposes an especially severe handicap because the analysis cannot legitimately span too long a period, thereby limiting the number of observations available for the application of statistical estimation procedures. The start of the sample period for the model was set at March 1970 because there is a break in the money supply series due to an enlargement in the coverage of financial institutions.* Further, there has been substantial change in the structure of the economy, and of the banking system in particular, which makes an analysis of earlier decades decidedly less relevant for the purposes of a forecasting model. For instance, the nationalization of the banking system in 1969 led to a number of developments in branch expansion, credit allocation and interest rate policies that have a

* For details, see *Money Supply in India: Concepts, Compilation and Analysis*, Reserve Bank of India, Bombay, 1977.

bearing on monetary analysis. Hence, it was decided to estimate the statistical relationships over the period 1970/71 to 1979/80.

Even during the selected sample period, the financial data are subject to some discontinuities which had to be removed by adjusting the data. The data on the scheduled commercial banks' "liabilities to the banking system" and "liabilities to others" from 1970 to 1975 are different from the data for subsequent years. Similarly the published data of demand and time deposits after January 1978 are not on the same basis as earlier, because banks adopted a revised method of classification of savings deposits into "demand" and "time" liabilities on different dates since January 1978. Using information on individual banks' liabilities, it was necessary to use reconstructed series on demand and time deposits conforming to the new system of classification so that valid forecasts could be generated by the model.

Another area where the financial data proved deficient for the model's purposes was interest rates. Almost all the interest rates on which data are published are regulated in some way and the published time series do not adequately reflect the changing conditions in the financial markets. Even moderately reliable time series on interest rates in indigenous money markets and rates paid by non-financial companies to their depositors are not available. Data on interest rates charged by banks on their advances are available only after a considerable delay. On reflection it was decided that only three interest rates were usable for this analysis: the call money rate and the dividend yield on industrial securities, which are practically the only published interest rates that are permitted to fluctuate more or less freely; and the interest rate on fixed deposits which, though fixed by RBI directive, can be expected to have an influence on the demand for time deposits.

Details concerning the precise definitions of the variables included in the model are given in Annexure I.

IV. The Model

The section discusses in detail the equations comprising the forecasting model, along with their underlying rationale, and their inter-relationships. The equations of the present model are given in Annexure II and flow charts depicting the significant interactions in the system are shown in Annexure III. It may be noted that the model only estimates linear equations so as to simplify their simultaneous solution required for simulation.

1. **Public's Demand for Currency:** The public's demand for currency has a crucial role in monetary analysis for a number of reasons. First, a relatively large share of money is held in the form of currency. The mean value of currency outstanding during the sample period was Rs. 7235 crores, which compares with demand deposits of Rs. 3522 crores and time deposits of Rs. 12110 crores. Thus, for the decade of the seventies, currency amounted to over two-thirds of M_1 and nearly one-third of M_3 . These rates have been declining slowly over the years but they are still much higher than in other countries.

The second reason for the importance of currency in monetary analysis is its volatility. Not only is it volatile from week to week, reflecting the ebb and flow of payments but the magnitude of annual changes also varies considerably from year to year from a low of Rs. 39 crores in 1974-75 to a high of Rs. 1581 crores in 1978-79. As already noted, the variation in the ratio of currency to deposits is mainly responsible for the fluctuations in the money multiplier. Any monetary forecasting system (whether a formal econometric model or not) that cannot explain these violent swings in currency holdings cannot be very successful in achieving its purpose.

A third feature of the monetary system that reinforces the importance of the public's demand for currency is that the amount of currency in circulation is determined by the demand for it rather than by factors influencing its supply. Deriving from theoretical considerations that currency serves both as a means of payment and a store of value, one may hypothesize that the demand for currency is determined by such factors as the flow of income/expenditure, its distribution, portfolio considerations etc. Based on these factors, the public expresses a certain demand for holding currency rather than other financial or real assets. Given the arrangements for the issue of currency by the Reserve Bank of India, the public's demand for currency automatically has to be met i.e., the supply of currency is completely elastic in adjusting to its demand. Hence the accurate estimation of the public's demand for currency is vital for monetary forecasting.

Table 1 presents some alternative equations estimating the public's demand for currency, all of which give reasonably good statistical fits despite all but one of them being specified in the form of first differences to eliminate the spurious correlation introduced by common time trends. A comparison of equations 1 (a) and 1 (b) is instructive. Both the equations have identical speci-

Table 1 — Currency Demand Equations

							⁻² R (adj)	D.W.	S.E.E.
1(a)	C = 3425.2 + 0.15 Y — 776.1 RLT + 4877.9 BCF/BC	(17.6)	(4.1)	(1.0)			0.98	2.64	318.1
1(b)	ΔC = 2066.0 + 0.03 Y — 567.6 RLT + 9331.6 BCF/BC	(5.0)	(4.0)	(2.6)			0.79	3.32	234.7
1(c)	ΔC = 2213.9 + 0.06 Y — 845.3 RLT + 19143.6 BCF/BC + 699.2 WP — 1.5 FR	(2.8)	(4.1)	(2.6)	(0.4)	(1.5)	0.82	3.62	213.5
1(d)	ΔC = 2091.6 + 0.05 Y — 791.0 RLT + 18053.1 BCF/BC + 1057.9 NP — 1.4 FR	(2.6)	(4.3)	(3.4)	(0.8)	(1.3)	0.84	3.48	202.4
1(e)	ΔC = 2036.7 + 0.06 Y — 803.5 RLT + 17377.2 BCF/BC + 120.5 SCP — 1.6 FR	(3.0)	(4.0)	(3.1)	(0.2)	(1.6)	0.82	3.62	216.3
1(f)	ΔC = 2306.6 + 0.02 Y — 526.3 RLT + 0.9 ΔBCF + 851.6 SCP + 1.2 FR	(1.2)	(2.9)	(2.1)	(0.9)	(1.5)	0.71	2.84	274.6

Note : Figures in brackets are t-statistics.

fications except that 1 (a) specifies the dependent variable in stock form and 1 (b) in first difference form. The second equation has a lower standard error of estimate which is an advantage from the forecasting point of view.

In addition to the income variable, all equations include the rate of interest on time deposits (RLT) which indicates the rate of return on a competing asset. As expected, the income co-efficient is positive and the RLT co-efficient is negative. In two equations the rate of change of wholesale prices ($\overline{WP}$) and the national income deflator ($\overline{NP}$) are also inserted to introduce the asset substitution effect between currency and commodities. But their signs are positive and the co-efficients are not significant.

Another variable that enters all the equations is the credit for food procurement, which serves as a proxy for the actual expenditures incurred in the public procurement of foodgrains. In the first five equations, this is introduced as a ratio to total credit (BCF/BC); in the last equation it is introduced as an annual change in outstanding food credit (ΔBCF). The hypothesis is that the process of procurement puts additional income in the hands of farmers who, traditionally, have a relatively high propensity to hold currency. Hence, in years where food procurement operations are on a larger scale, the public's demand for currency is relatively high. The hypothesis is borne out by the sign and significance of the estimated co-efficient. On similar reasoning, the inflow of foreign remittances (FR) is also tried. In equations 1 (c), 1 (d) and 1 (e) the co-efficient has the wrong sign but in equation 1 (f) it took on the right sign, albeit only marginally significant. In essence, these variables attempt to capture the effect of changes in the distribution of income on the public's demand for currency.

The positive co-efficient for the price variables in equations 1 (c) and 1 (d) suggests that it is really expressing the transactions demand for currency. Since the specification of income is at current prices, this should itself have fully captured the effect of the price level on the normal transactions demand for currency. This suggests that the additional transactions demand may be for speculative activities. Hence, equations 1 (e) and 1 (f) include the rate of change in the prices of sensitive commodities ($\overline{SCP}$). The co-efficient has the right sign but is not significant.

The final choice for the model lay between equations 1 (e) and 1 (f), the only difference in specification being in food procurement credit. The use of ΔBCF instead of BCF/BC led to a deterioration in the t-statistics (probably because of the introduc-

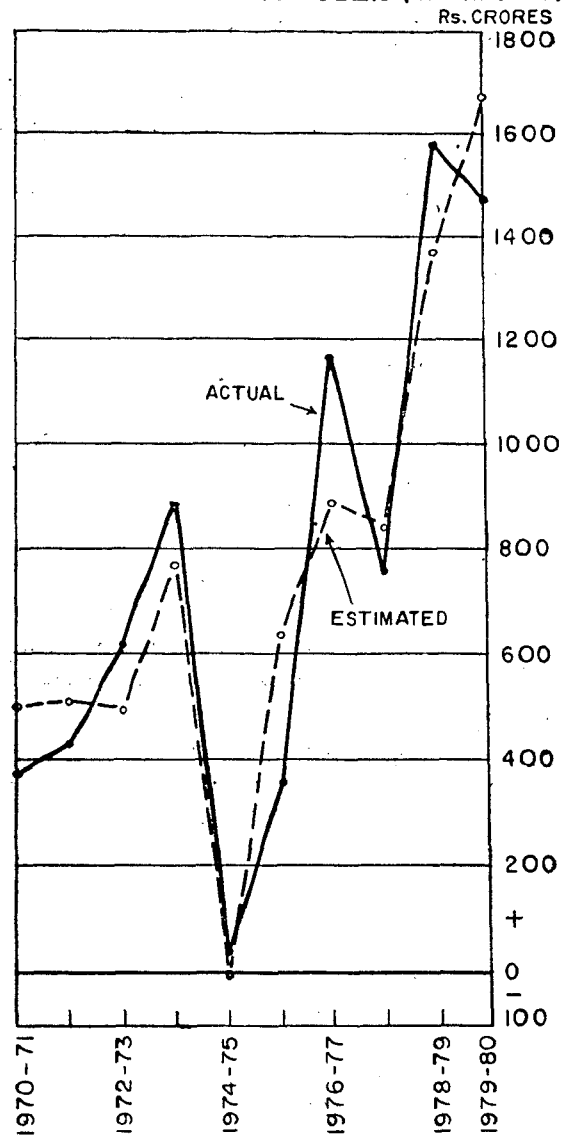
tion of multi-collinearity) and a higher standard error of estimate. Nevertheless, it was felt that for forecasting purposes equation 1 (f) was preferable partly because all the co-efficients had the expected signs. On the basis of the probable scale of procurement operations and announced foodgrain prices, it is possible to make a reasonably good forecast of the increase in food credit (ΔBCF). However, a forecast of BCF/BC also requires an estimate of aggregate bank credit (BC), which cannot be estimated independently of the endogenous monetary aggregates. For the present, the model does not attempt to estimate BC endogenously and, hence, it was decided that the exogenous variable representing food procurement credit should be ΔBCF rather than BCF/BC .

Although the selected equation is not the best equation on statistical criteria, its performance in tracking the highly volatile annual changes in currency is quite commendable. The graph below shows the actual changes and those predicted by the equation. The equation has captured almost all the turning points in the ΔC series during the sample period. (for graph see next page)

2. Supply of Bank Liabilities

Unlike demand, the supply of monetary liabilities can be modelled in a variety of ways. Basically, in a fractional reserve system, the supply of bank liabilities will depend on the availability of reserve assets to the banks and the required ratio of bank reserves to total liabilities. In practice, the banks may wish to hold reserves in excess of the minimum requirement to serve as a cushion against unanticipated reserve losses or spurts in their deposit accretion. Thus, the banks' demand for excess reserves can be estimated as a function of conditions in the money market, volatility of deposits etc. Further refinements are possible by separate estimation of the banks' demand for borrowing from RBI. Alternatively, banks' demand for reserves may be specified as a demand for free reserves (i.e. excess reserves minus borrowed reserves). These refinements were considered and rejected as being unsuitable to the current structure of the Indian banking system for the following reasons. First, the treatment of borrowed reserves as being determined largely by banks' demand at the prevailing Bank Rate is not valid in our economy. The RBI specifies detailed refinance limits in relation to outstanding credit of specified categories (e.g. food, export) and in respect of other forms of refinance, for each bank. Thus, it would be more appropriate to treat RBI's credit to the banks as being a policy variable than to estimate its magnitude on the basis of banks' demand.

CURRENCY WITH THE PUBLIC (Incremental)



This is the approach used in this model, where RBI's credit to the banks forms one of the sources of change in reserve money, which is an exogenous input to the model.

Secondly, some of the more refined approaches to the estimation of banks' demand for reserves usually assume that unborrowed reserves are controlled by the monetary authority and set by policy considerations. This assumption may be valid in advanced monetary systems, where open market operations can be used by the monetary authority to influence the level of the banks' unborrowed reserves. In India, open market operations are limited in scale and consist of gradual unloading of RBI's stocks of government securities and switch transactions whereby banks improve their interest earnings through exchanging government securities with RBI. On treasury bills, RBI plays an entirely passive role, selling and rediscounting them at rates that have remained fixed since 1974. Thus, RBI currently does not conceive of open market operations as being a means of influencing the supply of reserves to the banking system.

Thirdly, excess reserves held by scheduled commercial banks consist mainly of cash on hand, the excess balances with RBI being almost negligible in magnitude (See table below). It is possible to treat cash on hand as being mainly a transactions demand, which is determined by administrative considerations (e.g. the spread of branch offices and the location of currency chests).

Excess reserves of Scheduled Commercial Banks
(Rs. crores)

(as of last Friday of March)	Cash on hand (1)	Excess of average balances with RBI (2)	Excess Reserves (1 + 2)
1971	167	25	192
72	180	37	217
73	221	34	255
74	246	—109	137
75	296	81	377
76	305	41	346
77	354	—122	232
78	469	142	611
79	557	43	600
80 (prov)	616	—	616

Source: Statistical Tables Relating to Banks in India.

Fourthly, the data on excess reserves are subject to measurement error as the data on excess balances with RBI refer to the average of daily balances over the previous week, whereas the data on cash on hand refers to the banks' holdings on a particular Friday. Even small errors in an excess reserves equation can cause severe problems in the overall operation of the model because of the tremendous leverage implicit in translating the demand for excess reserves into a supply of bank liabilities at a given level of aggregate bank reserves.

The present model uses a fairly simple equation relating the supply of bank liabilities to the supply of bank reserves: As noted elsewhere, the amount of bank reserves is determined endogenously (see equation 2 of Annexure II). If it is assumed that banks' excess balance with RBI are always nil and that their cash on hand is a fixed proportion of their liabilities, then liabilities could be determined solely on the basis of the aggregate reserves and the statutory cash reserve ratio. Equation 2(a) in Table 2 uses this approach but the results are unsatisfactory. The standard error of estimate is rather high and the co-efficient of the statutory cash reserve ratio has the wrong sign. These short-comings are remedied by the inclusion of two more variables, the call money interest rate (RC) and the ratio of time deposits to total deposits (TD/D) which may influence the banks' desire to hold excess reserves. For an individual bank, borrowing from the call money market is an alternative to holding excess reserves and can be used to expand its liabilities. Thus, the interest rate on call money borrowing should be negatively related to the expansion of liabilities (given reserves etc.). The same applies to the scheduled commercial banks as a group, since they use the call money market to borrow from co-operative banks and other financial institutions. As expected, the co-efficients of RC in equations 2(b) and 2(c) are negative.

The ratio of time deposits to total deposits (TD/D) expresses the stability of the deposit base as the inflow and outflow of time deposits will be more predictable than that of other deposits. Hence, the higher this ratio, the less the need to hold excess reserves as a precautionary cushion and the greater the expansion of liabilities corresponding to a given supply of reserves. As expected, the co-efficient of TD/D is positive in the estimated equations.

Equations 2(b) and 2(c) differ in the way in which the required reserve ratio is specified. In the former, the statutory cash reserve

Table 2 — Bank Liability Supply Equations

						⁻² R (adj)	D.W.	S.E.E.
2(a) L =	5657.2	+ 6.8 TBR (4.7)	+ 10861.0 S (0.2)			0.95	0.73	2124.5
2(b) L =	-132160.7	+ 5.9 TBR (12.4)	- 67660.8 S (3.0)	- 269.9 RC (2.4)	+ 190672.6 TD/D (7.4)	0.99	2.24	631.3
2(c) L =	-139516.7	+ 4.9 TBR (16.8)	- 7132.3 Δ RR/ Δ L (3.8)	- 440.5 RC (4.0)	+ 200126.1 TD/D (8.8)	0.99	2.69	540.2

Note: Figures in brackets are t-statistics.

Table 3 — Nominal Income Equations

						⁻² R (adj)	D.W.	S.E.E.
3(a) Y =	25248.3	- 0.20 YR (0.7)	- 83203.6 YNA/Y (4.0)	+ 88.2 NP ₋₁ (1.1)	+4.37(C+DD)+3997.0 RLT (12.7) (3.8)	0.99	2.18	908.1
3(b) Y =	55142.5	- 0.97 YR (2.4)	- 78935.7 YNA/Y (3.0)	+384.6 NP ₋₁ (8.4)	+1.42(C+D) (8.7)	0.99	3.03	1494.2

Note: Figures in brackets are t-statistics.

ratio is specified as an average ratio of reserves to liabilities whereas in the latter equation, the marginal ratio is used. During the sample period, RBI has stipulated the cash reserve ratio in both the average and marginal forms. For the present model the marginal form has been used as it is more flexible and can be made to accommodate statutory changes in both the average and marginal requirements for forecasting purposes.

The supply of bank deposits is statistically derived from the supply of liabilities, as deposits account for more than 90% of the demand and time liabilities of scheduled commercial banks. The equation used for deriving the supply of bank deposits is as follows:

	⁻²		
	R adj	D.W.	S.E.E.
D = 60.9 + 0.94 L	0.99	3.16	68.3
(387.7)			

where D represents aggregate deposits and L represents aggregate liabilities of scheduled commercial banks. The figure in brackets represent t-statistics.

3. Nominal Income Determination

As explained in Section II and elaborated in the discussion of the model's flow chart below, variation in nominal income is the principal mechanism by which monetary equilibrium is brought about. In essence, this approach is derived from the quantity theory of money, which posits that disequilibrium between the supply of and demand for money expresses itself as changes in the aggregate price level. The approach has well known limitations, some of which are touched upon in Section VI which discusses further work on the model. In the present model, however, the equation determining nominal income may be viewed as a reformulation of an equation specifying the demand for money as a function of income, prices and interest rates. Here, the dependent variable is nominal income which is regressed on money stock and other variables influencing the demand for money. Hence, real income and the share of non-agricultural income in total income, which have a positive influence on the demand for money will have a negative influence on nominal income given the supply of money. The lagged national income deflator (NP_{-1}) has been introduced as an indicator of inflationary expectations. The hypothesis is that the higher the expected rate of inflation, the less the inclination to hold money rather than commodities. On this hypothesis, NP_{-1} should have a positive sign in the equation with nominal Income as the explained variable.

The difference between the two equations 3 (a) and 3 (b) of Table 3 lies in the concept of money that is used. Equation 3 (a) uses currency plus demand deposits ($C + DD$), corresponding to a narrow definition of money and 3 (b) uses currency plus aggregate deposits ($C + D$) which is the broader definition of money. The two equations are used in alternative versions of the model.

4. Demand for Deposits

As the demand for deposits is a part of the demand for money and as the latter is already the basis for the specification of the nominal income equation, there is no room in the model for an additional equation, estimating the demand for aggregate deposits. However, in the version of the model that equilibrates around narrow money (currency plus demand deposits), it is necessary to derive an estimate of demand deposits. This can be done directly by a demand deposit equation or indirectly by estimating the demand for time deposits and deriving demand deposits as a residual out of aggregate deposits which are separately determined. There is a conceptual difference between the estimates of demand deposits so derived. In the first case, where a demand deposit equation is used, the estimate is one of demand. In the second case, since the estimate of aggregate deposits is a supply estimate (having been derived from the equation estimating the supply of bank liabilities), the derived estimate of demand deposits should also be interpreted as a supply estimate.

Sets of equations estimating the demand for demand and time deposits are shown in Table 4. The specifications are fairly conventional in form, using income, the share of non-agricultural income in total income and rates of interests as explanatory variables.

Some special features of the equations for time deposits may be noted. A comparison of the income co-efficients in equations 4 (a) and 4 (b) shows that the inclusion of banks' branch expansion (NB_{-1}) distorts the income effect considerably. Hence, although the expansion of branches may be expected to have contributed to the mobilisation of time deposits, it is concluded that this effect cannot be distinguished from the expansion of time deposits caused by the growth of incomes. The co-efficient of time deposit interest rates (RLT) has remained insignificant and, in many of the equations, has the wrong sign. This may be partly due to the problems in measuring RLT , which is defined as a weighted average of interest rates payable on fixed deposits of different maturities. As the weights change from year to year and

Table 4 — Time Deposit Demand Equations

					⁻² R (adj)	D.W.	S.E.E.
4(a)	TD = -20622.4	+ 0.34 Y —	1699.2 RLT	+44781.6 YNA/Y	0.99	1.33	403.9
		(20.4)	(10.1)	(7.7)			
4(b)	TD = -19240.0	+ 0.28 Y —	1540.1 RLT	+ 41080.2 YNA/Y + 0.18 NB— ₁	0.99	1.29	423.0
		(3.1)	(5.3)	(5.1) (0.7)			
4(c)	ΔTD = -3806.2	+ 0.06 Y —	161.6 RLT	+ 6864.2 YNA/Y	0.90	1.25	391.0
		(3.5)	(1.0)	(1.2)			
4(d)	ΔTD = -6354.3	+ 0.05 Y —	80.2 RLT	+ 6042.6 YNA/Y + 422.7 RV	0.94	1.52	323.
		(4.1)	(0.6)	(1.3) (1.9)			
4(e)	ΔTD = -2578.5	+ 0.05 Y +	42.0 RLT	+ 2867.1 YNA/Y —3537.9 WP— ₁	0.94	2.15	289.
		(4.3)	(0.3)	(0.6) (2.4)			
4(f)	ΔTD = -4352.8	+ 0.05 Y +	34.2 RLT	+ 3461.3 YNA/Y —2598.6 WP— ₁ + 240.3 RV	0.94	2.17	286.
		(4.4)	(0.2)	(0.8) (1.5) (1.1)			
Demand Deposit Demand Equations							
4(g)	DD = -3778.1	+ 0.09 Y +	9780.1 YNA/Y	— 457.4 RLT	0.99	2.13	148.
		(14.2)	(4.6)	(7.4)			
4(h)	DD = -2845.5	+ 0.09 Y +	7965.3 YNA/Y	— 478.4 RLT — 866.9 WP	0.99	2.81	135
		(13.6)	(3.3)	(8.0) (1.4)			

Note : Figures in brackets are t-statistics.

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the changes in the structure of time deposit rates may sometimes induce shifts among maturities rather than increases or decreases in total time deposits, the sign of this co-efficient may have been affected. Further, as time deposits include the time liability component of savings deposits, the relationship between RLT and time deposits is thereby attenuated. A negative co-efficient for RLT may also be the result of the absence of a rate of return on assets competing with time deposits. It is with this in view that the dividend yield on industrial securities (RV) was tried, but without success (possibly because the dividend yield is only an incomplete measure of the return on industrial securities in so far as it ignores capital gains which are the principal motivation for investment in industrial shares). It is only the inclusion of the lagged change in wholesale prices, which may be interpreted as a proxy for inflationary expectations, that resulted in a positive, albeit insignificant, co-efficient for RLT. Thus, it would appear that, given income levels, the aggregate demand for time deposits is only mildly influenced by the interest rates on time deposits and is adversely affected by inflationary expectations.

Supply of Bank Reserves

As noted previously, the supply of bank reserves is derived from the reserve money identity. By definition, reserve money consists of currency with the public, bank reserves (including banks' holdings of cash) and other monetary deposits with RBI. This definition can be rewritten as follows to derive total bank reserves (TBR), given reserve money (H), currency with the public (C) and other deposits etc. (X).

$$TBR = H - C - X$$

Flow Chart

Following the above discussion of the individual equations, their inter-relationships can be gleaned with reference to the Flow Chart in Annexure III. The basic function of the model is to find values of nominal income and monetary aggregates that are internally consistent, in the sense of satisfying all the equations of the model, given the values of certain exogenous variables such as reserve money, real income, cash reserve ratio etc. Starting from a trial level of nominal income, the model derives a preliminary estimate of the public's demand for currency (using equation 1 of Annexure II) and, therefore, an estimate of the supply of bank reserves (using equation 2 of Annexure II). The same income level is also used to derive an estimate of the demand for time deposits or demand deposits. From the estimate of bank reserves,

the model derives the supply of aggregate deposits (using equations 3 and 4 of Annexure II). In one version, the model deducts the estimated time deposits from aggregate deposits to arrive at estimated demand deposits and introduces this estimate (along with the estimated currency) into the nominal income equation. In the other version, where the broader concept of money is used in the nominal income equation, the model introduces the sum of currency and aggregate deposits. Hence a new estimate of nominal income is derived which may be different from the estimate of nominal income with which the series of steps began. If so, a new trial level of nominal income is adopted and fresh estimates of currency and time deposits are made. This leads to all the other magnitudes being re-estimated and, finally, a new estimate of nominal income. The cycle is repeated until the estimates in successive iteration converges and are said to represent the solution of the model for a given year. This process is repeated for each year in the sample period and for the forecast year.

V. Simulation Results

The model has been simulated for the sample period 1970-71 to 1979-80 and the annual predictions generated by the model have been compared with the actual values of the monetary aggregates and the national income deflator for those years. A summary measure of the percentage deviation of the predicted values from the actual values for the period as a whole is provided by the Root Mean Square Percentage Error (RMSPE). The results are presented for two alternative models :

Model A : In this model the equilibration takes place around narrow money i.e. the national income equation used is 7a of Annexure II and demand deposits are derived as a residual by deducting estimated time deposits (equation 5a of Annexure II) from aggregate deposits ;

Model B : In this model the equilibration takes place around broad money i.e. the national income equation used is 7b of Annexure II and time deposits are derived as a residual by deducting estimated demand deposits (equation 5b of Annexure II) from aggregate deposits.

For each model, both static and dynamic simulations were made and the results are presented separately. In the static simulation, the previous year's values of each variable are set at their

actual levels whereas in the dynamic simulation the values generated within the model continue to be used in successive years until the end of the sample period. For one period forecasts, the static simulation results are an adequate measure of the model's performance. However, given the delays in obtaining data, it may sometimes be necessary to predict monetary aggregates for the next year without having reasonable data for the current year. In such cases, the dynamic simulation results gain relevance. It may be noted that although the model does not have lagged endogenous variables, it has dynamic properties because of the use of first differences in the estimated equations.

The prediction errors for the main variables are shown in the table below :

Prediction Errors in Sample Period Simulations
(Root Mean Square Percentage Errors)

	Model A		Model B	
	Static Simulation	Dynamic Simulation	Static Simulation	Dynamic Simulation
Currency	1.67	1.39	2.21	1.96
Aggregate Deposits	5.59	4.59	7.05	6.16
National Income Deflator	4.73	4.15	2.19	2.18
C + DD	4.89	4.46	1.63	1.64
C + D	3.12	2.53	3.85	3.26

The maximum RMSPE for any of the above variables in either model is 7.1 per cent in the estimation of aggregate deposits by model B. The error in the estimation of currency is of the order of 1.4 to 2 per cent and of the national income deflator is of the order of 2 to 5 per cent. The error in estimation of narrow money (C+DD) is much less in model B than in model A because the estimation of demand deposits in model A is as a residual whereas in model B it is direct. In all other respects, however, model A seems to perform better than model B. There is no significant difference between the static and dynamic simulations, and, surprisingly, the dynamic simulation often yields better results. In general, the performance of both the models is satisfactory, although there is clearly scope for improvement in the accuracy of the forecasts of aggregate deposits.

A further test of the model is its performance outside the sample period. Since the model's equations are estimated for the period

1970-71 to 1979-80, the model's predictions for 1980-81 can be compared with the data for 1980-81. Since final data for March 1981 are not yet available, the comparison is made against the partially revised data (as published in the RBI Bulletin April 1981). As far as possible, actual values are used for the exogenous variables such as reserve money etc. In a few cases, actual values are not available and their values had to be assumed. The important assumptions underlying the 1980-81 predictions are that national income in real terms would increase by 6.7 per cent; that the ratio of non-agricultural income to national income at current prices would be 60 per cent (as against 64 per cent in 1979-80); and that foreign remittance inflows would be Rs. 1,000 crores (at the same rate as in 1979-80).

On these assumptions, the model generated predictions of the monetary aggregates for 1980-81 which can be compared against the tentative data for 1980-81. The comparisons are presented in the table below:

Prediction Error for 1980-81
(as of last Friday of March)

	Actual Value	Model A		Model B	
		Predicted Value	% Error	Predicted Value	% Error
Currency	13464	13722	—1.9	13888	—3.1
Aggregate Deposits	37847	35540	6.1	34781	8.1
National Income Deflator	212.40	215.4	—1.4	230.8	—8.7
C + DD	21320	19971	6.3	21983	—3.1
C+D	51311	49262	4.0	48669	5.1

Model A which equilibrates around narrow money, has performed better than model B in the accuracy of its predictions of all the major variables presented in the table except for the prediction of narrow money where model B fares better because it uses a direct estimate of demand deposits. The predictions are quite good for all the monetary aggregates, with an error of 2 to 3% in the prediction of currency and of 4 to 5% in the prediction of broad money. The error in model A's prediction of the national income deflator is remarkably low at 1.4%. The errors in the prediction of aggregate deposits are, however, somewhat high.

VI. Further Work

The most striking limitation of the present version of the model is its small size which, from an operational point of view is also a major merit. For repeated policy simulations during the year, it is advisable that the forecasting model be restricted in size, at least in the initial stages. Hence, it was decided to restrict the model to a few monetary equations alone, without attempting detailed modelling of the real sector. In consequence, however, the determination of the national income deflator is extremely rudimentary and, in some circumstances, could even be misleading. Strictly speaking, the forecasting approach adopted in this model requires a more elaborate specification of both the monetary and real sectors of the economy and their interaction. But the limitations of the data, as discussed in Section III, suggest that the estimation of a large short-run model is an enterprise of doubtful utility, at least at this stage. Nevertheless, some improvements of the price determination system must be sought, at least in terms of incorporating some of the non-monetary influences on the price level. In the present version, the model perhaps overemphasises the link between monetary imbalance and the rate of inflation, ignoring such other factors as agricultural output, price level of imports, changes in administered prices, shortages of sensitive commodities etc.

- While experimenting with more complex specifications of the interaction between money and prices at the macro level, it should be possible to bring about some improvements even within the present structure of the model. First, the equations could be re-estimated using data averaged over a period rather than only as of the last Friday of March. Data pertaining to a single day are susceptible to substantial random shocks which may affect the quality of the parameter estimates, especially when the number of observations is not large. Secondly, an attempt could be made to estimate the present model on a quarterly or half yearly basis rather than on an annual basis. The main obstacle to this, as noted in Section III, is that national income data are available only on an annual basis. For the purposes of monetary forecasting, however, it may be worth experimenting with some of the unofficial attempts to derive estimates of GDP for six-monthly intervals. If the semi-annual national income series can be used, the model would gain in richness and utility in two major ways. The availability of semi-annual monetary forecasts on a systematic basis would greatly assist the formulation of monetary policy, and, in particular, the monitoring of the results of policy changes in relation to earlier anticipations. A semi-annual model

would also permit the exploration of lags in the transmission mechanism between the monetary and real sectors. In the present annual version, the time series is not long enough to permit the use of more flexible lag structures in the estimated equations. Through such improvements in the specifications of the equations, the predictive performance of the model could be considerably improved. With the incorporation of lagged relationships, the model could also be modified to allow temporary disequilibria between the demand and supply of money, whose effects could work themselves through the rest of the model over time. This would add greater realism to the analysis of the interaction between monetary variables and the price level.

The treatment of reserve money as exogenous accords with theory but may not be wholly appropriate in the present context. The composition of reserve money is such that RBI has direct control over only a small part of it and it may be incorrect to assume that by manipulating its lending to banks, RBI will be able to fully offset fluctuations in credit to the government sector or in net foreign assets. Given these limitations, forecasts generated by the present model must be viewed as conditional forecasts of monetary aggregates, conditional on the assumed change in reserve money. The utility of the model would be greatly enhanced if it included an endogenous forecast of the change in reserve money, given only certain exogenous policy variables that may be set at predetermined levels. In the main, this would require the inclusion of a set of fiscal equations to estimate the size of the budgetary deficit. As the rate of inflation may itself have a significant effect on the size of the budget deficit, endogenous estimation of RBI credit to the Government would then bring out the relationship between fiscal and monetary policies.

The assumption that RBI fully controls the quantum of lending to the commercial banks may require some modification in short-run analysis. RBI's lending to commercial banks may, broadly speaking, be divided into two categories: one category consists of refinance schemes under which the bank has an automatic entitlement to refinance based on a prescribed formula in relation to certain categories of advances (e.g. food, or export credit); another category of refinance is wholly discretionary, in that RBI deals with specific applications from banks for temporary accommodation. The extent to which banks actually use their entitlements for refinance under the first category will depend on their liquidity situation. With suit-

able refinements, these considerations could be incorporated into the forecasting model, making the creation of reserve money endogenous to a greater extent and focussing attention more sharply on the monetary instruments that RBI actually has under its control.

In the same vein, it is also possible to endogenise the estimation of the change in RBI's holdings of dated securities. The statutory liquidity ratio gives the best basis for the estimation of the absorption of government securities by the commercial banks, corresponding to the estimated increase in their demand and time liabilities. Given an estimate of the absorption of government securities by other financial institutions such as LIC and Provident Funds, and the Plan for market borrowing by the government and eligible institutions, the model can estimate the increase in RBI's holdings of dated government securities, which may be one of the important sources of change in reserve money.

It has earlier been noted that the structure of the present model assumes an excess demand for bank credit i.e. that banks are able to find borrowers at prevailing rates of interest for all the funds they wish to advance. While reasonable as an initial approximation, the assumption that banks do not have surplus liquidity is not always correct. There are times when banks find that credit demand has fallen short of expectation (e.g. because of a reduction in food procurement) and they are left with surplus resources to be invested in liquid assets. The model's specification of the bank's supply of liabilities does allow for some flexibility in bank behaviour in this respect but an explicit treatment of the credit market might be preferable. Further, a detailed study of credit demand is needed in order to consider how the estimated increase in bank credit compares with the amount of credit expansion required to support the projected increase in production. It would appear that such an analysis would have to be done first at a somewhat disaggregated level, when the precise relationship between production and credit can be explored in depth. Without such careful analysis, it is doubtful whether aggregative statistical studies will constitute a significant improvement over the present version of the model, in this respect.

ANNEXURE I

List of variables

- *1) C — Currency with the public — (Rs. Crores)
- *2) DD — Demand deposits of Scheduled Commercial Banks (Rs. Crores)
- *3) TD — Time deposits of Scheduled Commercial Banks (Rs. Crores)
- *4) D — Total demand and time deposits of Scheduled Commercial Banks (Rs. Crores)
- *5) L — Net demand and time liabilities of Scheduled Commercial Banks (Rs. Crores)
- 6) TBR — Total reserves of Scheduled Commercial Banks (Rs. Crores)
- 7) X — Total reserves of banks other than Scheduled Commercial Banks and other Deposits with RBI (Rs. Crores)
- *8) Y — Net national product at factor cost at current prices (Rs. Crores)
- 9) YR — Net national product at factor cost at constant (1970-71) prices (Rs. Crores)
- 10) BCF — Bank credit for food procurement (Rs. Crores)
- †11) BC — Total Bank Credit (Rs. Crores)
- 12) RR — Required reserves of Scheduled Commercial Banks (Rs. Crores)
- 13) RLT — Weighted average interest rate on fixed deposits of Scheduled Commercial Banks (percent)
- 14) RC — Call money rate (percent)
- 15) (YNA/Y) — Ratio of non-agricultural income to total national income.
- 16) WP — Index number of wholesale prices for all commodities (monthly average with base 1970-71 = 100)
- 17) $\overline{WP}$ — Rate of change in wholesale prices of all commodities.
- 18) $\overline{WP}-1$ — $\overline{WP}$ lagged by one year.
- 19) $\overline{SCP}$ — Rate of change in wholesale prices of sensitive commodities.
- 20) H — High powered money = $[C + TBR + X]$
- 21) S — RR/L
- 22) FR — Foreign remittances (Rs. crores)
- *23) NP — National income deflator ((base 1970-71 = 100)
- 24) TD/D — Ratio of time deposits to total deposits.
- †25) RV — Yield on industrial securities.

* Indicate endogenous variables in the model.

† Represents variables figuring only in the alternative equations discussed but not considered in the model.

Monetary Model For The

				SCP		FR		Δ BCF
1)	$\Delta C =$	2306.6493	+	851.6162	+	1.2259	+	0.9183
	t			0.945		1.496		2.071
	e			0.098		0.825		0.245
2)	TBR =	H	—	C	—	X		
				RC		TD/D		$\Delta^- RR/\Delta L$
3)	L =	— 139516.6667	—	440.4875	+	200126.1004	—	7132.327
	t			4.022		8.764		3.763
	e		—	0.224		9.258		—0.039
4)	D =	60.9487	+	L				
	t			0.94201				
	e			387.653				
				0.996				
				YNA/Y		Y		$\overline{WP}_{-1}$
5a)	$\Delta TD =$	— 2578.4649	+	2867.0873	+	0.0521	—	3537.8679
	t			0.642		4.332		2.433
	e			0.735	+	1.455	—	0.126
				RLT		Y		YNA/Y
5b)	DD =	— 3778.0608	—	457.4288	+	0.0870	+	9780.1080
	t			7.395		14.200		4.589
	e		—	0.930		1.477		1.526
6a)	DD = D	—		TD				
6b)	TD = D	—		DD				
7a)	Y =	25248.3482	—	YR	+	RLT	+	NP $_{-1}$
	t			0.1960		3997.0262		88.2332
	e			0.713		3.779		1.104
			—	0.128		0.479		0.205
7b)	Y =	55142.5394	—	YR	+	NP $_{-1}$	—	YNA/Y
	t			0.9703		384.6295		78935.6782
	e			2.376		8.430		3.016
			—	0.635		0.895		—0.725
8)	NP =	(Y/YR) 100						

Note:

1. t & e — indicate t-statistics & elasticities respectively.
2. The sign Δ before a variable denotes that the variable is considered in incremental terms.

ANNEXURE II

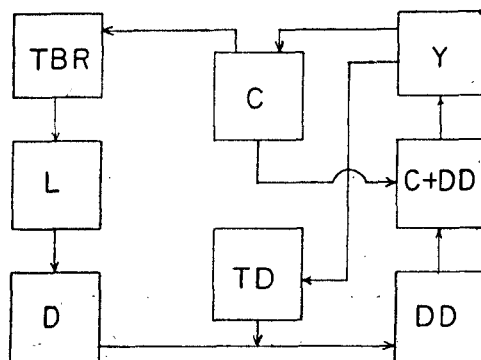
Indian Economy 1970-71. to 1979-80

Y	RLT	R ² (adj)	D.W.	Mean	S.E.E.
+ 0.0223 1.234 1.734	— 526.3328 2.947 —4.899	0.7084	2.8386	769.20	274.5933
TBR					
+ 4.8678 16.848 0.444		0.9966	2.6933	16532.60	540.1636
		0.9999	3.1578	15635.40	68.2734
RLT					
+ 41.9878 0.286 0.140		0.9485	2.1538	2143.20	289.8477
		0.9926	2.1311	3522.10	148.7711
YNA/ Y					
—83203.5519 5.019 —0.765 C + DD +4.3725 12.705 0.787 C + D		0.9978	2.1814	59795.90	908.0674
+1.4199 8.661 0.543		0.9940	3.0350	59795.90	1494.1660

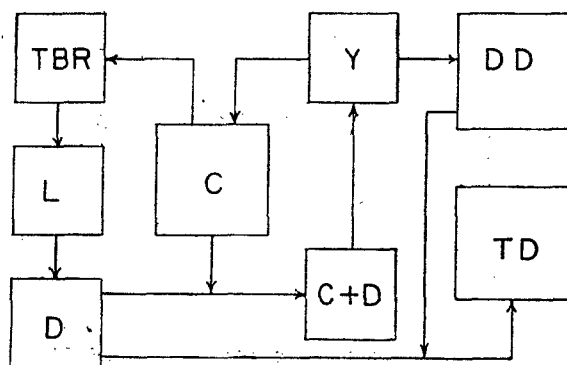
ANNEXURE III

FLOW CHART OF ENDOGENOUS VARIABLES

Model - A



Model - B



TRENDS IN THE GROWTH OF CENTRAL EXCISE DUTIES : 1950-51 TO 1981-82

M. V. Raghavachari*

Excise duties play an increasingly important role in the Indian tax structure as greater reliance is placed on them than on taxes on income and wealth for meeting the growing revenue and developmental expenditure of Government. Indirect taxes levied by the Central and State Governments formed about 80 per cent of their total tax revenue in 1980-81. Further, excise duties collected by the Central and State Governments constituted about 45 per cent of total indirect taxes levied by them in 1980-81. The revenue from Union excise duties¹ levied by the Government of India has increased phenomenally during the past thirty two years. The yield from excise duties before transfer of States' share has increased from Rs. 68 crores in 1950-51 to Rs. 1,759 crores in 1970-71. The yield from these duties rose further to Rs. 5,367 crores in 1978-79 and is budgeted to rise to Rs. 7,117 crores in 1981-82. The number of items² covered by basic excise duties has increased from 13 in 1950-51 to 88 items in 1970-71 and further to 133 items in 1981-82. A distinguishing feature of the Indian excise system is the large number of commodities encompassed by it. The share of excise duties in the total tax revenue (before transfer of States' share) of the Central Government increased from 16.8 per cent in 1950-51 to 54.9 per cent in 1970-71 and declined subsequently to 51.0 per cent in 1978-79. According to the revised estimates, this share is anticipated to decline further to 48.5 per cent in 1980-81 (Statement 1). On the other hand, these duties accounted for about 64 per cent of the total indirect taxes collected by the Central Government in 1980-81.

The ratio of excise duties to national income at current prices has also grown significantly from about 0.8 per cent in 1950-51 to about 5.1 per cent in 1970-71 and increased further to 6.7 per cent in 1979-80.

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1. Including Additional Duties of Excise in lieu of Sales Tax, Additional Duties on Textiles and Textile articles and Cesses on Commodities.
2. The term 'item' here refers to tariff items which in several cases cover more than one commercially known commodity. Even the residuary tariff No. 68 has been taken as one item.

The growth in revenue from excise duties, which has been particularly sharp in the past 15 years or so has been attributed to factors like increased coverage, changes in tax rates and increased consumption.³ The purpose of this study is to analyse the trends in the growth of excise duties levied by the Central Government during 1950-51 to 1981-82 and to examine whether the objectives underlying them have been achieved. This study is divided into six Sections. To begin with, the features and objectives of excise taxation are briefly considered in Section I. The trends in revenue from excise duties during the period 1950-51 to 1981-82 are reviewed in Section II. In Section III the impact of inflation on excise duties is analysed. The estimates of elasticity and buoyancy of revenue from excise duties is discussed in Section IV, while in Section V incidence of excise duties is examined. Differential excise taxation relating to cottage and small-scale industries is outlined in Section VI. Summary and Conclusions of the Study are presented in Section VII.

SECTION I

Features and Objectives of Excise Taxation

Broadly speaking, the distinguishing features of excise taxation are selectivity in coverage, discrimination in intent, and usually some form of quantitative measurement in determining the tax liability. The scope of coverage is the most useful distinction between excises and sales taxes. Under an excise system, taxable commodities are individually enumerated in the law, but under a sales tax, the base is typically defined to include all commodities for sale other than those specifically exempted.

According to Sijbren Cnossen⁴ historical precedence and usage in many countries support a broad application of the excise label to include selective taxes on goods, on services, and on road use; these three groups may be said to comprise an excise system. Depending upon the range of goods and services covered, excise systems may be of the limited, intermediate or extended type. While a limited excise system includes selective taxes on traditional excise goods (tobacco

³. According to a study on elasticity of excise revenues made by the National Institute of Public Finance and Policy (NIPFP) for the Indirect Taxation Enquiry Committee (Jha Committee), of the growth in excise revenue during 1965-66 to 1975-76, 12 per cent is attributable to increased coverage, 52 per cent to rate changes in relation to goods taxed in 1965-66 and 36 per cent to growth of base goods already taxed in 1965-66.

⁴. Cnossen, Sijbren — The case for Selective Taxes on Goods and Services in Developing Countries — *World Development*, Vol. 6, June 1978, p. 814.

products, alcoholic beverages, petroleum products), road use, entertainment services, and items like sugar, soft drinks and cement, the coverage of intermediate systems usually extends to a number of other non-traditional excise goods such as paints, cosmetics, perfumes, and specified services such as insurance and travel. Extended excise systems include in addition, a large number of selective taxes on luxury items and producer goods.

According to Carl Shoup⁵ certain excise taxes exert strong substitution effects, and therefore alter consumers' budget patterns substantially, others have only modest substitution effects; these are the excises on "additives" i.e. the consumer goods that are habit forming. The household's budget pattern is altered mainly through the income effect of the tax on the goods, the most notable of these being taxes on tobacco and liquor. The income effect of an excise becomes overwhelming and the substitution effect virtually nil when the tax is imposed on some physiological necessity within a price range where demand for it is perfectly inelastic.

Sijbren Cnossen⁶ advanced the following reasons to support the imposition of excise levies. Firstly, excises may be justified to control the consumption of items that are considered unhealthy, prime examples being sumptuary goods like tobacco products and alcoholic beverages. In the case of sumptuary goods this objective is difficult to attain, because the demand for them is relatively inelastic. Secondly, excises may also be imposed on non-essential or luxury items considered proxies for tax paying capacity. Thirdly, in view of the high rates of unemployment in developing countries, excise duties can be used to promote employment. It is hypothesized that aggregate employment can be increased directly through alterations in the factor mix, or indirectly by changing the product mix. For instance, excises might be imposed on capital equipment that has strong labour-displacing effects, or more generally, higher taxes may be levied on goods that are produced with capital-intensive technology, to induce a shift in consumer demand toward more labour-intensive products.

Role of commodity Taxation in India

It is well recognised that taxation, while raising resources for the Government, should also subserve important socio-economic

⁵. Shoup S. Carl — *Public Finance*, Columbia University, Weidenfeld and Nicolson, 1969, pp. 271-272.

⁶. Cnossen, Sijbren — *The Case for Selective Taxes on Goods and Services in Developing Countries — World Development*, Vol. 6 June 1978, pp. 814-815.

objectives. The major economic functions of indirect taxation in a developing economy are: to enable the Government to transfer real resources to the public sector without inflation, to help raise savings and investment, to influence the allocation of resources in the private sector of the economy in accordance with social priorities and also to curb domestic consumption in general and luxury consumption in particular. The Jha Committee⁷ opined that one of the basic tasks of indirect tax reform is to reconcile the revenue objective with the objectives of establishing a structure of taxation that would serve the ends of equity, growth and efficiency. According to Sijbren Cnossen, it would be difficult sailing between equity and efficiency roles of excise taxation. Intuitively the choice might be made in favour of progressive excises — and the case for them remains strong — but efficiency trade-offs and revenue and feasibility considerations should not be ignored. Ultimately, the weight attached to each goal and the use that is made of each excise — instrument depends on each country's social and economic policies. Often there may be more goals than instruments available, the effect of an instrument may not be fully predictable or it may be used so intensively that it may become counter-productive. But if the various goals and excise instruments are viewed together, broadly the prescription should be followed that internally the highest excises should be applied on luxury goods produced with capital-intensive technology, and the lowest on necessities or sumptuary goods made with labour-intensive production techniques.⁸ The Jha Committee spelt out the following salient features of the desired indirect tax structure:—

(a) It should ensure an adequate and rising flow of revenue to the Government so that the needed volume of real resources could be transferred to public consumption and public investment without causing inflation; (b) it should be such as to enable the Government to introduce the needed degree of progression with reference to consumer expenditure as between the different expenditure or income groups, without unnecessarily interfering with consumers' choice as between products within the same broad class or groups of goods; (c) from the long-term point of view, it should be such as to direct the flow of resources to priority areas in the private sector in terms of the

⁷. Government of India, Ministry of Finance (Department of Revenue) — Report of the Indirect Taxation Enquiry Committee (Chairman: Shri L. K. Jha) Part II, January, 1978, pp. 120-121.

⁸. World Development, June 1978, op. cit, pp. 822-823.

plan strategy; (d) it should serve the purpose of raising the rate of savings in the economy by restricting increases in non-essential consumption as national income grows; and (e) it should promote efficiency and should avoid interference with producers' choices in unintended and undesirable ways.

There is a considerable body of academic opinion which holds that indirect taxation should be general and neutral. For instance, Walter Mahler observed "that while the theory of taxation is concerned with economic neutrality, much of the practice of excise taxation in India is concerned with 'interventionism'. In India, there is almost no concern with neutrality of economic effect and impact as an objective of a satisfactory tax system. While some importance is given to the equity of the tax system, over-riding importance is given to raising revenue. This combination of over-riding importance of raising revenue and almost complete neglect of neutrality considerations had led to an *ad hoc* growth of the excise tax system, culminating in the frequently irrational, unwieldy excise system, of today".⁹ In India, where investment and production are to be carried on according to plan priorities and where reduction of inequalities is an accepted objective, indirect taxation will have to be used in a non-neutral way for bringing about reallocation of resources as between different consumer products and for introducing progression in the distribution of the tax burden. The Dandekar Committee observed that "because of wide coverage and also because of their impact on relative prices of inputs as well as final products, excise duties provide a potent instrument for influencing the pattern of production and the technological choices in the economy. Differential excise taxation of the mechanised and non-mechanised sectors as well as the organised and decentralised sectors has been used in India extensively to influence technological choices and, thereby, employment. The main focus of the exemptions and concessions provided in excise duty has been to protect and encourage the growth of non-mechanised and small units vis-a-vis those in the organised sector".¹⁰

The excise taxation is considered to be moderately regressive in industrial countries. Cnossen notes that excise systems in low-income countries may exhibit moderate progressivity on account of the dualistic nature of the economies, class-differentiated consump-

⁹. Mahler, Walter, R. op. cit, pp. 2-3.

¹⁰. Government of India, Ministry of Finance, (Department of Revenue) — **Report of the Expert Committee on Tax Measures to Promote Employment** — Chairman: Prof. V. M. Dandekar, January, 1980, p. 45.

tion patterns and excise structures that discriminate against non-essentials. Although excises may not be an ideal index of tax paying capacity, on the whole they appear to perform better in this respect than is generally believed, as long as the base consists of non-essential commodities and excise structures and rates are adjusted over time to reflect changes in consumption pattern.¹¹ As to welfare and output effects, it is obvious that the selective taxation of goods and services interferes with individual choice (not just the choices between saving and consumption but consumer choice generally) as relative prices of goods and services change under the impact of coverage and rate structure. Thus there is a suspicion of an excess burden over and above the amount of tax revenue. However, this burden might well prove to be a benefit if the change in relative prices is in accordance with the national objectives; for instance, if resources are employed more efficiently or meritoriously. In other words, the reallocative capacity of selective taxation can "internalize" external economies and diseconomies, subsidise merit goods, and penalise demerit goods.¹²

Referring to the rebates, reliefs and exemptions given in the field of excise duties, a former Secretary in the Ministry of Finance, Government of India, S. Bhoothalingam appointed to examine the tax structure, observed that it is desirable to restrain this tendency and fiscal instrument is best not used as a means of minor or petty policies. Bhoothalingam opined that exemptions and reliefs should be reviewed and retained only if it is quite clear that they are needed as well as effective for worthwhile purposes and do not lead to disproportionate loopholes.¹³

Commenting on the objectives of indirect taxes Bhabatosh Datta¹⁴ observed that "it is possible to build up a case for excise duties intended to reduce the consumption of particular commodities, like drugs and narcotics or of essential inputs or final goods in short supply. But in the present day conditions, such specific objectives are rare and are not likely to be successful. More important is the use

¹¹. Cnossen, Sijbren — *Excise Systems: The Global Study of Selective Taxation of Goods and Services*. The Johns Hopkins University Press, 1979, Baltimore, pp. 47-55.

¹². Wolfson, Dirk J — *Public Finance and Development Strategy* — 1979.

¹³. Government of India, Ministry of Finance, *Final Report on Rationalisation and Simplification of the Tax Structure*, by S. Bhoothalingam, 1967, pp. 13-14.

¹⁴. Datta, Bhabatosh — *Indirect Taxes in a Developing Economy* — Capital Mid-Year Special, August 31, 1981, p. 16.

of differential excise duties with a view to influence the allocation of resources, particularly through concessions on socially desired types of production and investment. Such measures have been tried in India on a wide scale through relief to small-scale industry, concessional taxes in case of specific commodities, tax holidays on new investment, duty drawbacks, negative duties like cash subsidies, free trade zones, etc. The pressure on the government for reducing particular excises has been increasing. Unfortunately, it is impossible, in the complexity of the different variables, to isolate the effects of particular excise duties on production, i.e. to point out clearly where high excises have prevented from being larger than what it is."

SECTION II

Trends in Revenue from Union Excise Duties

Excise duties levied by the Central Government have increased progressively from Plan to Plan. These duties which amounted to Rs. 517 crores in the First Five-Year Plan increased to Rs. 1,554 crores during the Second Five-Year Plan and further to Rs. 3,518 crores during Third Plan. Excise duties amounted to Rs. 3,504 crores during the Annual Plans period 1966-67 to 1968-69, while in the Fourth Plan these increased to Rs. 10,270 crores. There was a sharp rise in the excise duty collections during the Fifth Plan period when these amounted to Rs. 21,112 crores. Year-wise, the growth of excise duties since 1970-71 is remarkable. They have more than doubled during the period 1970-71 to 1975-76. As stated earlier the share of excise duties in total tax receipts of the Government of India has increased sharply from 16.8 per cent in 1950-51 to 54.9 per cent in 1970-71 and subsequently declined to 48.5 per cent in 1980-81. On the other hand, the share of income-tax in total tax receipts has declined from 32.8 per cent in 1950-51 to 10.9 per cent in 1980-81. Further, the share of customs duties in total tax receipts declined from 38.8 per cent in 1950-51 to 16.3 per cent in 1970-71 and subsequently rose to 25.5 per cent in 1980-81 as is evident from Table 1.

Table 1: Relative Shares (percentages) of Excise Duties etc. in Total Tax Receipts (Before Transfer of States' Share).

	1950-51	1960-61	1970-71	1980-81 (R.E.)	1981-82 (B.E.)
Excise Duties	16.8	45.8	54.9	48.5	48.5
Income Tax	32.8	18.4	14.7	10.9	9.9
Corporation Tax	9.9	12.2	11.6	11.8	11.5
Customs Duties	38.8	18.7	16.3	25.5	26.1
Others	1.7	4.9	2.5	3.3	4.0
Total	100.0	100.0	100.0	100.0	100.0

Trends in shares of Various Items

The period 1950-51 to 1980-81 witnessed increase in the shares in basic excise duties of modern sophisticated industries and decline in the shares of traditional consumer goods industries largely due to rapid industrialisation of the country beginning with the Second Five-Year Plan and the consequent diversification of the industrial structure. Group-wise, the share of Food and Beverages in total receipts of excise duties, has declined from 15.7 per cent in 1950-51 to 5.2 per cent in 1980-81 and that of Tobacco declined from 45.8 per cent to 10.0 per cent during the same period (Table 2). On the other hand, the share of Petroleum Products group has increased from 3.4 per cent in 1950-51 to 20.2 per cent in 1980-81 and that of the Metals group from less than 1 per cent to 8.4 per cent during the same period. The share of the Machinery and Transport Equipment group has increased from 4.0 per cent in 1960-61 to 11.1 per cent in 1980-81. Item-wise the share of sugar declined from 9.2 per cent to 2.7 per cent, tea from 4.8 per cent to 1.2 per cent, cotton fabrics from 13.2 per cent to 1.8 per cent, and that of matches from 11.5 per cent to 0.9 per cent during the period 1950-51 to 1980-81. The share of Iron and Steel products has increased from 0.8 per cent in 1950-51 to 4.6 per cent in 1980-81. The share of Rayon and Synthetic Fibres and Yarn has increased from less than 1 per cent in 1960-61 to 7.1 per cent in 1980-81 (Statement 2).

Table 3 gives the distribution of excisable commodities according to the amount of excise duties collected in the period. The largest number of commodities are in the range of Re. 1 to Rs. 20 crores. The number of commodities in that range has increased from 51 in

Table 3: Distribution of Excisable Commodities

Amount of Excise Duties in Rupees Crores	1970-71	1978-79	1980-81 (R.E.)	1981-82 (B.E.)
Less than Rs. 1 crore	17	25	14	12
1 - 20	51	69	72	69
21 - 40	10	14	14	18
41 - 60	3	2	8	7
61 - 80	2	4	2	4
81 - 100	1	4	2	2
100 and above	5	16	19	19
Total	89	134	131@	131@

@ Excluding Tooth Brushes and Locks and Keys for which figures are not available.

Table 2: Revenue from Basic Excise Duties: Shares of Excisable Commodities

Item/Year	Percentages to total amount						
April/March	1950-51	1960-61	1970-71	1978-79	1979-80	1980-81 (R.E.)	1981-82 (B.E.)
Basic Duties of Excise — Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Of which :							
A. Food and Beverages — Total	15.73	13.99	9.56	4.87	5.23	5.18	5.35
Of which :							
1. Sugar	9.24	11.66	6.43	2.54	2.98	2.67	2.89
2. Tea	4.81	1.97	2.18	1.31	1.06	1.15	1.07
B. Tobacco — Total	45.78	14.18	11.94	9.72	9.90	10.01	9.60
Of which :							
3. Unmanufactured Tobacco	45.78	14.18	4.39	1.87	1.82	1.76	1.68
Cigars and Cigarettes			7.55	6.46	8.07	8.23	7.91
C. Petroleum Products — Total	3.38	26.67	35.89	25.99	25.25	20.21	20.80
Of which :							
4. Refined Diesel Oil and Vaporising Oil	—	9.60	13.69	7.39	6.94	4.77	5.16
5. Motor Spirit	2.98	10.68	10.21	9.99	10.01	8.49	8.03
6. Kerosene Oil	0.40	2.19	7.14	3.20	2.96	2.16	2.43
7. Furnace Oil	—	3.43	1.96	0.78	0.77	0.80	0.90
8. Diesel Oil (not otherwise specified)	—		1.33	0.45	0.43	0.36	0.38
9. Asphalt, Bitumen and Tar	—	0.77	0.54	0.29	0.32	0.30	0.30
10. Petroleum Products (not otherwise specified)	—	—	1.01	3.85	3.74	3.26	3.52

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Table 2: Revenue from Basic Excise Duties: Shares of Excisable Commodities (contd.)

Item/Year	Percentages to total amount						
April/March	1950-51	1960-61	1970-71	1978-79	1979-80	1980-81 (R.E.)	1981-82 (B.E.)
D. Vegetable Oils and Fats — Total	3.13	4.57	0.88	0.64	0.62	0.72	0.70
E. Chemicals — Total	—	1.16	5.61	9.21	8.90	8.88	8.81
Of which :							
11. Fertilisers	—	—	1.07	2.25	1.16	0.30	0.20
12. Plastic Material and Synthetic resins	—	0.02	1.40	1.85	1.97	2.13	2.13
13. Patent and Proprietary Medicines	—	0.07	0.78	1.31	1.40	1.44	1.43
14. Soap	—	0.63	0.51	0.38	0.44	0.51	0.53
15. Paints and Varnishes	—	0.37	0.39	0.52	0.49	0.58	0.58
16. Synthetic Organic Dyestuffs	—	0.02	0.36	0.84	0.76	0.72	0.74
17. Cosmetic and Toilet Preparations	—	0.02	0.24	0.47	0.59	0.54	0.51
F. Metals — Total	0.77	4.41	7.44	9.35	8.42	8.38	9.08
Of which :							
18. Iron in any crude form	—	0.26	0.25	0.22	0.17	0.20	0.18
19. Iron and Steel Products	0.77	3.47	3.98	5.35	4.87	4.65	4.97
20. Aluminium	—	0.31	2.01	2.38	1.89	1.96	2.14
21. Copper and Copper Alloys	—	0.02	0.27	0.26	0.22	0.22	0.27
G. Manufactured Goods — Total	30.58	29.75	23.76	25.55	25.50	28.33	27.55
Of which :							
22. Cotton Fabrics	13.25	12.12	3.02	1.94	1.78	1.84	1.72
23. Cotton Yarn	—	0.03	1.94	1.77	1.62	1.62	1.52
24. Rayon and Synthetic Fibres and Yarn	—	0.74	5.24	6.62	6.51	7.10	6.85

Table 2: Revenue from Basic Excise Duties : Shares of Excisable Commodities (concl.)

Item/Year	Percentages to total amount						
April/March	1950-51	1960-61	1970-71	1978-79	1979-80	1980-81 (R.E.)	1981-82 (B.E.)
25. Jute Manufactures	—	—	1.26	0.81	0.88	1.00	0.94
26. Tyres and Tubes	5.78	3.57	3.24	3.57	3.72	4.88	4.73
27. Rubber Products	—	—	0.46	0.42	0.41	0.45	0.44
28. Cement	—	4.87	2.60	2.61	2.22	2.42	2.45
29. Matches	11.55	4.77	1.68	0.94	0.89	0.86	0.78
30. Paper	—	2.21	1.44	2.20	2.69	3.07	3.06
31. Glass and Glassware	—	0.03	0.41	0.66	0.68	0.75	0.75
H. Machinery and Transport Equipment — Total	—	3.98	4.74	10.55	9.28	11.15	11.19
Of which :							
32. Motor Vehicles	—	2.12	1.65	2.23	2.87	3.35	3.42
33. Electric Batteries and Parts thereof	—	0.50	0.45	0.61	0.62	0.70	0.69
34. Electric Wires and Cables	—	—	0.52	0.71	1.17	1.93	1.90
35. Electric Motors	—	0.21	0.39	0.48	0.56	0.71	0.70
36. Refrigerating and Air conditioning Appliances and Machinery	—	—	0.72	0.75	0.74	0.96	0.99

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1970-71 to 69 in 1978-79 and further to 72 in 1980-81. The number of commodities yielding Rs. 100 crores and above has increased from 5 in 1970-71 to 16 in 1978-79 and further to 19 in 1980-81. The average amount of excise revenue per excisable commodity worked out to Rs. 37 crores in 1978-79. On this basis, there were 104 commodities which fetched excise revenue less than Rs. 37 crores and 30 commodities which fetched excise revenue more than Rs. 37 crores in that year.

High-yielding and Low-yielding Excisable Commodities

For the purpose of this study, high-yielding excisable commodities are defined as those which fetched revenue over Rs. 100 crores in 1978-79. On this basis, 16 commodities are identified under this category which accounted for 67 per cent of the gross excise revenue in 1978-79 (Table 4). On the other hand, low-yielding excisable commodities are defined as those which fetched a revenue of less than Rs. 1 crore in 1978-79. Accordingly, 25 commodities are identified to be in the low-yielding commodities category. Excise revenue from these commodities formed only 0.25 per cent of the gross excise revenue in 1978-79 (Table 5). There has been a considerable amount of criticism of the retention of excise duties on items which yield little

Table 4: Revenue from High-yielding Excisable Commodities
(revenue Rs. 100 crores and above in 1978-79)

Commodity	(Rs. crores)
1978-79	
1. Sugar	125.9
2. Cigarettes, Cigar and Chiroots	320.6
3. Refined Diesel Oil and Vaporising Oil	366.7
4. Motor Spirit	495.6
5. Kerosene Oil	158.6
6. Petroleum Products not otherwise specified	191.0
7. Fertilisers	111.7
8. Iron and Steel Products	265.5
9. Aluminium	118.0
10. Man-made fibre and man-made Filament yarn	328.7
11. Tyres and Tubes	177.1
12. Cement	129.4
13. Paper	109.4
14. Motor Vehicles	110.7
15. Electricity	123.5
16. All other goods not elsewhere specified	202.2
A. Total (1 to 16)	3334.6
B. Gross Excise Revenue	4962.4
C. A as percentage of B	67.2

revenue. It is argued that the excise revenue from such items is not commensurate with the expenses and administrative effort required for the collection of the duties. Mahler¹⁸ opined that 'in deciding whether an excise duty on a specific item should be removed on grounds of insignificant revenue, it is desirable to give some consideration to likely future revenue as well as present revenues.' It is evident from Table 5 that revenue from commodities like Polishes and creams, Woollen yarn and Acrylic spun, Carpet, electric insulation and adhesive tapes (NES) etc. showed a notable increase in 1979-80 as compared with the preceding year. Further, it should be borne in mind that excise duties are levied not only on revenue considerations but also on grounds like equity, curbing luxury consumption and so on.

Table 5: Revenue from Low-Yielding Excisable Commodities
(excise revenue less than Rs. 1 crore in 1978-79)

Commodity	(Rs. crores)	
	1978-79	1979-80
1. Smoking mixtures	0.91	0.94
2. Camphor	0.26	0.46
3. Menthol	0.39	0.44
4. Polishes and Creams	0.94	1.47
5. Tooth brushes	0.04	0.08
6. Locks and Keys	0.08	0.18
7. Lead unwrought	0.57	0.59
8. Woollen Yarn and acrylic spun	0.98	1.85
9. Flax Fabrics and Ramie Fabrics	0.13	0.20
10. Textiles Fabrics impregnated	0.06	0.06
11. Linoleum	0.42	0.52
12. Carpet	0.08	1.17
13. Cinematograph Projectors and Parts	0.46	0.52
14. Mechanical Lighters	0.04	0.04
15. Typewriter ribbons	0.30	0.53
16. Electric Insulation and Adhesive Tapes (NES)	0.86	1.65
17. Zip or slide Fastners	0.42	0.22
18. Vacuum Flasks	0.69	0.77
19. Playing Cards	0.84	0.93
20. Stereo system	0.91	1.08
21. Fork Lift Trucks	0.58	1.34
22. Certain parts of Wireless receiving sets	0.47	0.32
23. Power driven Pumps	0.90	1.09
24. Computers	0.59	1.05
25. Electric Lighting Fitting	0.51	1.08
A. Total (1 to 25)	12.43	18.58
B. Gross Excise Revenue	4962.40	5729.67
C. A as Percentage of B	0.25	0.32

¹⁸ Mahler Walter R, op. cit, p. 75.

States' share in Union Excise Duties

Sharing of Union excise duties between the Union and States is permissible under article 272 of the Constitution of India. This sharing is done in accordance with law enacted on the basis of the recommendations of the Finance Commission set up once in five years, in terms of article 280 of the Constitution. The First Finance Commission recommended that 40 per cent of the net proceeds of the Union excise duties are shareable with the States and this was reduced to 25 per cent and 20 per cent by the Second and Third Finance Commissions, respectively. Fourth, Fifth and Sixth Finance Commissions have retained the States' share at 20 per cent of the divisible pool.

Under the Union Duties of Excise (Distribution) Amendment Act, 1979, which was based on the recommendations of the Seventh Finance Commission, during each year commencing from 1979-80, 40 per cent of the net proceeds of Union duties of excise (other than on electricity) levied and collected under the Central Excises and Salt Act, 1944, and any other law for the levy and collection of such duty, excluding cesses levied under special acts and earmarked for specific purposes, are paid to the States. Under the Union Duties of Excise (Electricity) Distribution Act, 1980, during the financial year commencing on the first day of April, 1979, and each of the four succeeding financial years, the entire net proceeds of the Union duties of excise on electricity (other than in Union Territories) are required to be paid to the States as recommended by the Seventh Finance Commission.

The additional duties on textiles and textile articles levied under the Additional Duties of Excise (Textile and Textile Articles) Act, 1978, are not distributable among the States. The Additional Duties of Excise (Goods of Special Importance) Act, 1957 provides for the levy and collection of additional duties on sugar, tobacco, cotton fabrics, woollen fabrics and man-made fabrics. This duty is in addition to the duties payable under the Central Excises and Salt Act, 1944 or under any other law for the time being in force, and replace, by agreement with the State Governments, the Sales Tax otherwise levied by the States on these commodities. The entire proceeds of the additional excise duties, other than the proceeds attributable to the Union Territories are distributable among the States.¹⁰

¹⁰ *Vide Explanatory Memorandum on the Budget of the Central Government for 1981-82, pp. 9-10.*

SECTION III

Excise Duties And Wholesale Prices

It is often argued whether there is any relationship between excise duties and inflation and also whether excise taxation is inflationary or anti-inflationary. Walter Mahler¹⁷ observed that "while the result of increasing the rate of commodity taxation is to raise the price of the taxed commodities, it is maintained that the ultimate effect of this is anti-inflationary. It is argued that an increase in prices resulting from a rise in the rate of commodity taxation differs from inflation in one important respect that is, factor prices do not rise. There is adjustment only in commodity prices, unlike general inflation which involves an adjustment of both factor and commodity prices. It is argued that this commodity tax-induced increase in prices does not generate additional increase in prices as is the case with inflation. The increase in the price level which results from a commodity tax is different from inflation because it does not give rise to additional money income, which generates further inflation. Thus, although a rise in commodity taxes raises the price of commodities, it is maintained that this rise has an anti-inflationary effect." However, Mahler emphasised that "the major limitation of a commodity tax as a deflationary measure is the danger that it will give rise to wage increases. If commodity taxes are allowed to generate added income via escalator clauses and wage increases, their net effect may be inflationary". While surveying the treatment of indirect taxation in econometric models, Nurun Choudhry¹⁸ observed that "in periods of rapid wage increases caused either by rising inflationary expectations or other factors not reflected in price-wage adjustment behaviour changes in indirect taxes may have negligible effects on prices. This is because the wage element has a very heavy influence on prices in most models".

Turning to the Indian situation, the experience of the 1970's during which the Indian economy passed through periods of very high rates of inflation as well as periods of remarkable price stability, provides a rough indication of the differential impact of excise duties on prices. When revenue from excise duties rose sharply by 19.0 per cent and 20.7 per cent, in 1975-76 and 1978-79, respectively, prices remained stable. On the contrary, when prices rose sharply by 20.2 per cent in 1973-74 and 25.2 per cent in 1974-75, revenue from excise duties rose by 12.0 per cent and

¹⁷. Mahler, Walter R, *op. cit.*, pp. 37-38.

¹⁸. Choudhry Nurun, N — The Treatment of Indirect Taxation in Econometric Models : An Analytical Survey, *IMF Staff Papers*, Vol. XXIV, No. 2, July 1977, p. 490.

24.2 per cent, respectively. During the four year period 1975-76 to 1978-79, when prices were stable showing an average annual rise of only 1.6 per cent the revenue from excise duties had increased at an average annual rate of 13.7 per cent (Table 6)

Table 6: Percentage Variation in Revenue from Excise Duties and Wholesale Prices

	Revenue from Excise Duties	Index Numbers of Wholesale Prices 1970-71 = 100 (average of weeks)
1971-72	17.2	5.6
1972-73	12.8	10.0
1973-74	12.0	20.2
1974-75	24.2	25.2
1975-76	19.0	— 1.1
1976-77	9.8	2.1
1977-78	5.4	5.2
1978-79	20.7	—
1979-80	12.0	17.1
1980-81	5.9	18.1

These macro-level data, however, do not seem to lead us to any concrete conclusions, perhaps because they are unable to capture the differential impact of excise duties on prices. To unravel this, the macro-level analysis will have to be supplemented with the disaggregated studies concerning excise duties at the commodity level.

It must be underlined that the changes in prices are the resultant of several factors, especially, when internal availability is dependent, to a certain extent, on imports. This implies that price changes can, and do take place, independently of tax changes. Lakdawala and Nambiar¹⁹ observed that "unanticipated shifts in flow of imports can have a substantial impact on relative prices. Fluctuations in agricultural production would be reflected in fluctuations of prices of commodities whose production is dependent on them. Changes in such factors can have significant impact on relative prices and can reduce, nullify or aggravate the effects of changes in tax rates on prices. No wonder that hitherto efforts at tracing the effects of tax changes on prices of taxed commodities seem to have yielded no conclusive results. Perhaps, by more careful col-

¹⁹. Lakdawala, D. T. and Nambiar K. V. — *Commodity Taxation in India*, Sardar Patel Institute of Economic and Social Research, Ahmedabad, April, 1972, pp. 63-64.

lection and shifting of detailed data and analysis one may be able to separate out the effects of the factors so as to get the net effect of a tax change on prices".

The extent of the rise in the overall price index would depend upon the choice of commodities selected for taxation. If, for instance, additional indirect taxes are imposed on items like food-grains, which have high weightage in the wholesale price index, the impact on the overall price level may be significant. Under the prevailing indirect tax structure in India, luxury goods are subjected to relatively higher rate of taxation. Excise collections from high-yielding items and the weights assigned to them in the wholesale price index are shown in Table 7. Fifteen excisable commodities accounted for 61 per cent of the gross excise collections in 1980-81, while their weightage in the wholesale price index was only 21 per cent.

Table 7: Excise Collections of Selected Commodities And Their Weights In Wholesale Price Index

Excisable Commodities	Union Excise Duties in 1980-81 (R.E.) (Including States' Share)		Weightage in Wholesale Price Index
	Amount Rs. Crores	Percentage to Gross Excise Revenue	Per Cent
1. Sugar	153.38	2.67	2.191
2. Manufactured Tobacco (including Cigarettes etc.)	575.49	10.01	1.949
3. Refined Diesel oil and Vaporising oil	274.00	4.77	1.718
4. Motor Spirit (Petrol)	488.01	8.49	0.856
5. Kerosene oil	124.00	2.16	0.835
6. Plastic materials and synthetic resins	122.61	2.13	0.830
7. Iron and Steel Products	267.18	4.65	3.093
8. Aluminium	112.69	1.96	0.429
9. Cotton Fabrics	106.00	1.84	3.804
10. Man-made fibres and man-made filament yarn	408.13	7.10	1.283
11. Tyres and Tubes	280.32	4.88	0.984
12. Cement	139.15	2.42	0.703
13. Paper	176.28	3.07	0.559
14. Motor Vehicles	192.62	3.35	1.103
15. Electric Wires & Cables	110.73	1.93	0.574
A. Total (1 to 15)	3530.59	61.43	20.911
B. Gross Excise Revenue	5747.31	100.00	

These items have individually percentage proportions higher, except cotton fabrics, in excise collections than their corresponding weightage in the wholesale price index. Jhaveri²⁰ observed that "does it follow that if the additional resources are mobilised from items with high weightage in excise collections, there will be only a nominal rise in the general price level despite a substantial increase in the tax rates? A simple answer is not possible: the final consumer's price would depend upon several other factors".

Although in the past, specific duties predominated in the excise tariff, in recent years there has been a growing emphasis on *ad valorem* levies. The excise duties on most of the new commodities brought under the excise net since 1970-71 have been levied on *ad valorem* basis. In recent years, there has also been a trend to convert specific duties to *ad valorem* duties. Thus, in respect of two important revenue items—paper and cotton fabrics—duties were converted to *ad valorem* basis in the 1976-77 Budget. Duties on a number of items namely, paints and varnishes, radios, tape recorders etc., were converted to *ad valorem* basis in the 1977-78 Budget. In the subsequent budgets, levies on new items were largely on *ad valorem* basis and the prevailing *ad valorem* rates were stepped up. The Jha Committee²¹ has estimated that in 1976-77 about 48 per cent of the excise revenue was realised through *ad valorem* duties (Table 8). Although such estimate is not readily available for recent years, it is reasonable to guess that it might have gone up, in view of the efforts made in the successive budgets bringing new items under excise duties on *ad valorem* basis and enhancing of the prevailing *ad valorem* rates²².

SECTION IV

Estimates of Elasticity and Buoyancy of Revenue from Union Excise Duties

Estimates of elasticity and buoyancy of Union excise duties have been made by Sahota²³, Lakdawala and Nambiar²⁴,

²⁰. Jhaveri, N. J. Resource Mobilisation Through Indirect Taxes: Some Aspects of Fifth Plan Strategy — Economic and Political Weekly, Vol. IX, No. 37, September 14, 1974, p. 1585.

²¹. Report of the Indirect Taxation Enquiry Committee, Part II op. cit, 23.

²². At present, out of 133 commodities actually subjected to duty, more than 100 are assessed to duty partly or wholly on a value basis (vide Explanatory Memorandum on the Budget of the Central Government for 1981-82, p. 9).

²³. Sahota, G. S.—Indian Tax Structure and Economic Development, Asia Publishing House, Bombay, 1961.

²⁴. Lakdawala, D. T. and Nambiar K. V. Commodity Taxation in India, Sardar Patel Institute of Economic and Social Research, Ahmedabad, April 1972.

The Jha Committee²⁵, V. G. Rao²⁶ and I. K. Khadye²⁷ (Table 9). Before examining the estimates made by the above authors, we may briefly define the concepts of tax elasticity and tax buoyancy. Tax elasticity measures the automatic response of the tax revenue i.e. increase in tax revenue excluding the effects of discretionary changes (rate and base changes in tax laws) to national income. Tax buoyancy measures the total response of tax revenue to changes in national income. It includes both natural growth through tax elasticity as well as the growth due to raising of the tax rates and introduction of new taxes. Thus, the automatic type of growth is measured by the concept of tax elasticity, while tax revenue growth inclusive of discretionary actions is measured by the concept of buoyancy. The built-in-elasticity of Union excise duties with reference to national expenditure at market prices was estimated by Sahota at 1.61 for the period 1948-49 to 1956-57 and its buoyancy at 3.97 for the period 1948-49 to 1957-58. Using data for the period 1960-61 to 1969-70 Lakdawala and Nambiar estimated elasticity and buoyancy coefficients of Union excise duties at 0.61 and 1.32, respectively. Lakdawala and Nambiar observed that since there had been a large number of tax changes in the period 1960-70, and as the money equivalents of all these

Table 8: Relative Share of Excise Revenue from Specific and Ad Valorem Duties

Commodity Group	Estimated Revenue Realization (1976-77) Rs. crores	Percentage to total Excise Revenue
1. Subject to specific duty	2127.87	50.7
2. Subject to ad valorem duty	1900.84	45.3
3. Others		
(a) Ad Valorem Component	97.69	2.3
(b) Specific Component	70.31	1.7
4. TOTAL	4196.71@	100.0

@ : Gross revenue excluding cesses and miscellaneous receipts.

Note : The item 'others' mentioned above includes commodities which are subject to ad valorem-cum-specific rates such as aluminium.

Source : Report of the Indirect Taxation Enquiry Committee, Part II, p. 23.

²⁵. Report of the Indirect Taxation Enquiry Committee, op. cit, p. 39.

²⁶. Rao, V. G. The Responsiveness of the Indian Tax System, 1960-61 to 1973-74, Allied Publishers Private Limited, 1979.

²⁷. Khadye, I. K. — The Responsiveness of Tax Revenue to National Income in India 1960-61 to 1978-79, RBI Occasional Papers, Vol. 2 No. 1, June 1981.

Table 9 : Elasticity and Buoyancy of Union Excise Duties with Respect to National Income

Author/s	Period of coverage	Income Elasticity coefficient	² R	Buoyancy coefficient	² R	Difference between elasticity and buoyancy
1	2	3	4	5	6	7
1. Sahota (1961)	1948-49 to 1956-57	1.61	0.7	3.97+		2.36
2. Lakdawala and Nambiar (1972)	1960-61 to 1969-70	9.61a	0.91	1.32a	0.96	0.71
3. National Institute of Public Finance and Policy (NIPFP) estimates for Jha Committee (1978)	1963-64 to 1974-75	0.75	0.9623	1.31	0.9748	0.56
4. V. G. Rao (1979)	1960-61 to 1973-74	0.8025	0.9789b	1.3732	0.9789b	0.5707
5. I. K. Khadye (1981)	1960-61 to 1978-79	0.7884	0.986b	1.3325	0.990b	0.5441

a At 1 per cent level of significance.

⁻²
b Refers to R

+ For the period 1948-49 to 1957-58.

changes were difficult to ascertain accurately, the estimates contain a margin of error.

NIPFP study estimated the elasticity and buoyancy of revenue from Union excise duties with respect to net national product at current prices for the period 1963-64 to 1974-75 at 0.75 and 1.31, respectively. The NIPFP study observed that "methodology we have adopted for adjusting actual revenue collections for discretionary tax changes would give fairly accurate results only if the effects of those discretionary changes had been accurately estimated by Government, if, as is quite possible, the estimates of additional taxation were on the high side, the automatic growth in revenue would be correspondingly understated. This might be one cause for our obtaining a fairly low value of elasticity. Again, the increase in the rate of a given tax could lower the automatic growth in revenue from other taxes. In any case, since there were several discretionary changes during the reference period yielding substantial amounts of revenue, the elasticity coefficient could not have been anywhere near the buoyancy coefficient and was in all probability below one. We could safely conclude that, all in all, Union excise duties have proved to be inelastic to changes in national income"²⁸. V. G. Rao estimated elasticity and buoyancy of revenue from Union excise duties for the period 1960-61 to 1973-74 at 0.8025 and 1.3732, respectively. More recently, Khadye has estimated the elasticity and buoyancy of revenue from Union excise duties for the period 1960-61 to 1978-79 at 0.7884 and 1.3325, respectively.

Thus, all the various studies cited above obtained income elasticity of excise duties equal to less than 1 and buoyancy around 1.3, except that of Sahota,²⁹ thus showing that excise tax system was quite unresponsive to increases in national income at current prices. Predominance of specific duties in the past is cited as one of the factors responsible for the overall low elasticity of

²⁸. Vide Jha Committee Report op. cit. p. 399. On the basis of data from 1970-71 to 1975-76 NIPFP study found that whereas the elasticity of base to income was as high as 1.5, the tax to base elasticity was only 0.5. This shows that the value of excisable commodities increased much faster than national income during this period, even if commodities brought into the tax net during the period are excluded. The low tax to base elasticity must be explained by the fact that the tax did not grow as fast as the base.

²⁹. Sahota's estimates of elasticity and buoyancy of Union excise duties were higher than those obtained by others. This may be perhaps because the commodities subject to excise during the period covered by Sahota's study were much narrower in range than now. Further, his study covered a relatively short period of 8-9 years.

the Union excise duties. The inelastic nature of excise duties to changes in national income is somewhat puzzling considering the fact that the tendency to levy excise duties on an *ad valorem* basis is increasing.

Khadye estimated elasticity and buoyancy of State excise duties for the period 1968-69 to 1977-78 at 1.3704 and 1.7963, respectively. It was noted earlier that Union excise duties have exhibited an income elasticity of less than one. State excises are generally levied at *ad valorem* rates, while Central excises are levied partly at specific rates and partly at *ad valorem* rates. This factor may be partially responsible for the income elasticity of State excises turning out to be greater than unity.

The significant difference between the elasticity and buoyancy estimates of Union excise duties suggests that increase in revenue has come through new tax measures. However, it is important to note that the difference between elasticity and buoyancy has narrowed down over the years (Table 9).

The overall income elasticity of excise revenue is the weighted average of the elasticities of the yield from the various groups of excisable commodities. An examination of elasticities of component groups would throw some light on the factors contributing to the low elasticity of excise revenue. Elasticity and buoyancy of major groups of excisable commodities with respect to national income are presented in Table 10.

Table 10: Group-wise Elasticity and Buoyancy of Union Excise Duties with Respect to National Income (1963-64 to 1974-75)

Commodity Group	Elasticity	R ²	Buoyancy	R ²
A. Food and Beverages	—	—	1.14	0.8595
B. Tobacco	—	—	1.09	0.9317
C. Petroleum Products	1.03	0.9409	1.43	0.9663
D. Vegetable Oils and Fats	0.86	0.8817	0.41	0.2968
E. Chemicals	1.12	0.9069	1.96	0.9536
F. Metals				
(a) Iron and Steel	-0.16	0.1753	0.83	0.8771
(b) Non-Ferrous metals	0.58	0.3521	2.53	0.7911
G. Manufactured Goods				
(a) Textiles	0.38	0.8534	1.08	0.9617
(b) Other Manufactured Goods	0.89	0.9670	1.06	0.9597
H. Machinery and Transport Equipment	0.99	0.9689	1.54	0.9412
Total Union Excise Duties	0.75	0.9623	1.31	0.9748

Note: Estimates made by the NIPFP for Jha Committee

Source: Report of the Indirect Taxation Enquiry Committee, Part II, January 1978, p. 399

SECTION V

Incidence of Excise Duties

In partial equilibrium setting, the incidence of selective taxation depends on the demand and supply elasticities of the taxed commodity; the larger the buyers' share the less elastic is the demand and the more elastic is the supply. Since, in the long run, producers generally will have more possibilities for substitution than will consumers, forward-shifting of the tax to consumers is considered the most plausible outcome, although monopolistic industries may choose to absorb part of the tax rather than shift supply into other, less profitable directions. Once an overall view is taken and the effects of other non-taxed markets are included in the analysis, the burden of selective excise tax is shared by consumers on tax-free products, as the pattern of consumption changes. If commodities are generally produced under conditions of increasing cost and selective taxation is introduced, decreasing demand reduces the pre-tax cost of the taxed commodities so that their prices rise by less than the tax. Conversely, increased demand for tax free commodities raises their cost. Thus, by rearranging their consumption pattern, consumers of taxed commodities shift burdens to consumers of tax-free commodities. On the sources side, finally, shifts in production from taxed to tax-free industries will change the pattern of earnings of households that supply labour or capital to either type of industry³⁰.

The question of incidence or the distribution of the burden of excise duties is important both to the households as well as to the Government. While households are affected by the degree of incidence of excise duties, the government has to take the incidence into account while evolving the pattern of taxation. The first systematic study of the overall incidence of indirect taxes in India was carried out by the Taxation Enquiry Commission (TEC) in 1953-54. This study was based on consumer expenditure data collected by the National Sample Survey (NSS) in the Fourth Round for the period April-September 1952. TEC study analysed the burden of indirect taxes in terms of percentages of expenditure in different monthly expenditure classes. Broadly similar exercises were made for the years 1958-59 and 1963-64 by the Economic Division of the Ministry of Finance, Government of India.³¹

³⁰. Wolfson, Dirk J. **Public Finance and Development Strategy 1979**. The Johns Hopkins University Press, Baltimore and London, p. 172.

³¹. Government of India, Ministry of Finance — **Incidence of Indirect Taxation 1958-59 and Incidence of Indirect Taxation, 1963-64**, New Delhi, 1961 and 1969, respectively

Chelliah and Ram Lal³² have made a comprehensive study of incidence of indirect taxation for the year 1973-74. They claim that in terms of conceptual refinement and methodological rigour their study can be said to make a great advance over earlier studies. While this study employs the same basic approach as the earlier studies by the Taxation Enquiry Commission and the Ministry of Finance (1958-59 and 1963-64), it incorporates several methodological improvements. The treatment of indirect taxes falling on general government consumption³³, for example, represents an important innovation. Similarly, the allocation of taxes falling on inputs has been done on a more scientific basis than in the earlier studies. The availability of more disaggregated consumption as well as tax data and the use of input-output information have enabled a much more accurate allocation of tax burden than was attempted or possible earlier.

In India, progressive pattern of distribution of excise duty burden is found to prevail among rural and urban households taken separately. However, the burden on urban households is distinctly higher than on the rural households in the corresponding expenditure classes. The Jha Committee observed that this difference is partly due to the higher proportion of non-cash expenditures for the rural households and partly due to differences in the pattern of consumption between rural and urban households. Burden of Central excises as per cent of consumer expenditure according to type of goods is shown in Table 11. Intermediate goods claim the largest share (55 per cent) of the incidence of excise duties in the rural and urban sectors combined together. Further, an examination of incidence of excise duties among monthly per capita expenditure groups showed that the relative contribution of intermediate goods to incidence of excise duties was higher for the rural sector than the urban sector. This shows that more reliance is placed on the taxation of intermediate goods for reaching the rural sector. This is significant, considering the fact that contribution of rural sector to the direct taxes is small.

³². Chelliah Raja J. and Lal Ram N. — *Incidence of Indirect Taxation in India, 1973-74*, National Institute of Public Finance and Policy, November 1978. This study was undertaken at the instance of the Indirect Taxation Enquiry Committee (Jha Committee). The findings of this study were incorporated in Volume II of the Report of the above Committee. The discussion in this Section on incidence of excise duties in 1973-74 is based on Chelliah and Ram Lal study.

³³. Chelliah and Ram Lal found that nearly 5 per cent of total indirect taxes in 1973-74 were borne by the Government sector.

Table 11 : Burden of Central Excises as Percent of Consumer Expenditure According to Type of Goods (In Rupees)

Monthly Per Capita Expenditure Groups									
	0-15	15-28	28-43	43-55	55-75	75-100	100 & above	All House-holds	
Rural									
1. Consumption goods	0.39	0.39	0.61	1.16	1.21	2.11	3.64	1.57	
2. Intermediate goods	1.03	1.10	1.39	1.74	2.04	2.70	4.13	2.24	
3. Capital goods, partly capital goods and parts thereof	—	0.01	0.01	0.02	0.02	0.04	0.10	0.04	
4. Total Central Excise	1.42	1.50	2.01	2.92	3.27	4.85	7.87	3.85	
Urban									
1. Consumption goods	0.61	1.13	1.51	2.25	3.03	3.91	7.00	4.28	
2. Intermediate goods	1.81	1.96	2.22	2.67	3.19	3.76	8.70	5.04	
3. Capital goods, partly capital goods and parts thereof	—	0.02	0.02	0.02	0.03	0.10	1.08	0.41	
4. Total Central Excise	2.42	3.11	3.75	4.94	6.25	7.77	16.78	9.73	
Rural and Urban Combined									
1. Consumption goods	0.41	0.46	0.74	1.37	1.63	2.62	5.03	2.25	
2. Intermediate goods	1.06	1.19	1.52	1.92	2.31	3.01	6.01	2.95	
3. Capital goods, partly capital goods and parts thereof	—	0.01	0.01	0.02	0.03	0.06	0.51	0.14	
4. Total Central Excise	1.47	1.66	2.27	3.31	3.97	5.69	11.55	5.34	

— Indicates negligible.

Source : Raja J. Chelliah and Ram N. Lal — Incidence of Indirect Taxation in India 1973-74 — Page 23.
National Institute of Public Finance and Policy, November, 1978.

Commodity-wise distribution of the burden of indirect taxes as per cent of total consumption expenditure in 1973-74 is given in Table 12. Commenting on the commodity-wise distribution of the burden, Chelliah and Ram Lal observed that "a broad conclusion that emerges from this analysis is that a reduction in the weightage of taxes on mass consumption goods, such as food-grains, sugar and kerosene that tend to be regressive or proportional, would serve to increase the degree of progression of the indirect tax system as a whole."³⁴

Gary Fromm and Paul Taubmann observed that for analytical purposes subsidies can be considered as negative excises³⁵. Strictly speaking, excise duties should be "adjusted" for subsidies while estimating the incidence of excise taxation. Subsidies provided by the Government of India through the Budget have risen sharply from Rs. 26 crores in 1950-51 to Rs. 1,875 crores in 1980-81 and are budgeted to rise further to Rs. 2,090 crores in 1981-82. Further, there are concealed subsidies which cannot be quantified easily. Derivation of incidence of excise duties without adjusting for subsidies would lead to overestimation of the burden of excise duties. However, the problems involved in such adjustment cannot be minimised. The Chelliah and Ram Lal study of incidence of indirect taxes including excise duties relates to the year 1973-74. Since then, there has been enormous increase in excise duties. As stated earlier such duties increased from Rs. 2,602 crores in 1973-74 to Rs. 6,363 crores in 1980-81 and are budgeted to reach Rs. 7,117 crores in 1981-82. In view of this, the need for systematic study on incidence of excise duties every quinquennium cannot be overemphasised.

SECTION VI

Differential Excise Taxation And Cottage And Small-Scale Industries

In view of the problem of widespread unemployment in the country, differential excise taxation of the mechanised and non-mechanised sectors as well as of the organised and decentralised sectors has been used to influence technological choices and thereby protect and promote employment. The main thrust of the exemptions and concessions provided in the excise system has been to protect and encourage the growth of non-mechanised and small units vis-a-vis those in the organised sector. Notable examples of differential excise taxation relate to production of BIRIS and

³⁴ Chelliah, Raja J. and Ram N. Lal — *op. cit.* pp. 27-28

³⁵ Fromm, Gary and Taubmann, Paul — *Public Economic Theory and Policy*, The Macmillan Company, New York, 1973 p. 54

Table 12 : Distribution of the Burden of Indirect Taxes as Percent of Total Consumption Expenditure 1973-74 (Urban Households)
(In Rupees)

Commodity	Monthly Per Capita Expenditure Groups							All Urban Households
	0-15	15-28	28-43	43-55	55-75	75-100	100 & above	
1. Foodgrains and atta*	0.30	0.37	0.36	0.33	0.28	0.24	0.18	0.26
2. Sugar	0.61	0.46	0.60	0.55	0.54	0.51	0.38	0.47
3. Tea and Coffee	—	0.05	0.14	0.15	0.22	0.33	0.28	0.23
4. Vegetable Products, Oil and Fats	—	0.33	0.46	0.52	0.50	0.50	0.40	0.47
5. Kerosene Oil	—	0.48	0.51	0.54	0.51	0.50	0.45	0.50
6. Drugs and medicines	—	0.09	0.17	0.23	0.28	0.36	0.52	0.36
7. Tobacco products	—	0.34	0.57	1.03	1.16	1.55	3.12	1.80
8. Liquor**	—	0.13	0.02	0.20	0.16	0.74	2.46	1.03
9. Cotton fabrics	—	0.12	0.01	0.18	0.51	0.59	1.68	0.81
10. Art and Rayon silk	—	—	—	0.02	0.15	0.25	1.31	0.52
11. Matches	—	0.05	0.07	0.10	0.09	0.06	0.05	0.07
12. Soap and detergents	—	0.08	0.11	0.11	0.12	0.12	0.11	0.11
13. Paper and Paper products	—	0.03	0.03	0.09	0.21	0.20	0.31	0.22
14. Motor spirit	—	0.18	0.21	0.26	0.28	0.29	4.45	1.66
15. Refined diesel oil	—	0.33	0.35	0.52	0.73	0.79	1.36	0.88
16. Tyres and tubes	0.61	0.10	0.10	0.13	0.16	0.17	0.39	0.23
17. Iron and Steel	—	0.48	0.54	0.68	0.76	0.80	1.30	0.91
Total for 17 items	1.52	3.62	4.25	5.64	6.66	8.00	18.75	10.53
Total Incidence for all Indirect Taxes	3.63	6.31	7.36	9.66	11.86	14.80	30.19	17.96

CENTRAL EXCISE DUTIES

— Indicates negligible.

* Taxes on these commodities are levied only by the States.

** Tax on this commodity is levied by the States.

Source : Raja J. Chelliah and Ram N. Lal. — incidence of Indirect Taxation in India 1973-74 — Page 26.
National Institute of Public Finance and Policy.

matches. The mechanism of differential excise taxation has been used to discourage the use of machines in BIRI manufacture. While the hand-made BIRIS are charged to duty at Rs. 3.60 per thousand, BIRIS made with machines are charged at Rs. 6.00 per thousand. There is a graded structure of duty on matches, the mechanised sector paying Rs. 7.20 per gross boxes, the middle sector paying Rs. 4.50 and the cottage sector Rs. 1.60. To protect the employment potential of the non-mechanised sector, it was proposed in the Union Budget for 1981-82 that the concessional rates of duty i.e. Rs. 4.50 for middle sector units and Rs. 1.60 for cottage units, will not be available if power is used in the labour-intensive process of frame-billing, dipping splints in match composition, box making, box filling, labelling and banderolling and packaging. If such units use power for any of the above processes, they will be liable to duty rate of Rs. 5.50 per gross boxes, which will be intermediate between the rate of Rs. 7.20 applicable to the fully mechanised sector and Rs. 4.50 applicable to the non-mechanised middle sector³⁶. It may be recalled that the Dandekar Committee has suggested that excise duty exemptions and concessions may be used for promoting greater employment in specific processes, such as material handling and packaging of final product. The Committee recommended that such processes should be identified, industry by industry, and appropriate rebate on excise duty leviable on their products should be allowed³⁷.

To enable small manufacturers to compete more effectively with large units in pursuance of the policy of promoting small scale industry in the interest of both employment and broader development of entrepreneurship, the duty exemption limit under the general scheme of excise duty concessions applicable to 72 excisable commodities has been raised from Rs. 5 lakhs in terms of value of clearances to Rs. 7.5 lakhs in the Central Budget for 1981-82. Clearances in excess of Rs. 7.5 lakhs will continue to benefit from the existing concessional duty limited to three-fourths of the applicable rates of excise duty upto a clearance of Rs. 15 lakhs in a financial year³⁸. Further, small manufacturers of goods falling under the residuary Item 68 of the Central Excise Tariff are eligible for complete exemption from duty on their first clearances of goods upto Rs. 30 lakhs in a financial year, provided

³⁶. Vide Government of India Budget 1981-82, Finance Minister's Speech (Part B), 28th February 1981, p. 32.

³⁷. Report of the Expert Committee on Measures to Promote Employment op. cit. p. 128.

³⁸. Finance Minister's Speech op. cit. p. 35.

their clearances during the preceding financial year did not exceed Rs. 30 lakhs.³⁹

One consequence of the preferential treatment of the small scale sector in the matter of excise duties has been the practice of "farming out" of production by large producers. The Dandekar Committee observed that "shoes manufactured in the exempted sector are purchased on a fairly large scale by established concerns and marketed in the brand names of such concerns. Similarly, electrical goods like domestic appliances which are marketed under the brand names of large concerns are manufactured mostly in the small sector. While this practice no doubt helps to promote employment, the margin of profit realised by the large producers simply by lending their brand names seems to be disproportionately high in relation to services rendered in terms of supply of input, quality control and marketing. In the case of shoes, available data show that the mark-up in prices goes upto even to 40 per cent to 50 per cent in some cases"⁴⁰. Small units producing shoes depend heavily on large marketing organisations for marketing their products. Therefore, efforts should be made to build up adequate marketing organisations for marketing the produce of such small units.

SECTION VII

Summary and Conclusions

The revenue from Union excise duties levied by the Government of India has increased phenomenally during the past thirty two years. The yield from excise duties before transfer of States' share had increased from Rs. 68 crores in 1950-51 to Rs. 1,759 crores in 1970-71. The yield from such duties rose further to Rs. 5,367 crores in 1978-79 and is budgeted to rise to Rs. 7,117 crores in 1981-82. Indirect taxes levied by the Central and State Governments formed about 80 per cent of their total tax revenue in 1980-81. The share of excise duties in the total tax revenue of the Central Government increased from 16.8 per cent in 1950-51 to 48.5 per cent in 1980-81. On the other hand, the share of income tax in the total tax receipts has declined from 32.8 per cent in 1950-51 to 10.9 per cent in 1980-81 and the share of customs duties declined from 38.8 per cent to 25.5 per cent during the same period. Central excise duties accounted for about 64 per cent of the total indirect taxes collected by the Central Government. The proportion of Central excise duties to natio-

³⁹. Vide Government of India Budget 1980-81, Finance Minister's Speech (Part B), 18th June 1980, pp. 26-27.

⁴⁰. Dandekar Committee Report op. cit. p. 51.

nal income at current prices has also grown significantly from about 0.8 per cent in 1950-51 to 6.7 per cent in 1979-80.

Excise duties levied by the Central Government have increased progressively from Plan to Plan. Such duties which amounted to Rs. 517 crores in the First Five Year Plan increased to Rs. 1,554 crores during the Second Plan and further to Rs. 3,518 crores during Third Plan. Excise duties amounted to Rs. 3,504 crores during the Annual Plans period 1966-67 to 1968-69. Collections from excise duties increased to Rs. 10,270 crores during Fourth Plan and further sharply to Rs. 21,112 crores during the Fifth Plan.

The period 1950-51 to 1980-81 witnessed increase in the shares in basic excise duties of modern sophisticated industries and decline in the shares of traditional consumer goods industries. Group-wise, the share of Food and Beverages in gross receipts of basic excise duties, has declined from 15.7 per cent in 1950-51 to 5.2 per cent in 1980-81 and that of Tobacco declined from 45.8 per cent to 10.0 per cent during the same period. On the other hand, the share of Petroleum Products group has increased from 3.4 per cent in 1950-51 to 20.2 per cent in 1980-81 and that of the Metals group from less than 1 per cent to 8.4 per cent during the same period.

Sixteen high yielding excisable commodities (which fetched revenue over Rs. 100 crores) accounted for 67 per cent of the gross excise revenue in 1978-79. Twenty-five low-yielding excisable commodities (which fetched revenue less than Rs. 1 crore in 1978-79) accounted for only 0.25 per cent of the gross excise revenue. Average amount of excise revenue per excisable commodity worked out to Rs. 37 crores in 1978-79. On this basis, there were 104 commodities which fetched excise revenue less than Rs. 37 crores and 30 commodities which fetched excise revenue more than Rs. 37 crores in that year.

Various empirical studies estimated income elasticity of excise duties equal to less than 1 and buoyancy around 1.3 thus showing that excise tax system was quite unresponsive to increases in national income. The inelastic nature of excise duties to changes in national income is somewhat puzzling considering the fact that the tendency to levy excise duties on an *ad valorem* basis is increasing.

A recent study on incidence of excise duties shows that progressive pattern of distribution of excise duty burden prevails

among rural and urban households taken separately. However, the burden on urban households is distinctly higher than on rural households in the corresponding expenditure classes. Intermediate goods claim the largest share of the incidence of excise duties in the rural and urban sectors combined together. Further, an examination of incidence of excise duties among monthly per capita expenditure groups showed that the relative contribution of intermediate goods to incidence of excise duties was higher for the rural sector than the urban sector. This shows that more reliance is placed on the taxation of intermediate goods for reaching the rural sector. This is significant considering the fact that contribution of rural sector to the direct taxes is small.

**Statement 1 : Proportion of Major Taxes to the Tax Receipts of the Government of India
(Before Transfer of States' Share)**

(Rs. Crores)

YEAR	Income Tax	Corporation Tax	Union Excise Duties †	Customs	Other Taxes and Duties	Total Tax Receipts (Col. 1 to Col. 5)
	1.	2.	3.	4.	5.	6.
1950-51	133 (32.8)	40 (9.9)	68 (16.8)	157 (38.8)	7 (1.7)	405
1951-52	146 (28.5)	41 (8.0)	86 (16.8)	232 (45.2)	8 (1.5)	513
1952-53	141 (31.8)	44 (9.9)	83 (18.7)	174 (39.2)	2 (0.4)	444
1953-54	123 (29.1)	42 (10.0)	95 (22.5)	159 (37.8)	2 (0.5)	421
1954-55	122 (26.8)	37 (8.1)	108 (23.7)	185 (40.6)	4 (0.9)	456
1955-56	131 (27.0)	37 (7.6)	145 (29.9)	167 (34.5)	5 (1.0)	485
1956-57	152 (26.5)	51 (8.9)	190 (33.2)	173 (30.2)	7 (1.2)	573
1957-58	164 (23.6)	56 (8.0)	274 (39.4)	180 (25.9)	22 (3.1)	696
1958-59	172 (24.1)	54 (7.6)	313 (43.8)	138 (19.3)	37 (5.2)	714
1959-60	149 (18.3)	107 (13.2)	361 (44.5)	156 (19.2)	39 (4.8)	812

Statement 1 : Proportion of Major Taxes to the Tax Receipts of the Government of India (contd.)
(Before Transfer of States' Share)

(Rs. Crores)

YEAR	Income tax	Corporation Tax	Union Excise Duties †	Customs	Other Taxes and Duties	Total Tax Receipts. (Col. 1 to Col. 5)
	1.	2.	3.	4.	5.	6.
1960-61	167 (18.4)	111 (12.2)	416 (45.8)	170 (18.7)	44 (4.9)	908
1961-62	165 (15.7)	156 (14.8)	489 (46.4)	212 (20.1)	32 (3.0)	1054
1962-63	186 (14.5)	222 (17.3)	599 (46.6)	246 (19.1)	32 (2.5)	1285
1963-64	259 (15.9)	275 (16.8)	730 (44.7)	335 (20.5)	35 (2.1)	1634
1964-65	267 (14.7)	314 (17.2)	802 (44.0)	398 (21.9)	40 (2.2)	1821
1965-66	272 (13.2)	305 (14.8)	898 (43.6)	539 (26.1)	47 (2.3)	2061
1966-67	309 (13.4)	329 (14.3)	1034 (44.8)	585 (25.3)	50 (2.2)	2307
1967-68	326 (13.9)	310 (13.2)	1149 (48.8)	513 (21.8)	54 (2.3)	2352
1968-69	378 (15.1)	300 (12.0)	1321 (52.6)	447 (17.8)	64 (2.5)	2510
1969-70	448 (15.9)	353 (12.5)	1524 (54.0)	423 (15.0)	74 (2.6)	2822

CENTRAL EXCISE DUTIES

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Statement 1: Proportion of Major Taxes to the Tax Receipts of the Government of India (contd.)
(Before Transfer of States' Share)

(Rs. Crores)

YEAR	Income Tax	Corporation Tax	Union Excise Duties †	Customs	Other Taxes and Duties	Total Tax Receipts (Col. 1 to Col. 5)
	1.	2.	3.	4.	5.	6.
1970-71	473 (14.7)	371 (11.6)	1759 (54.9)	524 (16.3)	80 (2.5)	3207
1971-72	537 (13.9)	472 (12.2)	2061 (53.2)	696 (18.0)	106 (2.7)	3872
1972-73	630 (14.0)	558 (12.4)	2324 (51.5)	857 (19.0)	141 (3.1)	4510
1973-74	745 (14.7)	583 (11.5)	2602 (51.3)	996 (19.6)	147 (2.9)	5073
1974-75	874 (13.8)	709 (11.2)	3231 (51.1)	1333 (21.1)	175 (2.8)	6322
1975-76	1214 (16.0)	862 (11.3)	3845 (50.5)	1419 (18.7)	269 (3.5)	7609
1976-77	1194 (14.4)	984 (11.9)	4221 (51.0)	1554 (18.8)	317 (3.9)	8270
1977-78	1002 (11.3)	1221 (13.8)	4448 (50.2)	1824 (20.6)	364 (4.1)	8859
1978-79	1177 (11.2)	1251 (11.9)	5367 (51.0)	2424 (23.0)	306 (2.9)	10525

Statement 1 : Proportion of Major Taxes to the Tax Receipts of the Government of India (concl.)
(Before Transfer of States' Share)

YEAR	Income Tax	Corporation Tax	Union Excise Duties †	Customs	Other Taxes and Duties	Total Tax Receipts (Col. 1 to Col. 5)
	1.	2.	3.	4.	5.	6.
1979-80	1340 (11.2)	1392 (11.6)	6011 (50.2)	2924 (24.4)	306 (2.6)	11973
1980-81 (R.E.)	1430 (10.9)	1550 (11.8)	6363 (48.5)	3350 (25.5)	440 (3.3)	13133
1981-82 (B.E.)@	1444 (9.9)	1690 (11.5)	7117 (48.5)	3833 (26.1)	584 (4.0)	14668

Note : Figures in brackets are percentage to total tax receipts.

@ Includes effects of budget proposals.

† Including Additional Duties of Excise in view of Sales Tax. Additional Duties on Textiles and Textile articles and cesses on commodities.

Source : Various Articles on "Finance of the Government of India" published in the Reserve Bank of India Bulletin.

Statement 2: Revenue from Basic Excise Duties

Item/Year	(Rs. Crores)									
	1950-51 (Accounts)		1955-56 (Accounts)		1960-61 (Accounts)		1965-66 (Accounts)		1966-67 (Accounts)	
April/March	Amount	% to Total	Amount	% to Total	Amount	% to Total	Amount	% to Total	Amount	% to Total
Basic Duties of Excise — Total	69.88	100.00	146.86	100.00	378.96	100.00	837.64	100.00	916.42	100.00
Of which :										
A. Food and Beverages — Total	10.99	15.73	22.68	15.44	53.01	13.99	73.01	8.72	104.03	11.35
Of which :										
1. Sugar	6.46	9.24	18.58	12.65	44.19	11.66	53.69	6.41	89.78	9.80
2. Tea	3.36	4.81	3.17	2.16	7.47	1.97	17.21	2.05	12.19	1.33
B. Tobacco — Total	31.99	45.78	36.46	24.83	53.73	14.18	98.88	11.80	95.77	10.45
Of which :										
3. Unmanufactured Tobacco Cigars and Cigarettes	31.99	45.78	36.46	24.83	53.73	14.18	98.88	11.80	95.77	10.45
C. Petroleum Products — Total@	2.36	3.38	26.11	17.78	101.07	26.67	272.78	32.56	320.43	34.96
Of which :										
4. Refined Diesel Oil and Vaporising Oil	—	—	0.16	0.11	36.38	9.60	104.09	12.43	142.04	15.50
5. Motor Spirit	2.08	2.98	23.05	15.69	40.46	10.68	82.88	9.89	84.54	9.22
6. Kerosene Oil	0.28	0.40	2.43	1.65	8.29	2.19	44.25	5.28	49.05	5.35
7. Furnace Oil	—	—	0.47	0.32	13.01	3.43	18.78	2.24	21.29	2.32
8. Diesel Oil (not otherwise specified)	—	—	—	—			15.88	1.89	16.49	1.80

Statement 2: Revenue from Basic Excise Duties (contd.)

		(Rs. Crores)									
Item/Year		1950-51 (Accounts)		1955-56 (Accounts)		1960-61 (Accounts)		1965-66 (Accounts)		1966-67 (Accounts)	
April/March		Amount	% to Total	Amount	% to Total	Amount	% to Total	Amount	% to Total	Amount	% to Total
9. Ashphalt, Bitumen and Tar		—	—	—	—	2.93	0.77	5.54	0.66	4.81	0.52
10. Petroleum Products (not otherwise specified)		—	—	—	—	—	—	1.36	0.16	2.21	0.24
D. Vegetable Oils and Fats — Total		2.19	3.13	4.11	2.80	17.32	4.57	8.55	1.02	7.89	0.86
E. Chemicals — Total		—	—	2.56	1.74	4.39	1.16	31.93	3.81	34.63	3.78
Of which :											
11. Fertilisers											
12. Plastic Material & Synthetic resins		—	—	—	—	0.08	0.02	5.75	0.69	5.50	0.60
13. Patent & Proprietary Medicines		—	—	—	—	0.26	0.07	7.23	0.86	8.33	0.91
14. Soap		—	—	1.55	1.05	2.38	0.63	4.73	0.56	4.35	0.47
15. Paints and Varnishes		—	—	1.01	0.69	1.40	0.37	4.10	0.49	4.34	0.47
16. Synthetic Organic Dyestuffs		—	—	—	—	0.09	0.02	2.94	0.35	3.79	0.41
17. Cosmetic & Toilet Preparations		—	—	—	—	0.07	0.02	2.41	0.29	2.30	0.25
F. Metals — Total		0.54	0.77	0.69	0.47	16.72	4.41	86.22	10.29	84.32	9.20
Of which :											
18. Iron in any crude form		—	—	—	—	0.97	0.26	4.70	0.56	4.45	0.48
19. Iron and Steel Products		0.54	0.77	0.69	0.47	13.14	3.47	70.86	8.46	68.46	7.47
20. Aluminium		—	—	—	—	1.17	0.31	3.73	0.44	3.78	0.41
21. Copper and Copper Alloys		—	—	—	—	0.07	0.02	4.63	0.55	4.79	0.52
G. Manufactured Goods — Total		21.37	30.58	52.24	35.57	112.76	29.75	221.53	26.45	226.13	24.67
Of which :											
22. Cotton Fabrics		9.26	13.25	28.18	19.19	45.94	12.12	50.49	6.03	55.26	6.03

CENTRAL EXCISE DUTIES

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Statement 2: Revenue from Basic Excise Duties (contd.)

(Rs. Crores)

Item/Year	1950-51 (Accounts)		1955-56 (Accounts)		1960-61 (Accounts)		1965-66 (Accounts)		1966-67 (Accounts)	
April/March	Amount	% to Total	Amount	% to Total	Amount	% to Total	Amount	% to Total	Amount	% to Total
23. Cotton Yarn	—	—	—	—	0.13	0.03	25.63	3.06	28.20	3.08
24. Rayon and Synthetic Fibre and Yarn+	—	—	—	—	2.82	0.74	20.01	2.39	20.67	2.25
25. Jute Manufactures	—	—	—	—	—	—	7.17	0.86	6.38	0.70
26. Tyres and Tubes	4.04	5.78	5.53	3.76	13.54	3.57	29.58	3.53	30.86	3.37
27. Rubber Products	—	—	—	—	—	—	1.84	0.22	1.57	0.17
28. Cement	—	—	2.22	1.51	18.45	4.87	30.73	3.67	26.91	2.94
29. Matches	8.07	11.55	10.08	6.86	18.08	4.77	23.24	2.77	25.75	2.81
30. Paper	—	—	2.68	1.82	8.38	2.21	18.09	2.16	15.87	1.73
31. Glass and Glassware	—	—	—	—	0.11	0.03	3.58	0.43	3.91	0.43
H. Machinery and Transport Equipment — Total	—	—	1.25	0.85	15.08	3.98	42.54	5.08	42.20	4.60
Of which :										
32. Motor Vehicles	—	—	—	—	8.03	2.12	20.09	2.40	19.57	2.13
33. Electric Batteries and Parts thereof	—	—	0.73	0.50	1.88	0.50	3.51	0.42	3.90	0.42
34. Electric Wires and Cables	—	—	—	—	—	—	4.56	0.54	5.48	0.60
35. Electric Motors	—	—	—	—	0.80	0.21	2.79	0.33	2.96	0.32
36. Refrigerating and Air Conditioning Appliances and Machinery	—	—	—	—	0.02	—	2.93	0.35	2.90	0.32

Statement 2: Revenue from Basic Excise Duties (contd.)

(Rs. Crores)

Item/Year	1967-68 (Accounts)		1968-69 (Accounts)		1969-70 (Accounts)		1970-71* (Accounts)		1971-72* (Accounts)	
April/March	Amount	% to Total	Amount	% to Total	Amount	% to Total	Amount	% to Total	Amount	% to Total
Basic Duties of Excise — Total Of which :	1029.95	100.00	1192.98	100.00	1463.83	100.00	1694.43	100.00	1944.41	100.00
A. Food and Beverages — Total Of which :	85.53	8.30	78.09	6.54	115.59	7.90	161.93	9.56	186.06	9.57
1. Sugar	60.45	5.87	49.63	4.16	85.01	5.81	109.01	6.43	133.55	6.87
2. Tea	22.66	2.20	24.69	2.07	25.10	1.71	36.99	2.18	33.96	1.75
B. Tobacco — Total Of which :	117.32	11.39	138.11	11.58	180.74	12.35	202.41	11.94	231.51	11.91
3. Unmanufactured Tobacco Cigars and Cigarettes	117.32	11.39	138.11	11.58	180.74	12.35	74.44 127.97	4.39 7.55	76.88 154.63	3.95 7.95
C. Petroleum Products — Total@ Of which :	396.79	38.52	468.62	39.28	530.50	36.24	608.18	35.89	708.39	36.43
4. Refined Diesel Oil and Vaporising Oil	169.65	16.47	204.55	17.15	222.73	15.21	231.99	13.69	263.86	13.57
5. Motor Spirit	109.04	10.59	126.37	10.59	143.76	9.82	173.10	10.21	219.66	11.30
6. Kerosene Oil	64.65	6.28	76.29	6.39	96.28	6.58	120.97	7.14	123.36	6.34
7. Furnace Oil	23.94	2.32	27.11	2.27	28.91	1.97	33.25	1.96	31.75	1.63
8. Diesel Oil (not otherwise specified)	21.30	2.07	22.82	1.91	24.09	1.64	22.56	1.33	21.87	1.12

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Statement 2: Revenue from Basic Excise Duties (contd.)

(Rs. Crores)

Item/Year	1967-68 (Accounts)		1968-69 (Accounts)		1969-70 (Accounts)		1970-71* (Accounts)		1971-72* (Accounts)	
April/March	Amount	% to Total	Amount	% to Total	Amount	% to Total	Amount	% to Total	Amount	% to Total
9. Asphalt, Bitumen and Tar	3.80	0.37	4.86	0.41	5.58	0.38	9.22	0.54	12.51	0.64
10. Petroleum Products (not otherwise specified)	4.41	0.43	6.62	0.55	9.15	0.62	17.09	1.01	26.62	1.37
D. Vegetable Oils and Fats — Total	8.72	0.85	9.98	0.84	11.62	0.79	15.00	0.88	14.43	0.74
E. Chemicals — Total	39.70	3.85	47.47	3.98	81.29	5.55	95.03	5.61	116.47	5.99
Of which :										
11. Fertilisers							18.08	1.07		
12. Plastic Material & Synthetic resins	8.26	0.80	10.30	0.86	18.55	1.27	23.75	1.40	28.39	1.46
13. Patent & Proprietary Medicines	9.40	0.91	10.83	0.91	12.77	0.87	13.18	0.78	15.30	0.79
14. Soap	4.68	0.45	5.41	0.45	7.81	0.53	8.68	0.51	11.74	0.60
15. Paints and Varnishes	4.17	0.40	5.06	0.42	6.14	0.42	6.56	0.39	7.21	0.37
16. Synthetic Organic Dyestuffs	3.51	0.34	4.31	0.36	5.82	0.40	6.11	0.36	5.82	0.30
17. Cosmetic & Toilet Preparations	2.67	0.26	2.81	0.23	4.01	0.27	4.06	0.24	5.84	0.30
F. Metals — Total	86.29	8.38	91.16	7.64	100.02	6.83	126.06	7.44	129.49	6.66
Of which :										
18. Iron in any crude form	4.40	0.43	4.44	0.37	4.07	0.28	4.31	0.25	4.84	0.25
19. Iron and Steel Products	64.89	6.30	66.45	5.57	69.51	4.75	67.39	3.98	69.64	3.58
20. Aluminium	9.87	0.96	11.11	0.93	16.33	1.11	34.10	2.01	34.10	1.75
21. Copper and Copper Alloys	4.01	0.39	4.19	0.35	4.16	0.28	4.51	0.27	4.52	0.23
G. Manufactured Goods — Total	254.16	24.68	306.46	25.69	377.84	25.81	402.56	23.76	445.95	22.93
Of which :										
22. Cotton Fabrics	51.12	4.96	56.81	4.76	57.49	3.93	51.27	3.02	53.89	2.77

Statement 2: Revenue from Basic Excise Duties (contd.)

(Rs. Crores)

Item/Year	1967-68 (Accounts)		1968-69 (Accounts)		1969-70 (Accounts)		1970-71* (Accounts)		1971-72* (Accounts)	
April/March	Amount	% to Total	Amount	% to Total	Amount	% to Total	Amount	% to Total	Amount	% to Total
23. Cotton Yarn	36.46	3.54	38.91	3.26	34.07	2.33	32.96	1.94	34.98	1.80
24. Rayon and Synthetic Fibre and Yarn+	31.36	3.04	47.06	3.94	82.10	5.61	88.73	5.24	89.88	4.62
25. Jute Manufactures	9.91	0.96	13.56	1.14	19.67	1.34	21.35	1.26	24.18	1.24
26. Tyres and Tubes	31.64	3.07	38.68	3.24	53.12	3.63	54.91	3.24	63.13	3.25
27. Rubber Products	3.28	0.32	6.54	0.55	7.35	0.50	7.84	0.46	10.46	0.54
28. Cement	27.06	2.63	29.39	2.46	42.57	2.91	44.07	2.60	48.74	2.51
29. Matches	25.70	2.49	27.61	2.31	27.37	1.87	28.49	1.68	29.47	1.51
30. Paper	17.36	1.69	19.51	1.63	23.37	1.60	24.39	1.44	26.25	1.35
31. Glass and Glassware	4.21	0.41	4.74	0.40	5.46	0.37	6.90	0.41	9.14	0.47
H. Machinery and Transport Equipment — Total	40.23	3.91	51.64	4.33	64.91	4.43	80.36	4.74	110.61	5.69
Of which :										
32. Motor Vehicles	17.00	1.65	20.75	1.74	23.89	1.63	27.94	1.65	35.61	1.83
33. Electric Batteries and Parts thereof	4.20	0.41	5.62	0.47	7.08	0.48	7.65	0.45	9.88	0.51
34. Electric Wires and Cables	6.11	0.59	7.32	0.61	7.61	0.52	8.89	0.52	11.07	0.57
35. Electric Motors	3.21	0.31	3.41	0.29	5.26	0.36	6.59	0.39	6.60	0.34
36. Refrigerating and Air Conditioning Appliances and Machinery	2.91	0.28	4.59	0.38	7.52	0.51	12.20	0.72	15.35	0.79

CENTRAL EXCISE DUTIES

Statement 2: Revenue from Basic Excise Duties (contd.)

(Rs. Crores)

Item/Year	1972-73* (Accounts)		1973-74* (Accounts)		1974-75* (Accounts)		1975-76* (Accounts)		1976-77* (Accounts)	
	Amount	% to Total	Amount	% to Total	Amount	% to Total	Amount	% to Total	Amount	% to Total
April/March										
Basic Duties of Excise — Total	2143.89	100.00	2359.03	100.00	2861.31	100.00	3363.78	100.00	3726.28	100.00
Of which :										
A. Food and Beverages — Total	194.60	9.08	211.33	8.96	223.39	7.81	282.53	8.40	295.14	7.92
Of which :										
1. Sugar	140.66	6.56	154.60	6.55	153.67	5.37	194.84	5.79	192.73	5.17
2. Tea	31.51	1.47	31.92	1.35	40.30	1.41	57.47	1.71	59.01	1.58
B. Tobacco — Total	226.34	10.56	243.74	10.33	268.93	9.40	319.42	9.49	370.31	9.94
Of which :										
3. Unmanufactured Tobacco	78.38	3.66	79.49	3.37	74.45	2.60	73.61	2.19	82.95	2.23
Cigars and Cigarettes	147.94	6.90	164.25	6.96	192.36	6.72	216.51	6.44	255.13	6.85
C. Petroleum Products — Total@	767.42	35.79	873.85	37.04	1010.57	35.32	1039.51	30.90	1109.71	29.78
Of which :										
4. Refined Diesel Oil and Vaporising Oil	283.79	13.24	291.02	12.34	309.62	10.82	299.61	8.91	326.11	8.75
5. Motor Spirit	228.18	10.64	307.23	13.02	388.66	13.58	404.08	12.01	425.64	11.42
6. Kerosene Oil	137.91	6.43	141.12	5.98	139.49	4.87	160.89	4.78	170.38	4.57
7. Furnace Oil	24.82	1.16	30.01	1.27	32.65	1.14	49.36	1.47	42.81	1.15
8. Diesel Oil (not otherwise specified)	20.15	0.94	23.04	0.98	22.58	0.79	20.49	0.61	24.27	0.65

Statement 2: Revenue from Basic Excise Duties (contd.)

(Rs. Crores)

Item/Year	1972-73* (Accounts)		1973-74* (Accounts)		1974-75* (Accounts)		1975-76* (Accounts)		1976-77* (Accounts)	
April/March	Amount	% to Total	Amount	% to Total	Amount	% to Total	Amount	% to Total	Amount	% to Total
9. Asphalt, Bitumen and Tar	16.70	0.78	16.02	0.68	15.02	0.52	11.18	0.33	14.22	0.38
10. Petroleum Products (not otherwise specified)	43.45	2.03	46.84	1.98	51.30	1.79	45.85	1.36	55.88	1.50
D. Vegetable Oils and Fats — Total	16.45	0.77	17.10	0.72	19.15	0.67	20.78	0.62	22.74	0.61
E. Chemicals — Total	147.86	6.90	163.70	6.94	236.42	8.26	283.81	8.44	325.08	8.72
Of which :										
11. Fertilisers			38.04	1.61	58.66	2.05	81.66	2.43	97.23	2.61
12. Plastic Material & Synthetic resins	34.10	1.59	39.41	1.67	58.17	2.03	54.07	1.61	49.28	1.32
13. Patent & Proprietary Medicines	17.09	0.80	19.42	0.82	22.47	0.78	26.90	0.80	53.62	1.44
14. Soap	11.44	0.53	7.99	0.34	12.03	0.42	16.37	0.49	14.52	0.39
15. Paints and Varnishes	9.75	0.45	9.81	0.41	7.96	0.28	9.07	0.27	10.28	0.27
16. Synthetic Organic Dyestuffs	9.95	0.46	11.61	0.49	14.27	0.50	24.47	0.73	29.30	0.79
17. Cosmetic & Toilet Preparations	5.93	0.28	7.69	0.32	8.58	0.30	7.97	0.24	10.56	0.28
F. Metals — Total	160.90	7.50	152.42	6.46	191.47	6.69	236.29	7.02	272.77	7.32
Of which :										
18. Iron in any crude form	5.62	0.26	6.02	0.25	10.07	0.35	9.20	0.27	8.50	0.23
19. Iron and Steel Products	96.83	4.52	89.21	3.78	107.69	3.76	114.46	3.40	127.61	3.42
20. Aluminium	33.56	1.56	27.37	1.16	34.01	1.19	66.55	1.98	85.63	2.30
21. Copper and Copper Alloys	4.56	0.21	4.73	0.20	6.28	0.22	8.74	0.26	13.88	0.37
G. Manufactured Goods — Total	500.64	23.35	540.78	22.92	691.59	24.17	923.30	27.45	1027.21	27.57
Of which :										

CENTRAL EXCISE DUTIES

Statement 2 : Revenue from Basic Excise Duties (contd.)

(Rs. Crores)

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Item/Year	1972-73* (Accounts)		1973-74* (Accounts)		1974-75* (Accounts)		1975-76* (Accounts)		1976-77* (Accounts)	
April/March	Amount	% to Total	Amount	% to Total	Amount	% to Total	Amount	% to Total	Amount	% to Total
22. Cotton Fabrics	51.76	2.41	63.28	2.68	69.36	2.42	72.12	2.14	78.11	2.10
23. Cotton Yarn	33.65	1.57	33.78	1.43	55.94	1.95	73.34	2.18	68.16	1.83
24. Rayon and Synthetic Fibre and Yarn+	104.97	4.90	119.50	5.06	121.37	4.24	241.33	7.17	268.39	7.20
25. Jute Manufactures	23.22	1.08	19.71	0.83	18.83	0.66	30.92	0.92	29.61	0.79
26. Tyres and Tubes	69.46	3.24	76.76	3.25	129.10	4.51	134.59	4.00	127.61	3.42
27. Rubber Products	12.31	0.57	13.33	0.56	16.39	0.57	17.20	0.51	17.87	0.48
28. Cement	54.89	2.56	53.19	2.25	80.56	2.81	127.47	3.79	142.20	3.82
29. Matches	26.85	1.25	30.61	1.30	32.59	1.14	33.00	0.98	38.12	1.02
30. Paper	31.18	1.45	33.33	1.41	42.08	1.47	48.04	1.43	86.29	2.31
31. Glass and Glassware	10.22	0.48	13.05	0.55	19.53	0.68	20.84	0.62	23.82	0.64
H. Machinery and Transport Equipment — Total	127.50	5.94	154.46	6.55	208.03	7.27	225.80	6.71	255.62	6.86
Of which :										
32. Motor Vehicles	37.29	1.74	44.44	1.88	64.88	2.27	71.00	2.11	74.73	2.00
33. Electric Batteries and Parts thereof	12.79	0.60	14.87	0.63	20.99	0.73	20.95	0.62	23.11	0.62
34. Electric Wires and Cables	13.07	0.61	11.69	0.49	11.46	0.40	18.08	0.54	24.00	0.64
35. Electric Motors	9.84	0.46	12.86	0.54	15.31	0.53	17.72	0.53	19.30	0.52
36. Refrigerating and Air Conditioning Appliances and Machinery	15.08	0.70	20.53	0.87	21.39	0.75	17.83	0.53	24.04	0.64

RESERVE BANK OF INDIA OCCASIONAL PAPERS

Statement 2: Revenue from Basic Excise Duties (contd.)

(Rs. Crores)

Item/Year	1977-78* (Accounts)		1978-79* (Accounts)		1979-80* (Accounts)		1980-81 (R.E.)		1981-82 (B.E.)	
April/March	Amount	% to Total	Amount	% to Total	Amount	% to Total	Amount	% to Total	Amount	% to Total
Basic Duties of Excise — Total	4109.27	100.00	4962.40	100.00	5574.84	100.00	5747.31	100.00	6394.96	100.00
Of which :										
A. Food and Beverages — Total	270.41	6.58	241.44	4.87	291.79	5.23	297.83	5.18	342.18	5.35
Of which :										
1. Sugar	164.87	4.01	125.87	2.54	165.89	2.98	153.38	2.67	185.05	2.89
2. Tea	60.63	1.48	64.78	1.31	59.08	1.06	65.87	1.15	68.42	1.07
B. Tobacco — Total	422.12	10.27	482.59	9.72	551.98	9.90	575.49	10.01	613.98	9.60
Of which :										
3. Unmanufactured Tobacco	85.15	2.07	93.03	1.87	101.40**	1.82	101.18**	1.76	107.31**	1.68
Cigars and Cigarettes	283.51	6.90	320.58	6.46	449.64	8.07	473.27	8.23	505.57	7.91
C. Petroleum Products — Total@	1151.86	28.03	1289.52	25.99	1407.87	25.25	1161.45	20.21	1330.43	20.80
Of which :										
4. Refined Diesel Oil and Vaporising Oil	337.62	8.22	366.69	7.39	387.05	6.94	274.00	4.77	330.00	5.16
5. Motor Spirit	444.20	10.81	495.64	9.99	558.32	10.01	488.01	8.49	513.38	8.03
6. Kerosene Oil	161.52	3.93	158.62	3.20	165.25	2.96	124.00	2.16	155.50	2.43
7. Furnace Oil	40.91	1.00	38.72	0.78	43.18	0.77	46.22	0.80	57.78	0.90
8. Diesel Oil (not otherwise specified)	24.67	0.60	22.36	0.45	23.71	0.43	20.80	0.36	24.53	0.38
9. Asphalt, Bitumen and Tar	14.92	0.36	14.26	0.29	17.94	0.32	17.45	0.30	19.46	0.30
10. Petroleum Products (not otherwise specified)	81.98	1.99	191.04	3.85	208.38	3.74	187.19	3.26	224.95	3.52

CENTRAL EXCISE DUTIES

Statement 2: Revenue from Basic Excise Duties (contd.)

(Rs. Crores)

Item/Year	1977-78*		1978-79*		1979-80*		1980-81 (R.E.)		1981-82 (B.E.)	
April/March	Amount	% to Total	Amount	% to Total	Amount	% to Total	Amount	% to Total	Amount	% to Total
D. Vegetable Oils and Fats — Total	27.05	0.66	31.92	0.64	34.65	0.62	41.37	0.72	44.46	0.70
E. Chemicals — Total	383.58	9.33	457.23	9.21	496.18	8.90	510.55	8.88	563.43	8.81
Of which :										
11. Fertilisers	105.13	2.56	111.74	2.25	64.71	1.16	17.42	0.30	12.78	0.20
12. Plastic Material & Synthetic resins	62.60	1.52	91.70	1.85	109.64	1.97	122.61	2.13	136.16	2.13
13. Patent & Proprietary Medicines	61.56	1.50	65.25	1.31	77.98	1.40	83.01	1.44	91.41	1.43
14. Soap	15.29	0.37	18.94	0.38	24.48	0.44	29.57	0.51	33.60	0.53
15. Paints and Varnishes	20.35	0.50	25.60	0.52	27.47	0.49	33.47	0.58	37.15	0.58
16. Synthetic Organic Dyestuffs	38.05	0.93	41.81	0.84	42.23	0.76	41.34	0.72	47.25	0.74
17. Cosmetic & Toilet Preparations	17.09	0.42	23.46	0.47	32.85	0.59	30.99	0.54	32.92	0.51
F. Metals — Total	401.69	9.78	464.11	9.35	469.65	8.42	481.54	8.38	580.72	9.08
Of which :										
18. Iron in any crude form	8.09	0.20	11.07	0.22	9.20	0.17	11.48	0.20	11.44	0.18
19. Iron and Steel Products	236.21	5.75	265.51	5.35	271.23	4.87	267.18	4.65	317.54	4.97
20. Aluminium	94.44	2.30	118.04	2.38	105.34	1.89	112.69	1.96	137.03	2.14
21. Copper and Copper Alloys	16.39	0.40	12.79	0.26	12.50	0.22	12.71	0.22	17.03	0.27
G. Manufactured Goods — Total	1088.13	26.48	1268.11	25.55	1421.35	25.50	1628.48	28.33	1761.66	27.55
Of which :										
22. Cotton Fabrics	98.73	2.40	96.49	1.94	99.16	1.78	106.00	1.84	109.90	1.72
23. Cotton Yarn	69.95	1.70	87.88	1.77	90.59	1.62	93.36	1.62	97.13	1.52
24. Rayon and Synthetic Fibre and Yarn+	282.24	6.87	328.73	6.62	362.82	6.51	408.13	7.10	437.83	6.85
25. Jute Manufactures	34.01	0.83	39.96	0.81	48.97	0.88	57.38	1.00	60.22	0.94

Statement 2: Revenue from Basic Excise Duties (concl.)

(Rs. Crores)

Item/Year	1977-78* (Accounts)		1978-79* (Accounts)		1979-80 (Accounts)		1980-81 (R.E.)		1981-82 (B.E.)	
April/March	Amount	% to Total	Amount	% to Total	Amount	% to Total	Amount	% to Total	Amount	% to Total
26. Tyres and Tubes	127.20	3.10	177.13	3.57	207.62	3.72	280.32	4.88	302.34	4.73
27. Rubber Products	19.56	0.48	20.99	0.42	22.86	0.41	25.59	0.45	28.40	0.44
28. Cement	121.81	2.96	129.37	2.61	123.79	2.22	139.15	2.42	156.49	2.45
29. Matches	41.38	1.01	46.89	0.94	49.69	0.89	49.25	0.86	50.00	0.78
30. Paper	90.26	2.20	109.35	2.20	149.93	2.69	176.28	3.07	195.65	3.06
31. Glass and Glassware	25.07	0.61	32.64	0.66	38.11	0.68	43.15	0.75	47.82	0.75
H. Machinery and Transport Equipment — Total	279.90	6.81	523.58	10.55	517.23	9.28	640.64	11.15	715.34	11.19
Of which :										
32. Motor Vehicles	78.35	1.91	110.69	2.23	160.14	2.87	192.62	3.35	218.57	3.42
33. Electric Batteries and Parts thereof	22.95	0.56	30.29	0.61	34.54	0.62	40.03	0.70	44.10	0.69
34. Electric Wires and Cables	23.11	0.56	35.42	0.71	65.48	1.17	110.73	1.93	121.80	1.90
35. Electric Motors	19.33	0.47	24.06	0.48	30.96	0.56	40.72	0.71	44.52	0.70
36. Refrigerating and Air Conditioning Appliances and Machinery	29.48	0.72	37.14	0.75	41.24	0.74	55.13	0.96	63.00	0.99

CENTRAL EXCISE DUTIES

£ This figure is slightly different from the figure used in the text due to differences in sources.

@ Includes yields from additional duties levied on petroleum products under the Mineral Products (Additional duties of Excise and Customs) Act, 1958.

+ Data from 1977-78 onwards relate to man-made fibre and man-made filament yarn.

* Actuals as per Departmental Records.

\$ Includes Cess realisations.

** Manufactured Tobacco.

Sources: 1. Report on Currency & Finance for the years 1970-71, 1975-76, 1976-77, 1977-78 and 1978-79.

2. Explanatory Memoranda on the Budgets of the Central Government for 1980-81 and 1981-82.

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AGRICULTURAL SUPPLY RESPONSE IN INDIA: 1961-62 TO 1977-78

A. K. Ray*

Introduction

An attempt is made in this paper to study the farmers' response of agricultural supply in India during the period 1961-62 to 1977-78. Studies of farmers' acreage response towards changes in prices of agricultural commodities were made in the past in respect of specific crops of some particular regions. A few all-India studies are, however, available for groups and sub-groups of crops. These investigations have shown in general, that farmers do respond to changes in prices, and reallocate area under cultivation towards commodities with higher relative prices or rates of return. Such findings coupled with information on acreage elasticities of output of various crops would be useful in the formulation of agricultural price policy towards achieving a set of desired or targeted levels of output within certain prescribed limits. However, as pointed out by Narayana and Parikh, agricultural supply response has not been given due consideration by the planners and policy makers in determining the targets of agricultural production.**

The present study attempts to estimate agricultural supply equations with reference to selected factor inputs, and with respect to output prices. The analysis is attempted for two broad groups of commodities, viz., foodgrain crops and non-foodgrain crops, at all-India level, to conform broadly to commodities for direct consumption and raw materials for (agro-based) industries. A similar investigation has been attempted for some major individual crops, viz., rice, wheat and groundnut. In the following sections, econometric specifications, results and policy implications have been presented. Estimated equations and graphs of certain selected equations have been presented in the Appendix.

2. Specification

Allocation of acreage under various alternative or substitutable crops is a part of supply response by farmers. An acreage res-

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**Narayana, N.S.S. and Kirit S. Parikh — "Agricultural Planning and Policy in Draft Sixth Plan: Will Farmers fulfil Planners Expectations", *Economic and Political Weekly*, Vol. 15, Nos. 30-32, Special Number, (1979)

ponse function depicts farmers' behaviour towards maximizing the overall returns under certain constraints on future expectation of output prices taking into account probable climatic conditions etc. In this study, acreage response functions, output and yield functions have been estimated for composite foodgrain crops, non-foodgrain crops and the three individual crops separately. Nerlovian adjustment model, incorporating weather (rainfall) and yield in addition to the output prices or revenues, has been used in order to study acreage response. Assuming that the area under cultivation could be put to alternative uses in the sense of growing alternative crops, farmers are in a position to adjust the acreage under a crop towards a desired level. The process of such adjustment is more likely to be spread over a time period rather than being instantaneous. Instantaneous adjustment may involve certain costs —like conditioning the area to grow new varieties, acquisition of other complementary inputs which may involve financial decisions. The long crops calendar in the case of certain crops might also act as a constraint on the annual adjustment of acreage. The adjustment model is described as follows :

$$X_t^* = a + bP_{t-1} + cY_{t-1} + dW_t + U_t$$

$$X_t - X_{t-1} = \lambda(X_t^* - X_{t-1})$$

where X and X^* are respective actual acreage and its desired level under a crop ; P and Y are relative price and relative yield of the crop of concern over its competing ones ; W is a rainfall index and U is random error term.

The coefficient λ (lying between 0 & 1) defines the adjustment mechanism in a manner that the farmers are assumed to adjust their acreage in the current year in proportion to the difference between the desired level and actual level in the previous year. The reduced form of equation worked out from the above model which is useful for estimation is :

$$X_t = a_1 + b_1 P_{t-1} + c_1 Y_{t-1} + d_1 W_t + \mu X_{t-1} + V_t$$

where

$$a_1 = \lambda a, \quad b_1 = \lambda b, \quad c_1 = \lambda c, \quad d_1 = \lambda d, \quad \mu = 1 - \lambda \text{ and } V_t = \lambda U_t$$

Output is explained by selected inputs like the acreage, irrigation, fertilizer and rainfall. Yield equation have also been esti-

mated in a similar way by expressing the output and inputs per unit of area.

3. Results

Alternative equations on the above lines have been estimated for acreage, output and yield of aggregate foodgrain crops, non-foodgrain crops and rice, wheat and groundnut. Selected equations are presented in detail in the Appendix. The main findings of the study are summarised below :

Acreage

(a) relative prices of crops in the previous year and rainfall during the sowing season have strong impact on the current year's acreage allocation between alternative crops ;

(b) except for groundnut, relative yield does not influence acreage allocation significantly ;

(c) short-run price elasticities of acreage under the two groups of crops — foodgrains and non-foodgrains are expected to be equal in magnitude but opposite in signs. The empirical results show the desired signs, but the magnitudes differ to some extent. A plausible explanation for this is that aggregation ignores substitution within a group of crops. Thus the estimated elasticities are likely to be subject to aggregation bias ;

(d) acreage adjustment coefficient for aggregate non-foodgrains is very small, while that for foodgrains is high (around 0.5). This is suggestive of higher long-run elasticities of acreage under non-foodgrains that corresponding ones for foodgrains acreage.

However, acreage adjustment coefficient for groundnut is an exception which is rather close to those of foodgrains.

(e) elasticities of acreage under rice and wheat are of smaller magnitudes as compared to those of composite foodgrain crops.

The estimated elasticities of acreage as obtained from different equations are presented in the following Table A.

Output

Output is explained by acreage, irrigation under a crop (group), rainfall and the total fertiliser-use. Particularly in a time series study, fertiliser use is highly correlated with irrigated acreage and thus it becomes difficult to segregate statistically the independent effects of the two variables in a production function. The important findings are presented below :

TABLE A: Elasticities of Acreage

Crop (Competing crops)	Elasticities of Acreage with respect to						
	Relative price		Relative Yield		Relative Revenue		Rainfall
	Short run	Long run	Short run	Long run	Short run	Long run	
Foodgrain (non-food grain)	0.12 - 0.16	0.22 - 0.33	— - —	— - —	— - —	— - —	0.11 - 0.15
Of which							
a) rice, (Ragi, Masta, Jute),	0.12 - —	0.21 - —	0.04 - —	0.07 - —	— - —	— - —	0.14 - —
b) Wheat (Gram)	— - —	— - —	— - —	— - —	0.11 - —	0.16 - —	0.13 - —
	0.04 - —	0.11 - —	— - —	— - —	— - —	— - —	0.10 - —
	0.05 - —	0.14 - —	— - —	— - —	— - —	— - —	0.10 - —
Non-foodgrain (food-grains)	-0.06 - —	-0.51 - -0.84	— - —	— - —	— - —	— - —	0.17 - —
	-0.07 - —	-1.44 - —	-0.04 - 0.90	— - —	— - —	— - —	0.19 - —
	— - —	— - —	— - —	— - —	-0.06 - —	-1.85 - —	0.19 - —
Of which groundnut (Jowar, Bajra, Cotton)	0.18 - —	0.44 - —	— - —	— - —	— - —	— - —	0.14 - —

(a) the acreage elasticities for all the crops under study are higher than unity. The elasticities with respect to other variables like irrigation and fertiliser are lower than unity. Irrigation elasticity is higher than fertiliser and rainfall elasticities:

(b) elasticities of output of foodgrains with respect to all selected inputs are higher than the corresponding elasticities of non-foodgrains. Rainfall and fertiliser elasticities of output of foodgrains are found to be of the order of 0.15. In the case of non-foodgrains, the corresponding elasticities are 0.06—0.10 and 0.12. However, here too, the groundnut shows a different pattern and the rainfall elasticity of output is as high as 0.60.

The Statistical relations for this crop traces almost all the seesaw movements in its output during the last decade. The role of rainfall in determining the per acre yield of groundnut is more important than in the case of foodgrains. While mild adverse climatic conditions can be counteracted to some extent by more intensive use of fertilisers and other inputs of new technology, the susceptibility of groundnut crop to vagaries of weather is yet to overcome.

(c) the elasticities of output of rice and wheat are broadly comparable with those of aggregate foodgrains output.

The elasticities are presented in the following Table B:—

TABLE B: Elasticities of Output

Crop	Elasticity of output with respect to			
	Acreage	Irrigation	Rainfall	Fertilizer
Foodgrains	1.60 - 2.73 2.22 - —	— 0.58	0.13 - 0.31 0.22 - — (0.51)*	0.11 - 0.16 — - —
Of which				
a) rice	1.82 - —	—	0.33 - — (0.51)*	0.07 - —
b) wheat	1.67 - —	—	0.05 - — (0.22)*	0.16 - —
Non-foodgrains	1.38 - 1.53 1.36 - —	— 0.33	0.06 - 0.08 0.10 - — (0.36)*	0.12 - — — - —
Of which groundnut	1.44 - —	0.10	0.61 - — (0.81)*	— - —

*Figures in the parenthesis show the total effect of rainfall on the output, which is roughly the sum of elasticity of output with respect to rainfall and product of elasticity of output with reference to acreage and elasticity of acreage with reference to rainfall. Thus $0.22 + (2.22 \times 0.13) = 0.51$, $0.33 + (1.82 \times 0.10) = 0.51$, $0.10 + (1.36 \times 0.19) = 0.36$, $0.05 + (1.67 \times 0.10) = 0.22$ and $0.61 + (1.44 \times 0.14) = 0.81$. That is, total effect is direct effect plus indirect effect of rainfall on output.

Yield

The results obtained from yield equations are generally consistent with those obtained from output equations. Elasticities of yield of foodgrains with respect to selected variables are higher than the corresponding elasticities of non-foodgrains. Rainfall elasticity is higher than the fertiliser elasticity, while both are less than the irrigation elasticity with an exception of groundnut. The elasticities are presented below in Table C.

TABLE C: Elasticities of Yield

Crop	Elasticity of Yield with respect to		
	Irrigation	Rainfall	Fertilizer
Foodgrains	— 0.66	0.21 - 0.27 0.38 - —	0.16 —
Of which			
a) rice	—	0.38 - —	0.12
b) wheat	—	0.41 - —	0.23
Non-foodgrains	— 0.23	0.12 - 0.16 0.16 - —	0.09 —
Of which groundnut	0.08	0.61 - —	—

Policy Implications of the Results

(a) The results show that short-run price elasticity of acreage is small at the all-India level both for foodgrains and non-foodgrains. For the policy point of view, it would appear from the first two tables that in the short-run, a ten percent rise in relative price in favour of foodgrains would raise their output by two per cent by the mechanism of acreage adjustment. This rise is accompanied by a decline in the non-foodgrains output by one per cent, other things remaining the same. Foodgrains having a major share in the Indian Agriculture, a favourable relative price of foodgrains would yield a higher level of aggregate agricultural output;

(b) Rainfall elasticity of output is high. This may reflect very adversely on the output under the drought conditions. This adverse effect of drought conditions may be counteracted by enlarged irrigation, output having higher elasticity with respect to irrigation. Also the lower difference between fertiliser and rainfall elasticities suggest that higher consumption of fertiliser would contribute to containing the impact of drought conditions.

APPENDIX

The equations of acreage, output and yield of foodgrain crops and non-foodgrain crops, rice, wheat and groundnut have been estimated by the ordinary least squares method. Some representative equations have been presented here. The estimated equations have, by and large, significant coefficients and high values of $\bar{R}^2$ s.

Alternative Equations**List of variables**

Acreage Index (base triennium ending 1969-70 = 100) of a) foodgrains: AF, b) non-foodgrains: ANF, c) rice: ARI, d) Wheat: AWI;

Area under groundnut (1000 hectares): AG;

Output Index (base triennium ending 1969-70 = 100) of a) foodgrains: QF, b) non-foodgrains: QNF, c) rice: QRI, d) Wheat: QWI;

Output of groundnut (1000 tonnes): QG;

Yield Index (Same base) of a) foodgrains: YF, b) non-foodgrains: YNF, c) rice: YRI, d) Wheat: YWI;

Yield of groundnut (Kg. per hectare): YG;

Relative price Index of a) food to non-food: PI, b) rice to its substitutes — ragi, mesta, jute: PRR, c) Wheat to gram: PWR and d) groundnut to jowar, bajra and cotton: PGR;

Relative yield index of a) food to non-food: YI, b) Wheat to gram: YWR, c) groundnut to its substitutes — jowar, bajra and cotton: YGR;

Total fertiliser Consumption ('000 tonnes): F;

Irrigated acreage ('000 hectares) under a) foodgrains: IF, b) non-foodgrains: IN;

Rainfall Index (mm) as weighted average of states' rainfall during May-October with weights being proportional to respective states' average area under a) foodgrain: WF, b) non-foodgrain: WN, c) rice: WR, d) Wheat: WW, e) groundnut: WG, f) total cropped area: WT. The above rainfall variables suffixed with 1 or 2 are to denote

the corresponding rainfall indices for May—July and August—October respectively;

Dummy variables D and D_1 are taken in order to explain the rise in acreages of wheat for the entire period after 1966-67 and of groundnut in the year 1965-66 respectively;

$$PI^* = (PI + PI_{-1})/2, \quad RI = (PI) \times (YI),$$

$$PR^* = (PRI + PRI_{-1})/2 \quad \text{and} \quad PW^* = (PWI + PWI_{-1})/2.$$

SOURCES OF DATA

Acreage, Output and Yield : Estimates of Area and Production of Principal Crops in India, 1978-79, Directorate of Economics and Statistics, Ministry of Agriculture, Govt. of India.

Price Index : Wholesale Price Statistics, H. L. Chandhok.

Fertiliser Consumption : Indian Agriculture in brief Directorate of Economics & Statistics, Ministry of Agriculture and Irrigation Govt. of India.

Rainfall : Statistical Abstract India, Central Statistical Organisation, Department of Statistics, Ministry of Planning, Govt. of India.

Alternative Equations (1961-62 — 1977-78)

I. ACREAGE

a) FOODGRAINS

1. AF =	26.2616	+ 0.1059 (PI)— ₁	+ 0.0901 WT	+ 0.4842 AF— ₁	
t-ratio	1.61	2.15	3.54	2.94	
Elast. SR, LR		0.12, 0.22	0.14, 0.27		
	$\bar{R} = 0.61$	Mean = 99.39	SEE = 2.06	D.W. = 2.22	
2. AF =	27.5210	+ 0.1071 (PI)— ₁	+ 0.0411 (YI)— ₁	+ 0.0882 WT	+ 0.4325 AF— ₁
t-ratio	1.56	2.09	0.26	3.21	1.66
Elast. SR, LR		0.12, 0.21	0.04, 0.07	0.14, 0.24	
	$\bar{R} = 6.58$	Mean = 99.39	SEE = 2.14	D.W. = 2.20	
3. AF =	40.5123	+ 0.0986 (RI)— ₁	+ 0.0842 WT	+ 0.3596 AF— ₁	
t-ratio	2.34	2.00	3.28	1.85	
Elast. SR, LR		0.11, 0.16	0.13, 0.20		
	$\bar{R} = 0.59$	Mean = 99.39	SEE = 2.09	D.W. = 2.11	
4. AF =	16.5722	+ 0.1436 PI*	+ 0.1005 WT	+ 0.5249 AF— ₁	
t-ratio	1.00	2.47	3.96	3.40	
Elast. SR, LR		0.16, 0.33	0.15, 0.33		
	$\bar{R} = 6.64$	Mean = 99.39	SEE = 1.98	D.W. = 2.03	
5. AF =	-8.0206	+ 0.1437 PI*	+ 0.5052 WT	- 0.0031 WT ²	+ 0.4663 AF— ₁
t-ratio	0.29	0.48	1.38	1.11	2.88
Elast. SR, LR		0.16, 0.29	0.13, 0.25		
	$\bar{R} = 0.64$	Mean = 99.39	SEE = 1.96	D.W. = 2.08	
6. AF =	24.8291	+ 0.1210 PI*	+ 0.0797 WT ¹	+ 0.5082 AF— ₁	
t-ratio	1.17	1.60	2.05	2.54	
Elast. SR, LR		0.13, 0.27	0.11, 0.23		
	$\bar{R} = 0.40$	Mean = 99.39	SEE = 2.55	D.W. = 2.59	

Note: SR — Short Run, LR — Long Run

b) NON-FOODGRAIN

1. ANF = t-ratio Elast. SR, LR	— 2.9342 0.20 ² R = 0.77	—0.0623 (PI)— ₁ 1.37 —0.06, —0.84 Mean = 103.23	+ 0.1222 WT 5.03 0.18, 2.34 SEE = 1.88	+ 0.9224 ANF— ₁ 6.87 D.W. = 1.85
2. ANF = t-ratio Elast. SR, LR	— 2.6082 0.17 ² R = 0.76	—0.0624 (PI)— ₁ 1.33 —0.07, —1.44 Mean = 103.23	— 0.0431 (YI)— ₁ 0.40 — 0.04, —0.90 SEE = 1.94	+ 0.1264 WT 4.65 0.19, 4.11 D.W. = 1.86
3. ANF = t-ratio Elast. SR, LR	— 8.7719 0.59 ² R = 0.77	—0.0601 RI— ₁ 1.46 —0.06, —1.85 Mean = 103.23	+ 0.1284 WT 5.31 0.19, 5.69 SEE = 1.86	+ 0.9666 ANF— ₁ 6.73 D.W. = 1.87
4. ANF = t-ratio Elast. SR, LR	— 1.5777 0.10 ² R = 0.76	—0.0589 PI* 0.99 —0.06, —0.69 Mean = 103.23	+ 0.1188 WT 4.64 0.18, 1.97 SEE = 1.94	+ 0.9106 ANF— ₁ 6.56 D.W. = 2.11
5. ANF = t-ratio Elast. SR, LR	— 13.0363 0.47 ² R = 0.76	—0.0508 (PI)— ₁ 1.30 —0.06, —0.72 Mean = 103.23	+ 0.2698 WT 0.78 0.18, 2.00 SEE = 1.99	+ 0.9118 ANF— ₁ 6.47 D.W. = 1.87
6. ANF = t-ratio Elast. SR, LR	— 3.4310 0.20 ² R = 0.67	—0.0640 (PI)— ₁ 1.20 —0.06, —0.51 Mean = 103.23	0.1277 WT1 3.86 0.17, 1.33 SEE = 2.20	+ 0.8693 ANF— ₁ 5.61 D.W. = 2.69

II. Output

a) FOOD GRAIN

1. QF =	-195.1940	+ 1.6308AF	+ 0.0081F	+ 1.4080WF	-0.0041WF ²
t-ratio	2.91	2.09	4.47	1.83	1.68
elast	$\frac{-2}{-}$	1.60	0.16	0.20	
	R = 0.94	Mean = 101.18	SEE = 3.76	DW = 2.69	
2. QF =	-273.7339	+ 2.2587AF	+ 0.2020 IF/AF	+ 1.0558WF	-0.0029WF ²
t-ratio	4.29	2.99	3.85	1.28	1.12
elast	$\frac{-2}{-}$	2.22	0.58	0.22	
	R = 0.92	Mean = 101.18	SEE = 4.11	DW = 2.51	
3. QF =	-200.0151	+ 2.7826AF	+ 0.0059F	+ 0.0943WF1	
t-ratio	3.64	4.57	3.59	1.45	
elast	$\frac{-2}{-}$	2.73	0.11	0.13	
	R = 0.94	Mean = 101.18	SEE = 4.16	DW = 2.39	
4. QF =	-145.7190	+ 2.2091AF	+ 0.0073F	+ 0.0779WF2	
t-ratio	1.96	2.59	3.49	1.42	
elast	$\frac{-2}{-}$	2.17	0.14	0.31	
	R = 0.94	Mean = 101.18	SEE = 4.17	DW = 2.19	

b) NON-FOODGRAIN

1. QNF =	-122.6816	+ 1.4037 ANF	+ 0.0666 F	+ 0.8603 WN	- 0.0026 WN ²
t-ratio	2.42	3.22	4.70	1.58	1.49
elast	$\frac{-2}{-}$	1.38	0.12	0.08	
	R = 0.94	Mean = 104.61	SEE = 3.46	DW = 1.55	
2. QNF =	-194.8042	+ 1.3751 ANF	+ 0.4196 IN/ANF	+ 1.5513 WN	- 0.0048 WN ²
t-ratio	4.98	3.54	5.39	2.98	
elast	$\frac{-2}{-}$	1.36	0.33	0.10	
	R = 0.94	Mean = 104.61	SEE = 3.15	DW = 1.51	
3. QNF =	-116.1751	+ 1.5469 ANF	+ 0.0634 F	+ 0.6423 WN1	- 0.0021 WN1 ²
t-ratio	2.45	3.45	4.27	1.23	1.21
elast	$\frac{-2}{-}$	1.53	0.12	0.06	
	R = 0.92	Mean = 104.61	SEE = 3.70	DW = 1.45	

4. QNF =	— 69.8356	+	1.4951 ANF	+	0.0663 F	+	0.0454 WN2
t-ratio	1.73		3.46		4.67		1.36
elast			1.48		0.12		0.07
	$R^2 = 0.94$		Mean = 104.61		SEE = 3.53		DW = 1.56

III. YIELD

a) FOODGRAIN

1. YF =	53.9429	+	0.8279 (F/AF)	+	0.0722 WF1	+	0.1216 WF2
t-ratio	6.26		8.40		1.00		2.83
Elast.			0.16		0.10		0.20
	$R^2 = 0.86$		Mean = 100.34		SEE = 4.23		D.W. = 2.03
2. YF =	8.9956	+	0.8184 (F/AF)	+	0.7742 WF2	—	0.0019 (WF2) ²
t-ratio	0.29		0.80		2.01		1.64
Elast.			0.16		0.21		
	$R^2 = 0.87$		Mean = 100.34		SEE = 4.00		D.W. = 2.04
3. YF =	—62.2746	+	0.7864 (F/AF)	+	1.7406 WF	—	0.0050 (WF) ²
t-ratio	1.82		9.45		2.71		2.39
Elast.			0.15		0.27		
	$R^2 = 0.90$		Mean = 100.34		SEE = 3.56		D.W. = 2.81
4. YF =	3.8154	+	0.2286 (IF/AF)	+	0.2492 WF		
t-ratio	0.33		7.62		4.51		
Elast.			0.66		0.38		
	$R^2 = 0.84$		Mean = 100.34		SEE = 4.58		D.W. = 2.23

b) NON-FOODGRAIN

1. YNF = t-ratio Elast.	77.7628 11.33	+ 0.5210 (F/ANF) 6.74 0.09	+ 0.0080 WN1 0.16 0.01	+ 0.0830 WN2 2.76 0.13
	R = 0.76	Mean = 101.68	SEE = 3.15	D.W. = 2.01
2. YNF = t-ratio Elast.	39.3241 1.83	+ 0.5085 (F/ANF) 7.49 0.09	+ 0.5866 WN2 2.17 0.12	- 0.0015 (WN2) ² 1.86
	R = 0.81	Mean = 101.68	SEE = 2.80	D.W. = 1.58
3. YNF = t-ratio Elast.	16.3400 0.59	+ 0.4905 (F/ANF) 8.12 0.09	+ 1.3289 WN 3.60 0.16	- 0.0040 (WN) ² 3.30
	R = 0.86	Mean = 101.68	SEE = 2.43	D.W. = 1.28
4. YNF = t-ratio Elast.	58.2347 3.23	+ 0.2865 13.10 0.23	+ 1.6900 WN 7.14 0.16	- 0.0051 (WN) ² 6.68
	R = 0.94	Mean = 101.68	SEE = 1.59	D.W. = 2.51

The selected equations for rice, wheat and groundnut are given below :

RICE

1. Acreage :

a) ARI = 17.5001 + 0.0349 PPR— ₁ t-ratio : 0.97 Elast SR, LR	+ 1.05 0.04, 0.11	+ 0.6950 ARI— ₁ 3.48	+ 0.0657 WT 2.68 0.10, 0.33
	Mean = 100.25	SEE = 1.98	DW = 2.28
b) ARI = 20.8472 + 0.0564 RR* t-ratio : 1.30 Elast SR, LR	+ 1.63 0.06, 0.17	+ 0.6488 ARI— ₁ 3.70	+ 0.0591 WT 2.48 0.09, 0.26
	Mean = 100.25	SEE = 1.89	DW = 2.22

2. QWI =	- 93.6889	+ 1.7749 AWI	+ 8806 F/AWI	+ 0.0011 WW2	
t-ratio	6.32	6.39	1.40	0.02	
Elasticity		1.73	0.14	0.002	
$\bar{R}^2$					
R = 0.98		Mean = 107.89	SEE = 6.47	DW = 1.95	
III. Yield					
1. YWI =					
t-ratio		35.6052	+ 0.1572 WW	+ 2.3511 F/AWI	
Elasticity		3.14	9.41	1.96	
$\bar{R}^2$			0.41	0.23	
R = 0.88					
2. YWI =					
t-ratio		39.0018	Mean = 99.40	SEE = 7.51	DW = 2.02
Elasticity		4.02	+ 0.1102 WW2	+ 2.4634 F/AWI	
$\bar{R}^2$			10.42	1.97	
R = 0.88			0.43	0.18	
			Mean = 99.40	SEE = 7.51	DW = 2.02
GROUNDNUT					
I. Acreage					
1. AG =					
t-ratio	- 479.9970	+ 11.0420YGR ₋₁	+ 0.5950 $\left(\frac{AG_{-1} + AG_{-2}}{2} \right)$	+ 564.5270D ₁	+ 8.5462WT ₁ + 15.1506 PGR ₋₁
Elasticity	0.24	2.26	3.26	3.34	3.93
SR, LR					
$\bar{R}^2$		0.16, 0.40		0.14, 0.35	0.18, 0.44
R = 0.61					
		Mean = 7219.50		SEE = 151.17	DW = 2.02

2.	AG =	354.4399	+	0.6270	$\left(\frac{AG_{-1} + AG_{-2}}{2} \right)$	+	561.0434	D ₁	+	9.1805	WT ₁	+	14.7797	RGR ₋₁	
	t-ratio	0.24		3.90			3.82			3.87			4.39		
	Elasticity									0.15, 0.40				0.18, 0.48	
	SR, LR														
	$\bar{R}^2$														
	$\bar{R} = 0.66$														
				Mean = 7219.50			SEE = 142.29			DW = 2.04					
II. Output															
1.	QG =	-15188.9724	+	0.0626	IN	+	169.2812	WG	-	0.5575	WG ²	+	1.0821	AG	
	t-ratio	2.37		1.29			2.03			1.67			1.82		
	Elasticity			0.09			0.61						1.44		
	$\bar{R}^2$														
	$\bar{R} = 0.55$				Mean = 5413.61					SEE = 522.25			DW = 1.15		
2.	QG =	-15784.9342	+	474.5636	IN/AG	+	168.8665	WG	-	0.5554	WG ²	+	1.1634	AG	
	t-ratio	2.42		1.35			2.04			1.68			1.89		
	Elasticity			0.10			0.60						1.55		
	$\bar{R}^2$														
	$\bar{R} = 0.55$				Mean = 5413.61		SEE = 519.26						DW = 1.18		
III. Yield YG = -															
		1.0482	+	0.0242	WG	-	0.0001	WG ²	+	0.0504	IN/AG				
	t-ratio	1.53		2.21			1.85			1.24					
	Elasticity			0.58						0.08					
	$\bar{R}^2$														
	$\bar{R} = 0.56$				Mean = 0.75		SEE = 0.07			DW = 1.25					

II. Output :

QRI = 250.1668	+ 1.8413 ARI	+ 0.0039 F	+ 1.5170 WR	-0.0035 WR ²
t-ratio : 2.81	1.76	1.16	1.24	1.10
Elast	1.82	0.07	0.33	
R = 0.89	Mean = 101.49	SEE = 4.97	DW = 2.58	

III. Yield :

YRI = -149.7534	+ 0.6586 F/ARI	+ 2.3281 WR	- 0.0056 WR ²
t-ratio : 1.81	5.80	2.61	2.35
Elast :	0.12	0.37	
R = 0.81	Mean = 100.91	SEE = 4.78	DW = 2.71

WHEAT

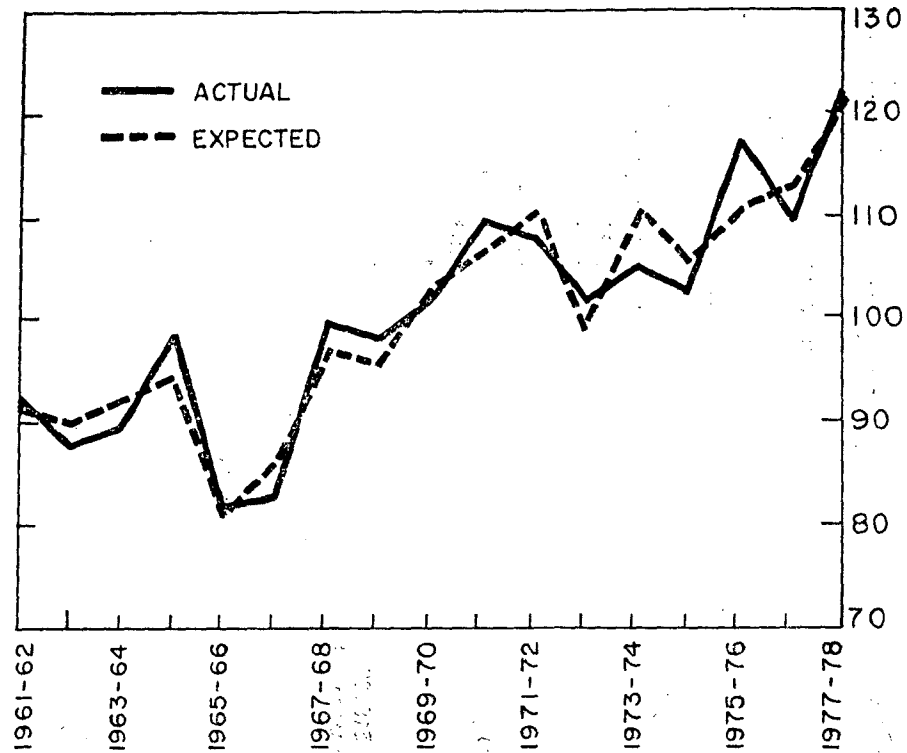
I. Acreage

1. AWI =	2.8024	+ 0.1338 YWR ₋₁	+ 0.6423 AWI ₋₁	+ 0.0740 WW	+ 9.8554 D	+ 0.0585 PWR ₋₁
t-ratio	0.23	1.18	5.91	1.35	2.29	0.70
Elasticity						
SR, LR		0.13, 0.36		0.10, 0.28		0.05, 0.14
R = 0.94		Mean = 104.92		SEE = 4.54		DW = 2.01
2. AWI =	4.5440	+ 0.7010 AWI ₋₁	+ 0.0701 WW	+ 12.9798 D	+ 0.1153 PW*	
t-ratio	0.40	7.52	1.39	3.66	1.22	
Elasticity			0.10, 0.33		0.10, 0.33	
SR, LR						
R = 0.94		Mean = 104.92		SEE = 4.38		DW = 2.03

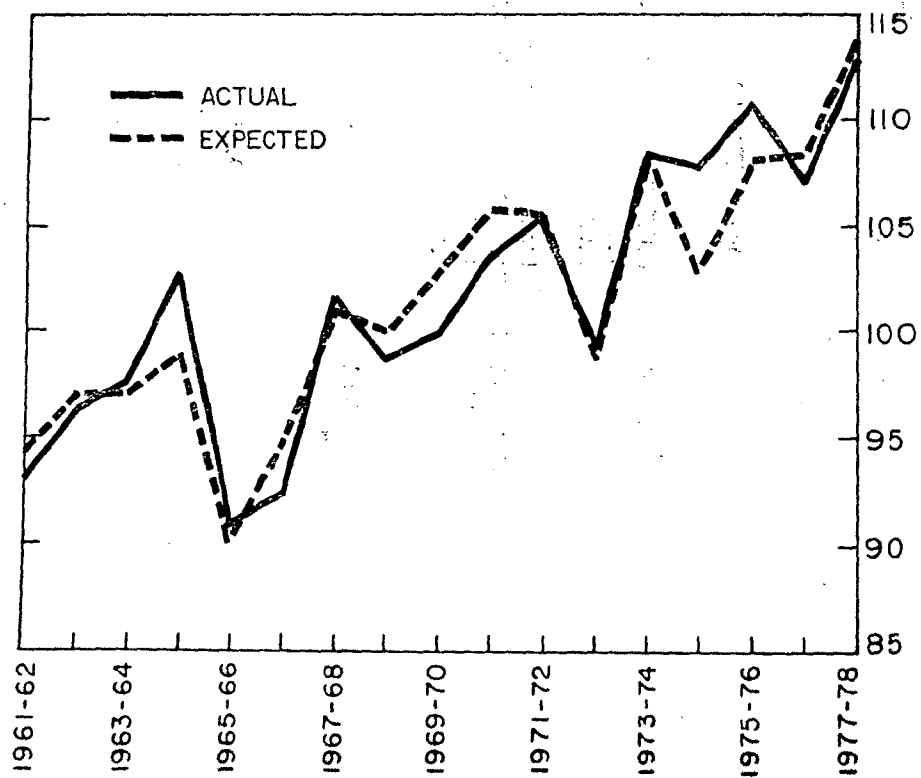
II. Output

1. QWI =	- 94.4168	+ 1.7157 AWI	+ 0.9725 F/AWI	+ 0.0374 WW
t-ratio	6.46	6.86	1.77	0.46
Elasticity		1.67	0.16	0.05
R = 0.98		Mean = 107.89	SEE = 6.42	DW = 1.97

FOODGRAINS YIELD EQUATION



NON-FOODGRAINS YIELD EQUATION



SOCIAL SECURITY AND ECONOMIC GROWTH : AN EMPIRICAL STUDY

N. Nagarajan*

1. Introduction

Extensive and scholarly literature is available on various aspects of social security and on their relationships with selected economic postulates. However, the relationship between social security and economic growth is relatively unexplored. A few studies that are available in this area are tenuous in nature. For instance, a possible link between these two through the likely improvement in labour productivity due to the availability of social security benefits is suggested.¹ This is probably an appropriate approach in the present context of interpreting economic development as a process of social dynamics but involves the inevitable subjective valuation in assessing the link-parameter namely productivity. Further, the approach takes into account only the benefit aspect which is but a part of the schemes. Some may rightly argue that this is reasonable because the schemes are primarily welfare measures and are based on assessment principle under which resources are raised just to meet the demand from the beneficiaries. However, the applicability of this argument is very limited where the schemes are based on accumulation principle as in India.²

On the other hand, the scope for integrating the finances of social insurance schemes, which form virtually the entire gamut of social security, with the process of economic growth within the framework of the conventional approach is vast and inviting especially when the schemes are based on accumulation principle. The importance of the schemes in mobilising saving and augmenting

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¹ Rimlinger, G. V.: Welfare Policy and Economic Development: A Comparative Historical Perspective, *Journal of Economic History*, Vol. 26, No. 4, (December 1966), pp. 566-571.

² In fact, uncritical acceptance of this approach may lead to incomprehensible results. Galenson, for instance, found that neither capital nor labour was a significant determinant of the rate of economic growth in the least developed countries. See Galenson, W.: Social Security and Economic Development: A Quantitative Approach, *Industrial and Labour Relations Review*, Vol. 21, No. 4, (July 1968), p. 567.

investment is well recognised.³ A logical extension of this realisation is to evaluate the effects of the saving thus mobilised on the rate of economic growth. No attempt has, however, been made in this direction. This study ventures into this hitherto uncharted area with empirical explorations in Indian context.

The model is presented in the following Section. Methodology adopted and data-base are explained in Section 3. Empirical results are analysed in Section 4. Some of the main findings and their implications are noted in the last Section. A note on the Employees' Provident Fund Scheme (EPFS) with special reference to its rôle in mobilising saving in India is appended.

2. The Model

The hypothesis for consideration is, whether, within the framework of orthodox economic postulates, a social insurance scheme of the Employees' Provident Fund Scheme (EPFS) variety, as assessed in its total financial structure, is compatible with economic growth. The enquiry therefore has to commence from a total assessment of the scheme. Following conventionalists, benefits paid under the scheme may be taken to increase consumption expenditure of the households which has retrograde effects on the rate of economic growth. However, the scheme also has substantial surplus funds which are, as pointed out in the appendix, additional saving in the economy. This saving is invested and, if the traditional theory of economic growth is accepted, certain amount of output is attributable to these funds. The net effect of the scheme, therefore, is the difference between the positive effects of the surplus funds and the negative effects of the benefits paid.

The model is developed within the framework of input-output method. This method is chosen not only because it is simple and sufficiently flexible to cover all necessary articulations but also because it traces the inter-industrial dependency in great detail. In fact, this method has increasingly been used to evaluate the response of productive activities to changes in tertiary sector.⁴ Moreover, academically, it has been mathematically proved that the situation portrayed by this method is the Hicksian general equi-

³. For a detailed discussion, see appendix.

⁴. See, for instance, Foressel, O: Effects of Public Expenditure on Production, Income and Employment in Finland, *Review of Income and Wealth*, Vol. 21. 1, (March, 1975) pp. 81-94.

librium which, in turn, is the Classical System in a nutshell.⁵ Use of input-output method *ipso facto* refers to an attempt to integrate the scheme with the Classical System which has not been hitherto attempted.

The economic structure explained by the input-output method may compactly be expressed as

$$(I-A)^{-1} C = X \quad (1)$$

where

X = a vector of gross output

I = an $n \times n$ identity matrix

A = an $n \times n$ matrix of technical coefficients and

C = a vector of final demand.

This equation states that the total gross output of a sector is equal to the demand for its product from other sectors in the process of production of their products and to the residual quantum available for meeting final consumption demand emanating from households, government, capital formation and foreign trade. The $(I-A)$ inverse denotes the inter-sectoral dependency in the process of production and is called the technical coefficient matrix. This is an input multiplier because it denotes the sum of direct and indirect requirements for the product of one sector from various sectors in the process of production of the latter. Given the A matrix, the relationship discussed facilitates the computations of compatible values in a vector corresponding to every value exogenously set in the other vector. If C is given, compatible X can be obtained and *vice versa*.

This equation deals exclusively with the current flows and thus provides a snapshot view of the economy. The process of economic growth is dynamic involving the use of capital. A variant of the input-output method enables the picturisation of this relationship thus :

$$B^{-1} S = \bar{X} \quad (2)$$

where

$\bar{X}$ = a vector of gross output produced by a given capital stock

B = an $n \times n$ matrix of investment coefficients, and

S = a vector of capital stock.

⁵. Bharadwaj, G. R.: *International Trade and Economic Growth: Some Issues in Analysis and Applications*, Unpublished Ph.D. thesis, University of Bombay, Bombay (1974), pp. 35-47 and 53-54.

As in the case of equation (1), this relationship enables, given B matrix, the computation of compatible values in one vector with every exogenously predetermined values in the other vector. If S is given, output attributable to it ($\bar{X}$) can be derived. Alternatively, if $\bar{X}$ is given, the investments needed, S, can be obtained.⁹

Following conventional approach, social insurance benefits may be treated as additions to household consumption expenditure. This is, however, only an apparent or a nominal cost on the system. The total or real cost should take into account the production requirements to sustain this increase in consumption expenditure. Using equation (1), the total cost may be computed which, for the sake of analytical convenience, may be called **warranted output** and denoted as $\bar{X}^*$.

On the other hand, the surplus funds of the schemes are additional savings of the economy. If it is assumed that these funds are invested to augment capital stocks, called for brevity, **actual investment**, S, and that there is no time lag between investment and output, using equation (2), output attributable to the scheme may be estimated. This may be named **actual output**, X. The net effect of the scheme on the economy then is the difference between **actual output** (X) and **warranted**

output ($\bar{X}^*$). If X is greater than $\bar{X}^*$, the net effect is an addition to Gross Domestic Product (GDP) and the scheme makes a positive contribution. If $\bar{X}^*$ is greater than X, the scheme is retrogressive, since it utilises more products to meet the unproductive consumption expenditure created by it than that it produces with its surplus funds.

The introduction of surplus funds of the scheme in the articulations facilitates the linking of the scheme to rate of economic growth. By assumption, the scheme augments capital stocks (**actual investments**, S). Using equation (2), a vector of additional capital needed to sustain the **warranted output**, $\bar{X}^*$, called **warranted investment** ($\bar{S}^*$) can be obtained. Analogous to the approach outlined in the preceding paragraph, the net effect of the scheme on rate of economic growth is the difference between S and $\bar{S}^*$ — the former having a positive and the latter a

⁹. For details of input-output method, see, for instance, Mathur, P.N. & Bharadwaj, R.: *Input-Output Economics—A Resume*, Artha Vijnana, Vol. 9, Nos. 3-4, (September-December 1967), pp. 283-296.

negative effect. If S is greater than $\bar{S}$, the scheme promotes growth because the additions to capital stocks are higher than the consumption of capital stocks to sustain unproductive household consumption. If $\bar{S}$ is greater than S , the inverse materialises and hence the scheme retards economic growth.

Within the framework of the input-output analysis, the repercussions of social insurance scheme on the factors of production also may be computed. From equation (1), it is evident that the column-wise elements of $(I-A)$ inverse matrix provide the inputs, both direct and indirect, required from all sectors to produce one rupee worth of output in the respective sector.⁷ If the matrix is transposed so that columns become rows and rows become columns, elements in the rows represent such inputs. The transposed matrix, when multiplied by a column vector of factor coefficients, yields a column vector of factor, used in the production of one rupee worth of output in each sector. Multiplying the elements in this vector by the output of the respective sectors, the quantum of factor used in the production of the output is derived. When the multiplier is a column vector of output attributable to social insurance scheme, the resultant vector denotes the impact of that scheme on the factor concerned. The implicit assumptions in this method are (i) the economy is under-employed and (ii) supply of factors is perfectly elastic.

The foregoing articulations clearly show that the emphasis of the model is on production. This approach is justified on two counts. First, economic growth *per se* is a process of increasing output. Hence, the effects of the scheme on level of output *ipso facto* integrate it with the process of economic growth. Second, assuming that the social security benefits increase unproductive consumption expenditures of households, it is more desirable to have reliable estimates of the effects of such benefits on the output to take meaningful decisions regarding the promulgation/extension of the scheme⁸.

It is also evident that the validity of the articulations depends greatly upon the reality of the assumption that the surplus funds of the scheme have augmented capital stocks. The orthodox contention is that the surpluses accrue to the Government, forming a

7. The unit of measurement should, strictly speaking, be in physical quantities. However, they may also be expressed in monetary terms, *ibid*, p. 286.

8. Deshpande, L. K.: Economics of Social Welfare, *Indian Journal of Labour Economics*, Vol. 19, Nos. 3-4, (October 1976-January 1977), p. c163.

part of its total revenue, and it is impossible to trace their flows. In fact, this is the reason often advanced to defend the neglect of this area by the economists. This stance is, however, untenable because the economists themselves have been advocating that the resources mobilised by the social security agencies should be invested according to criteria established for the optimum economic and social development of the country as also to expand productivity and taxable capacity.⁹ Further, in India, the Government dominates investment activities which are financed *inter alia* by the surplus funds of the scheme. Also, the pattern of these investments is pre-determined according to priorities laid down in the plan documents and information on the proposed investments in different projects are available. These considerations amply demonstrate the realism of this assumption.

3. Data-base and Methodology

For empirical evaluation, the model requires a matrix of technical coefficients and another matrix of investment coefficients. The technical coefficient matrix is derived from the 60x60 input-output table for 1968-69 published in the November 1978 issue of the **Reserve Bank of India Bulletin**. This table is chosen because it contains greater disaggregated service sector. However, a matrix of investment coefficients is not available either for the year 1968-69 or for the year 1974-75 (the year to which data other than the technical coefficient matrix used in this study relate). As an alternative, data from various sources are used to derive the needed parameter. For factory sector, incremental capital-output ratios are obtained from the data available in the **Annual Survey of Industries for the years 1973-74 and 1974-75**. The industry-wise coefficients thus obtained are suitably treated to conform to the description of the sectors used in the model. In respect of non-factory pursuits, the capital coefficients are culled out from other specified studies.¹⁰ These are suitably treated to conform to the sectoral classification of the input-output table. The coefficients thus obtained are substituted for the B matrix.

Benefits paid during 1974-75 are taken from the **Annual Report on the Working of the Employees' Provident Fund and Family**

⁹. See, for instance, Reviglio, F.: *Social Security: A Means of Saving Mobilisation for Economic Development*, IMF Staff Papers, Vol. 14, No. 2 (July 1967), pp. 348-350.

¹⁰. Saluja, M. R.: *Component-wise Capital-Output Ratios in the Indian Economy*, Paper presented at the 18th All-India Annual Econometric Conference, Simla (1979) Mathur, P. N. et al: *An Inter-industry Capital Coefficient Table for India — First Approximation, 1960*, Artha Vijnana, Vol. 9, Nos. 3-4, (September-December 1967), pp. 342-346.

Welfare Scheme for the year 1974-75. They comprise claims settled and non-recoverable advances made under various heads during the year. However, no information is available either on the quantum or on the expenditure pattern of these benefits. These details are essential to derive the consumption vector because some of the heads under which the benefits are dispersed are apparently for non-consumption purposes (e.g., financing house construction).

The problem of the quantum is solved by estimating the effects under two assumptions. Under the first assumption, a part of the benefits obtained is treated to have increased consumption expenditure, the rest having been used to augment saving. This bifurcation involves certain amount of subjective valuation. Given the paucity of data this could not be avoided. Precaution is, however, taken to minimise the possible bias by considering the nature of each contingency separately. Under the second assumption, the entire quantum of benefits is taken to have been spent on consumption.

To obtain the consumption vector, information available in the **Technical Note on the Approach to the Fifth Five-Year Plan of India, 1974-79** is utilised. It contains, *inter alia*, consumption coefficients for urban class for 1973-74. The coefficients for different income groups are averaged and are suitably treated to conform to the 60 sectors used in the computations. The average coefficients thus obtained are applied to the estimated total consumption expenditure to derive consumption vector.

The Annual Report of the EPFFW Scheme provides information on the quantum of surplus funds invested in Government and other securities. It does not, however, furnish sector-wise details of such investments as also the quantum of investments for developmental purpose. This study, therefore, attempts to estimate the effects under two assumptions. In the first instance, the surplus funds are assumed to have been utilised by the Government to finance both developmental and non-developmental expenditures in the same proportion as that noticed in the Central Government's budget for 1974-75. In the second instance, entire surplus funds of the scheme are assumed to have been used to finance developmental expenditure.

The sector-wise pattern of investments is derived from the information available in the **Annual Plan for 1974-75**. This contains project-wise details of outlays. They are suitably treated to conform to the 60 sectors used in this study. The amounts are

reduced to coefficients and are applied to the total quantum of investible funds of the scheme to obtain the quantum of sectoral investments. As an academic exercise, it is felt desirable to assess the relative efficiency of the pattern of investments envisaged in different plans by different governments. Therefore, an additional possibility is explored assuming that the funds are invested according to the priorities set in the Sixth Five-Year Plan. Project-wise details, available in the **Draft Five-Year Plan, 1978-83**, are suitably treated to obtain this alternative investment pattern.

Factor coefficients are derived from the **Annual Survey of Industries (C.S.O)** and from **Labour Statistics** (Labour Bureau, Simla). In respect of manufacturing industries, total number of employees and total amount of emoluments are used to derive employment-output and emolument-output coefficients. For others, worker-output and wage-output ratios are obtained from the information available in the **Labour Statistics** and in the input-output table. Profits are defined as the difference between net value added and emoluments/wages. The ratios of this residual to output are taken as profit-output coefficients.

The combination of all these assumptions has yielded, in all, eight sets of possible effects of the EPFS as detailed below:

Set 1 : Effects under the assumptions

(S1)

- a) Surplus funds are invested in developmental and non-developmental expenditures in the same proportion as that noted in the Central Government budget;
- b) The pattern of investment is that envisaged in **Annual Plan, 1974-75**;
- c) The benefits are spent on consumption and on saving.

Set 2 : Effects under the assumptions

(S2)

- a) Surplus funds are invested in developmental and non-developmental expenditures in the same proportion as that noted in the Central Government budget;
- b) The pattern of investment is that envisaged in the **Annual Plan, 1974-75**;
- c) Entire benefits are spent on consumption.

Set 3 : Effects under the assumptions

(S3)

- a) Surplus funds are invested in developmental and

non-developmental expenditures in the same proportion as that noted in the Central Government budget ;

- b) The pattern of investment is that envisaged in the **Draft Five-Year Plan, 1978-83 ;**
- c) The benefits are spent on consumption and on saving.

Set 4 : Effects under the assumptions
(S4)

- a) Surplus funds are invested in developmental and non-developmental expenditures in the same proportion as that noted in the Central Government budget ;
- b) The pattern of investment is that envisaged in the **Draft Five-Year Plan, 1978-83 ;**
- c) Entire benefits are spent on consumption.

Set 5 : Effects under the assumptions
(S5)

- a) Total surplus funds are spent on developmental investments ;
- b) The pattern of investment is that envisaged in the **Annual Plan, 1974-75 ;**
- c) The benefits are spent on consumption and on saving.

Set 6 : Effects under the assumptions
(S6)

- a) Total surplus funds are spent on developmental investments ;
- b) The pattern of investment is that envisaged in the **Annual Plan, 1974-75 ;**
- c) The entire benefits are spent on consumption.

Set 7 : Effects under the assumptions
(S7)

- a) Total surplus funds are spent on developmental investments ;
- b) The pattern of investment is that envisaged in the **Draft Five-Year Plan, 1978-83 ;**
- c) The benefits are spent on consumption and on saving.

Set 8 : Effects under the assumptions
(S8)

- a) Total surplus funds are spent on developmental investments ;

- b) The pattern of investment is that envisaged in the **Draft Five-Year Plan, 1978-83**;
- c) The entire benefits are spent on consumption.

For brevity, the estimated effects may be denoted as S1, S2, S3, S4, S5, S6, S7 and S8, respectively. The computations, besides enabling the assessment of the net effects of the scheme under different assumptions, facilitates a comparative study of the following three aspects: (a) the impact on the GDP consequent upon a change in the level of consumption, i.e., a comparison of S1 with S2, S3 with S4, S5 with S6 and S7 with S8, and their respective capital requirements; (b) the relative efficiency of the investment pattern envisaged in the **Annual Plan, 1974-75** and the **Draft Five-Year Plan, 1978-83**, i.e., S1 with S3, S2 with S4, S5 with S7 and S6 with S8; and (c) the relative effect of Governmental expenditure on developmental projects, i.e., S1 with S5, S2 with S6, S3 with S7 and S4 with S8. Analyses under (b) and (c) are attempted taking variations into consideration because the estimated net effects of the scheme vary widely between the sets (even from negative sign in one set to positive sign in another).

Similar procedure is followed to compute the effects on factors. Labour and capital are the two factors chosen for the purpose, level of employment and emoluments representing the former and profits the latter.

4. Empirical Results¹¹

The net effects of the EPFS on the economy in terms of its impact on Gross Domestic Product (GDP) are set out in Table 1. These computations understandably show that the net effect is more positive (or less negative) if, (a) the total surplus funds are spent on developmental expenditure and (b) the consumption expenditure is less than the total benefits. The magnitude of the net effect, however, depends upon the assumptions. It ranges from a net addition of Rs. 819.5 crores (0.8 per cent of GDP) under S7 to a net subtraction of Rs. 272.5 crores (—0.3 per cent of GDP) under S2. Sector-wise, the net effects are mixed with many sectors showing negative signs mainly because the investments of the surplus funds are, in general, in non-consumer goods industries. If a part of the benefits is assumed to have been saved, other assumptions remaining constant, the scheme is found to have a uniformly beneficial effect on the economy. Conversely, if the total amount is assumed to have been spent on consumption, the effect is negative except under S5. This underlines the need to have more information on

¹¹. The results presented here differ from those obtained in the thesis due to changes in the data-base and methodology.

the usage of benefits obtained from the EPFS to estimate the relationship between the scheme and economic growth with greater confidence.

An interesting result of a comparative analysis is that to meet an increase of Rs. 96.7 crores in consumption expenditure (from Rs. 85.5 crores to Rs. 182.2 crores), total output requirements, according to the investment pattern envisaged in the **Annual Plan, 1974-75** is Rs. 476.5 crores, (S2 and S1) but, according to the **Draft Five-Year Plan, 1978-83**, the need is Rs. 521.95 crores (S4 and S3). In other words, one rupee worth of urban consumption requires, according to the priorities envisaged in **Annual Plan, 1974-75** an output worth Rs. 4.93 but under the pattern of investments envisaged in the **Draft Five Year Plan, 1978-83**, the output requirement is higher at Rs. 5.40.

A comparison of S1 with S5 and S3 with S7 reveals the likely effect of diverting funds from non-developmental outlays to financing development according to the two sets of investment pattern. An addition of Rs. 147.7 crores to the developmental expenditure, according to the **Annual Plan, 1974-75**, yields Rs. 231.3 crores of output and, according to the **Draft Five-Year Plan, 1978-83**, Rs. 356.3 crores of output.

The effects of the EPFS on the rate of growth through its impact on capital stocks is brought out in Table 2. In general, the scheme emerges as a net consumer of capital, the magnitude of which ranges from 1.0 per cent to 5.5 per cent of Gross Domestic Capital Formation in 1974-75. However, if all surplus funds of the scheme were utilised exclusively to finance developmental expenditure and, if the consumption expenditure out of benefits received is less than the total, the scheme adds to the capital stocks to the extent of about 3 per cent of Gross Domestic Capital Formation (S5 and S7). There is, therefore, reason to believe that the effect of the scheme on capital formation is uncertain. However, the scheme *per se* appears to have no negative effect on capital because the net effect, as pointed out, depends mainly upon the proportion of the flow of the surplus funds into developmental and non-developmental activities as also upon the ratio of the benefits spent on consumption.

As in the case of GDP, it is noticed that the investment pattern envisaged in the **Draft Five-Year Plan, 1978-83** yields better results. A comparison of S1 and S2 in Tables 1 and 2 show that, according to the investment pattern followed in the **Annual Plan, 1974-75**, the capital stocks required to produce Rs. 476.5

crores of output is Rs. 488.3 crores. A similar comparison of S3 and S4 reveals that, according to the investment pattern of the **Draft Five-Year Plan, 1978-83**, capital stocks needed to produce Rs. 521.9 crores of output are Rs. 476.7 crores. Therefore, one rupee worth of capital stocks yield, according to the **Annual Plan 1974-75**, an output of 98 paise while under the **Draft Five-Year Plan, 1978-83**, the return is Rs. 1.10.

The effects of **actual output** attributed to the surplus funds of the EPFS (not adjusted for **warranted output**) on the factors are presented in Table 3. The rationale behind the acceptance of total and not net output is that from the view point of the effects on factors, it is immaterial to know the end-use of the output. In general, the computations show the same trend as that noticed in the GDP, probably because the estimates are output-linked. Depending upon the assumptions, total employment attributable to the surplus funds range from 4.6 million (S4) to 9.8 million (S6) or from 0.24 to 0.52 per cent of estimated working force. The **Annual Plan** appears to provide more employment. However, this inference may not be emphasised on three grounds: first, the **Sixth Plan's** emphasis is on labour-intensive projects with induced changes in labour-output ratios. The computations, on the other hand, are based on output levels assuming constant labour-output ratios. This would tend to depress the estimated level of employment generated. Second, parameters used are heterogenous, culled out from various sources with substantial adjustments. Above all, thirdly, the difference is microscopic.

Estimated total emoluments accruing to the employees range between Rs. 128.7 crores (S2) and Rs. 335.1 crores (S7) or between 0.51 and 1.34 per cent of compensation paid to the employees. The **Draft Five-Year Plan, 1978-83**, generates more emoluments than the **Annual Plan, 1974-75**. Similarly, profits attributable to the surplus funds of the scheme vary, depending upon the assumptions, from Rs. 99.6 crores (S2) to Rs. 326.6 crores (S7) or between 1.1 to 3.6 per cent of 'operating surpluses'. As in the other instances, the **Draft Five-Year Plan, 1978-83**, yields uniformly a higher rate of return.

5. Summary and Conclusions

An attempt is made in this study to evaluate the compatibility of social insurance schemes with economic growth with special reference to the role of the EPFS in India. The appraisal is confined to the analytical framework of the traditional approach both to social insurance scheme (which is considered incompatible

with developmental efforts) and to the process of economic growth (in which the crucial growth-determinant is the rate of capital formation). The rationale of the objective and the approach of the study are, respectively, to provide the missing link between the finances of the scheme and the rate of economic growth and to empirically evaluate the compatibility of the scheme with economic growth.

The finances of the EPFS are evaluated within the framework of an open input-output method. Necessary computations are attempted to test the conventional approach to social insurance benefits and to assess the relative efficiency of the investment pattern envisaged in the **Annual Plan, 1974-75** and in the **Draft Five-Year Plan, 1978-83**. Though definite conclusions cannot be drawn from the exercise due to paucity of data, tentative findings disprove the hypothesis of mutual incompatibility under two conditions: when the entire surplus funds of the scheme are invested in developmental outlays and when the incremental consumption expenditure from the benefits is less than unity. By depleting capital stocks, the scheme appears to retard growth rate but this aspect may not be overemphasised for two reasons. In the first place, the investment pattern envisaged in the public sector is intended to provide a strong infra-structure in the economy and not to supplement the capital base in the consumer goods producing sectors. In the second place, the analysis deals exclusively with the effects of public sector investments; the private sector, guided by the emerging level and pattern of demand, may augment its investments in the sectors producing consumption goods, thus compensating the possible negative effects. The impact of the scheme on the factors is also notably favourable. Given the microscopic proportion of the population subscribing to the scheme, the generation of emoluments and profits, in particular, are significant. The comparative analysis of the investment pattern shows that from the point of view of contribution to GDP, capital formation and wages as also profit generation, the pattern envisaged in the **Draft Five-Year Plan, 1978-83**, is preferable to the **Annual Plan, 1974-75**.

Incidentally, this endeavour has underlined the need to have a comprehensive data-base. An immediate requirement in this area will be the availability of the level and pattern of consumption expenditure out of benefits availed of from the EPFS. This information shall enable the economists to estimate the net effects of the scheme more confidently, which in turn, would lend support to the argument for the extension of the scheme to areas hitherto uncovered.

TABLE 1: Estimated Net Effects of the EPFS on Gross Domestic Product, 1974-75 (Sector-wise)

(Rupees lakhs)

Sector Number	Details of the Sector	Net Output (First Estimate) As per The Pattern of Investment Envisaged in				Net Output (Second Estimate) As per The Pattern of Investment Envisaged in			
		Annual Plan, 1974-75 Under		Sixth Five Year Plan Under		Annual Plan, 1974-75 Under		Sixth Five Year Plan Under	
		Assumption one (S 1)	Assumption two (S 2)	Assumption one (S 3)	Assumption two (S 4)	Assumption one (S 5)	Assumption two (S 6)	Assumption one (S 7)	Assumption two (S 8)
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1.	Food crops	593.21	— 2267.80	753.64	— 2156.39	1667.47	— 1193.53	1902.79	— 1007.23
2.	Cash crops	10.02	— 986.51	24.65	— 976.35	311.41	— 685.12	332.86	— 668.13
3.	Plantation crops	1299.04	721.39	1902.36	21140.36	1961.43	1383.78	2846.38	2084.36
4.	Other crops	654.96	— 663.43	686.01	— 641.87	1294.51	— 23.89	1340.04	12.17
5.	Animal husbandry	346.92	— 982.35	218.76	— 1071.35	873.86	— 455.40	685.86	— 604.24
6.	Forestry and logging	459.17	— 386.03	1462.19	310.47	1010.35	165.13	2481.58	1329.86
7.	Fishing	— 240.12	— 894.97	93.47	— 663.32	— 135.27	— 790.13	354.05	— 402.75
8.	Coal and lignite	— 522.20	— 1114.04	— 371.78	— 1009.59	— 479.92	— 1071.77	— 259.29	— 897.10
9.	Petroleum and natural gas	— 1293.12	— 3194.44	— 1217.98	— 3142.26	— 1133.43	— 3034.75	— 1023.22	— 2947.50
10.	Iron ore	— 279.36	— 487.63	— 77.12	— 347.20	— 270.68	— 478.95	25.96	— 244.12
11.	Other minerals	— 1096.01	— 1997.35	— 1129.57	— 2000.16	— 1049.04	— 1950.38	— 1098.27	— 1989.35
12.	Sugar	— 264.24	— 640.17	— 280.80	— 651.67	— 250.79	— 626.72	— 275.07	— 645.95
13.	Food other than sugar	— 225.28	— 611.66	— 266.28	— 640.13	— 191.96	— 578.34	— 252.09	— 625.98
14.	Beverages	— 16.29	— 589.50	— 317.11	— 794.38	147.12	— 422.09	— 294.14	— 771.41

Table 1—(Contd.)

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
15.	Tobacco Products	809.80	12.10	— 188.16	— 680.90	1351.69	553.85	— 112.32	— 605.05
16.	Cotton textiles	— 165.93	— 659.70	315.33	— 325.51	— 80.86	— 574.62	625.06	— 15.78
17.	Wool, silk and synthetic fibre textiles	— 59.77	— 237.36	23.80	— 179.31	— 27.53	— 205.13	95.06	— 108.05
18.	Jute, hemp and mesta textiles	— 130.42	— 313.58	— 157.34	— 332.28	— 108.53	— 291.69	— 148.03	— 322.98
19.	Other textile products including wearing apparel	— 120.03	— 345.97	16.63	— 250.89	— 95.78	— 321.47	105.05	— 162.50
20.	Wood and wood products except furniture	— 866.55	— 1492.23	— 866.10	— 1491.92	— 843.11	— 1468.79	— 842.44	— 1468.27
21.	Furniture and fixtures	— 487.54	— 1276.36	— 482.81	— 1273.12	— 243.27	— 1032.08	— 236.30	— 1026.61
22.	Paper and products	— 109.18	— 464.00	103.90	— 316.04	— 29.23	— 384.05	283.30	— 136.64
23.	Printing, publishing and allied industries	— 165.44	— 417.44	— 188.51	— 437.20	— 142.31	— 394.32	— 184.04	— 427.38
24.	Leather and leather products	— 0.33	— 42.96	33.43	— 19.52	12.34	— 30.28	61.86	8.91
25.	Plastic and rubber products	— 220.66	— 537.26	— 191.35	— 505.20	— 197.63	— 514.23	— 154.65	— 480.22
26.	Petroleum, miscellaneous	847.80	— 142.80	2313.56	1083.41	1485.65	495.05	4075.71	2545.49
27.	Petroleum and coal products	— 489.56	— 1053.10	— 548.90	— 1103.90	— 430.11	— 993.65	— 537.39	— 1078.60
28.	Inorganic heavy chemicals	— 395.96	— 973.61	— 461.21	— 1018.94	— 345.07	— 922.72	— 440.76	— 998.48
29.	Organic heavy chemicals	— 1059.27	— 2250.35	— 1137.83	— 2242.38	— 1016.07	— 2207.15	— 999.30	— 2193.86
30.	Fertilisers	— 686.38	— 3319.41	— 927.36	— 3483.56	— 159.92	— 2792.95	— 506.65	— 3067.44
31.	Paints, varnishes and lacquers	— 374.95	— 770.61	— 387.49	— 779.31	— 345.57	— 741.22	— 363.94	— 755.76
32.	Other chemicals & chemical products including pesticides	— 235.56	— 650.96	— 246.09	— 658.28	— 147.81	— 563.21	— 163.23	— 575.41
33.	Cement	— 856.34	— 1554.95	— 868.97	— 1566.72	— 768.00	— 1469.64	— 786.52	— 1484.30

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Table 1—(Contd.)

1	2.	3.	4.	5.	6.	7.	8.	9.	10.
34	Non-metallic mineral products other than cement	— 974.72	— 1635.28	— 949.66	— 1617.90	— 956.39	— 1616.94	— 919.63	— 1587.87
35	Iron & steel industries & foundries	7331.31	4530.53	5974.71	3588.41	11019.19	8218.36	9029.25	6642.95
36	Other basic metal industry	— 102.57	— 639.35	— 300.27	— 776.64	55.92	— 480.86	— 234.08	— 710.44
37	Metal products except machinery & transport equipment	— 138.48	— 360.57	— 171.90	— 383.78	— 111.31	— 333.40	— 160.33	— 372.24
38	Agricultural machinery	18.56	7.57	5.74	— 1.34	28.98	17.99	10.17	3.09
39	Industrial machinery for food industries	34.42	21.40	14.31	7.43	51.26	38.23	21.76	14.87
40	Other machinery	12.41	— 95.89	— 35.28	— 129.01	52.45	— 55.87	— 17.53	— 111.26
41	Electrical machinery, apparatus & appliances	3487.67	2161.53	5628.82	3648.38	5198.37	3872.22	8339.02	6358.59
42	Railway transport equipment	6315.03	4063.70	5384.20	3417.28	9372.43	7121.09	8007.08	6040.13
43	Other transport equipment	556.48	43.89	1462.04	672.75	958.96	416.40	2257.26	1467.97
44	Miscellaneous manufacturing industries	87.74	— 233.65	128.79	— 205.12	218.38	— 102.98	278.63	— 55.27
45	Construction	— 1054.00	— 1742.50	— 800.43	— 1566.42	— 1053.17	— 1741.32	— 680.88	— 1446.87
46	Electricity	— 489.80	— 1072.27	— 355.57	— 979.06	— 474.99	— 1057.47	— 278.10	— 901.59
47	Gas and water supply	2342.33	1199.33	32878.91	22404.66	3569.29	2426.29	48360.88	37886.36
48	Railway transport service	— 386.71	— 916.03	— 462.10	— 968.38	— 346.90	— 876.22	— 457.49	— 963.77
49	Other transport service	— 205.99	— 688.40	— 349.56	— 788.09	— 119.39	— 601.79	— 329.98	— 768.51
50	Storage and warehousing	— 413.85	— 965.72	— 472.74	— 1006.62	— 369.20	— 921.06	— 455.60	— 389.46

Table 1—(Conld.)

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
51.	Communication	1518.60	678.72	506.49	— 24.10	2351.36	1511.48	866.79	366.20
52.	Trade	— 348.74	— 774.48	— 360.12	— 782.37	— 316.15	— 741.87	— 332.82	— 755.08
53.	Hotel and restaurants	— 100.11	— 245.25	— 87.72	— 236.65	— 93.97	— 239.11	— 75.81	— 224.74
54.	Banking	— 435.68	— 953.51	— 259.89	— 950.53	— 428.80	— 946.63	— 422.48	— 941.63
55.	Insurance	— 466.42	— 977.40	— 449.34	— 965.55	— 459.54	— 970.52	— 434.48	— 950.69
56.	Ownership of dwelling and real estate	— 270.16	— 400.07	— 270.45	— 400.27	— 269.20	— 399.12	— 269.63	— 399.45
57.	Education and research	1390.56	— 805.12	847.66	428.11	2087.46	1502.00	1291.12	851.57
58.	Medical and health	1413.48	— 798.09	474.39	145.97	2156.14	1721.52	778.68	450.24
59.	Other services	3935.12	2222.69	488.13	— 170.95	5936.13	4223.69	880.05	220.94
60.	Public administration and defence	2680.31	1700.77	216.32	— 10.26	3979.25	2999.71	365.04	138.46
TOTAL		20397.22 (0.20)	—27254.49 (—0.27)	46320.45 (0.46)	— 5875.46 (—0.06)	43530.50 (0.44)	— 636.64 (—0.01)	81954.74 (0.82)	29502.15 (0.30)

NOTES :

- i) First estimates are based on proportionate bifurcation of surplus fund outlays on development and non-development as per the Central Government budget for 1974-75; second estimates assume that the entire surplus funds are invested in development activities.
- ii) Investment pattern of the Annual Plan is arrived at from the Annual Plan document providing project-wise details of investments envisaged. Similarly, investment pattern of the Sixth Plan is derived from the **Draft Five-Year Plan, 1978-83**, Planning Commission, Government of India, New Delhi, (1978); estimates under first assumption are based on the bifurcation of benefits into saving and consumption; estimates under second assumption consider entire benefits to have been spent on consumption.
- iii) Negative sign indicates warranted output is greater than actual output.
- iv) Figures in paranthesis are percentage shares in the Gross Domestic Product.

TABLE 2; Estimated Effects of the EPFS on Investible Funds, 1974-75 (Sector-wise)

(Rupees lakhs)

Sector Number	Details of the Sector	First Estimate				Second Estimate			
		As Per The Pattern Envisaged in the Annual Plan		As Per The Pattern Envisaged in the Sixth Plan		As Per The Pattern Envisaged in the Annual Plan		As Per The Pattern Envisaged in the Sixth Plan	
		Assumption one	Assumption two	Assumption one	Assumption two	Assumption one	Assumption two	Assumption one	Assumption two
		(S 1)	(S 2)	(S 3)	(S 4)	(S 5)	(S 6)	(S 7)	(S 8)
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1.	Food crops	734.15	— 2806.63	932.70	— 2668.75	2063.66	— 1477.12	2354.89	— 1246.55
2.	Cash crops	22.23	— 2188.43	54.68	— 2165.90	690.82	— 1519.84	738.40	— 1482.15
3.	Plantation crops	— 40.66	— 22.58	— 59.55	— 43.31	— 61.40	— 35.69	— 89.09	— 65.24
4.	Other crops	684.70	— 693.55	717.16	671.01	1353.28	24.98	1400.88	— 12.72
5.	Animal husbandry	130.23	— 368.77	82.12	— 402.16	328.03	— 170.95	257.46	— 226.82
6.	Forestry and logging	172.36	— 144.91	548.87	116.54	379.26	61.98	931.52	499.19
7.	Fishing	— 239.95	— 894.34	93.41	— 662.85	— 135.17	789.57	353.81	— 402.46
8.	Coal and lignite	— 2853.15	— 6086.79	— 2031.31	— 5516.10	— 2622.14	— 5855.84	— 1416.68	— 4901.47
9.	Petroleum and natural gas	— 2756.64	— 6809.82	— 2596.46	— 6698.59	— 2416.23	— 6469.41	— 2181.27	— 6283.41
10.	Iron ore	— 316.17	— 551.89	— 87.28	— 392.95	— 306.35	— 542.07	29.38	— 276.29
11.	Other minerals	— 1240.43	— 2260.54	— 1278.42	— 2286.92	— 1187.27	— 2207.38	— 1242.99	— 2251.49
12.	Sugar	— 192.85	— 467.20	— 204.93	— 475.59	— 183.03	— 457.38	— 200.75	— 471.42
13.	Food other than sugar	— 66.39	— 180.24	— 78.47	— 188.63	— 56.57	— 170.42	— 74.29	— 184.46
14.	Beverages	— 3.71	— 133.54	— 72.32	— 181.18	— 33.56	— 96.27	— 67.08	— 175.94
15.	Tobacco products	55.95	0.84	— 13.00	— 47.04	93.39	38.27	— 7.76	— 41.80

Table 2—(Contd.)

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
16.	Cotton textiles	— 57.60	— 228.99	109.45	— 112.99	— 28.07	— 199.46	216.96	— 5.48
17.	Wool, silk and synthetic fibre textiles	— 26.69	— 105.99	10.63	— 80.07	— 12.29	— 91.60	42.45	— 48.25
18.	Jute, hemp and mesta textiles	— 58.52	— 140.70	— 70.60	— 149.09	— 48.70	— 130.88	— 66.42	— 144.92
19.	Other textile products including wearing apparel	— 48.21	— 138.68	6.67	— 100.57	— 38.39	— 128.86	42.11	— 65.14
20.	Wood and wood products except furniture	— 363.02	— 625.13	— 362.83	— 625.00	— 353.20	— 615.31	— 352.92	— 615.09
21.	Furniture and fixtures	— 19.60	— 51.31	— 19.41	— 51.18	— 9.78	— 41.49	— 9.50	— 41.27
22.	Paper and products	— 56.89	— 241.78	54.14	— 164.68	— 15.23	— 200.12	147.62	— 71.20
23.	Printing, publishing and allied industries	— 70.25	— 177.26	— 80.05	— 185.65	— 60.43	— 167.44	— 78.15	— 181.48
24.	Leather and leather products	— 0.26	— 33.28	25.90	— 15.12	— 9.56	— 23.46	47.93	6.91
25.	Plastic and rubber products	— 94.09	— 229.10	— 81.59	— 220.43	— 84.27	— 219.28	— 65.94	— 204.78
26.	Petroleum, miscellaneous	137.91	— 23.23	425.15	176.24	241.67	80.53	663.00	414.08
27.	Petroleum and coal products	— 80.86	— 173.24	— 90.66	— 182.33	— 71.04	— 164.12	— 88.76	— 178.16
28.	Inorganic heavy chemicals	— 113.83	— 279.89	— 132.59	— 292.92	— 99.20	— 265.26	— 126.71	— 287.04
29.	Organic heavy chemicals	— 304.51	— 646.92	— 301.22	— 644.63	— 292.09	— 634.50	— 287.27	— 630.68
30.	Fertilisers	— 551.91	— 2669.11	— 741.98	— 2801.10	— 128.59	— 2245.79	— 407.39	— 2466.51
31.	Paints, varnishes and lacquers	— 147.77	— 303.70	— 152.71	— 307.13	— 136.19	— 292.12	— 143.43	— 297.85
32.	Other chemicals & chemical products including pesticides	— 105.58	— 291.77	— 110.30	— 295.05	— 66.25	— 252.44	73.16	— 257.91
33.	Cement	— 328.22	— 597.14	— 333.06	— 600.50	— 294.36	— 563.29	— 301.46	— 568.91

SOCIAL SECURITY AND GROWTH

Table 2—(Contd.)

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
34.	Non-metallic mineral products other than cement	— 521.92	— 875.62	— 508.50	— 866.31	— 512.10	— 865.80	— 492.42	— 850.23
35.	Iron & steel industries & foundries	1310.36	809.76	1067.88	641.37	1969.50	1468.90	1613.83	1187.32
36.	Other basic metal industry	— 144.18	— 898.73	— 422.09	— 1091.72	78.61	— 675.94	— 329.04	— 998.66
37.	Metal products except machinery & transport equipment	— 50.05	— 130.33	— 62.13	— 138.72	— 40.23	— 120.51	— 57.95	— 134.55
38.	Agricultural machinery	17.49	7.13	5.41	— 1.26	27.31	16.95	9.59	2.91
39.	Industrial machinery for food industries	47.81	29.71	19.88	10.32	71.19	53.09	30.22	20.65
40.	Other machinery	7.37	— 56.98	— 20.97	— 76.66	31.16	— 33.20	— 10.42	— 66.11
41.	Electrical machinery, apparatus & appliances	4147.47	2570.45	6693.68	4338.58	6161.80	4604.77	9916.60	7561.51
42.	Railway transport equipment	1605.76	1033.30	1369.07	868.93	2383.18	1810.72	2035.99	1535.86
43.	Other transport equipment	276.40	21.80	726.19	334.15	461.41	206.82	1121.17	729.13
44.	Miscellaneous manufacturing industries	26.35	— 70.18	38.68	— 61.61	65.59	30.93	83.69	16.60
45.	Construction	— 8746.24	— 14459.56	— 6642.14	— 12998.44	— 8739.42	— 14449.74	— 5650.10	— 11357.00
46.	Electricity	— 1498.03	— 3279.49	— 1087.49	— 2994.41	— 1452.74	— 3234.21	— 850.56	— 2757.47
47.	Gas and water supply	86.65	44.37	1216.32	828.84	132.04	89.76	1789.06	1401.57
48.	Railway transport service	— 2933.10	— 6947.89	— 3504.96	— 7345.00	— 2631.14	— 6645.93	— 3469.94	— 7309.99
49.	Other transport service	— 1068.11	— 3569.46	— 1812.54	— 4086.41	— 619.03	— 3120.39	— 1710.98	— 3984.85
50.	Storage and warehousing	— 459.83	— 1073.02	— 525.27	— 1118.46	— 410.22	— 1023.40	— 506.22	— 1099.40

TABLE 3 : Estimated Effects of the EPFS on the Factors 1974-75 (Sector-wise)

Sector Number	Details of the Sector	FIRST ESTIMATE							
		Employment created (in lakh persons)				Emoluments generated (in lakh rupees)			
		under the pattern of				under the pattern of			
		Annual Plan, 1974-75	Sixth Five Year Plan	Annual Plan, 1974-75	Sixth Five Year Plan	Annual Plan, 1974-75	Sixth Five Year Plan	Annual Plan, 1974-75	Sixth Five Year Plan
		Assumption one (S 1)	Assumption two (S 2)	Assumption one (S 3)	Assumption two (S 4)	Assumption one (S 1)	Assumption two (S 2)	Assumption one (S 3)	Assumption two (S 4)
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1.	Food crops	51.64	35.86	55.24	38.36	1205.88	837.39	1289.95	895.77
2.	Cash crops	2.26	1.57	2.31	1.61	130.83	90.85	133.79	92.91
3.	Plantation crops	1.17	0.81	1.66	1.16	222.55	154.54	317.17	220.25
4.	Other crops	6.89	4.79	7.05	4.89	302.76	210.24	309.62	215.00
5.	Animal husbandry	19.19	13.33	17.01	11.81	351.65	244.19	311.72	216.47
6.	Forestry and logging	2.92	2.03	5.40	3.75	304.67	211.58	563.49	391.30
7.	Fishing	0.03	0.02	0.07	0.05	34.65	24.06	86.09	59.79
8.	Coal and lignite	0.22	0.16	0.58	0.41	12.05	8.37	32.06	22.26
9.	Petroleum and natural gas	0.11	0.07	0.13	0.09	88.20	61.25	107.58	74.70
10.	Iron ore	0.01	0.01	0.06	0.04	1.96	1.36	23.27	16.16
11.	Other minerals	0.09	0.07	0.06	0.06	14.10	9.79	9.40	9.40
12.	Sugar	0.10	0.07	0.05	0.03	3.96	2.75	1.69	1.17
13.	Food other than sugar	4.88	3.39	2.08	1.45	27.72	19.26	11.80	8.20
14.	Beverages	2.30	1.60	0.33	0.23	78.66	54.62	11.07	7.69
15.	Tobacco products	6.71	4.66	0.94	0.66	151.03	104.88	21.16	14.70
16.	Cotton textiles	3.60	2.50	13.10	9.10	106.63	74.05	388.20	269.57
17.	Wool, silk and synthetic fibre textiles	0.40	0.28	0.87	0.61	14.63	10.16	32.32	22.45
18.	Jute, hemp and mesta textiles	0.50	0.35	0.21	0.15	18.43	12.80	7.85	5.45

Table 3 (Contd.)

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
19.	Other textile products including wearing apparel	0.18	0.12	0.61	0.42	9.12	6.33	32.89	22.85
20.	Wood and wood products except furniture	0.18	0.13	0.18	0.13	8.36	5.81	8.43	5.86
21.	Furniture and fixtures	0.63	0.44	0.64	0.44	180.12	125.14	181.75	126.25
22.	Paper and paper products	0.90	0.62	2.01	1.40	32.13	22.31	72.11	50.07
23.	Printing, publishing and allied industries	0.15	0.10	0.08	0.05	20.00	13.90	10.68	5.92
24.	Leather and leather products	0.07	0.05	0.15	0.11	4.90	3.40	10.99	7.63
25.	Plastic and rubber products	0.34	0.23	0.53	0.45	14.65	10.18	23.36	19.70
26.	Petroleum, miscellaneous	2.91	2.02	6.67	4.63	1140.42	791.93	2614.17	1815.37
27.	Petroleum and coal products	1.13	0.79	0.61	0.34	9.57	6.65	5.11	2.83
28.	Inorganic heavy chemicals	0.41	0.28	0.17	0.12	13.37	9.29	5.37	3.73
29.	Organic heavy chemicals	0.04	0.03	0.04	0.03	9.33	64.48	10.49	7.28
30.	Fertilisers	7.71	5.35	6.09	4.23	182.51	126.74	144.26	100.18
31.	Paints, varnishes and lacquers	0.13	0.09	0.11	0.07	8.84	6.14	7.08	4.92
32.	Other chemicals & chemical products including pesticides	2.66	1.85	2.51	1.75	77.84	54.06	73.48	51.03
33.	Cement	2.31	1.61	2.16	1.50	36.82	25.58	34.37	23.87
34.	Non-metallic mineral products other than cement	0.55	0.39	0.91	0.63	11.05	7.68	18.10	12.57
35.	Iron & steel industries & foundries	325.07	225.74	269.25	186.97	4576.65	3178.15	3790.75	2632.36
36.	Other basic metal industry	2.04	1.42	0.86	0.60	17.34	12.04	7.25	5.03
37.	Metal products except machinery & transport equipment	0.72	0.50	0.31	0.21	21.71	15.09	9.24	6.43
38.	Agricultural machinery	0.10	0.07	0.04	0.03	4.36	3.03	1.86	1.29
39.	Industrial machinery for food industries	0.04	0.03	0.02	0.01	5.85	4.06	2.59	1.80

SOCIAL SECURITY AND GROWTH

Table 3 (Contd.)

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
40.	Other machinery	0.57	0.40	0.25	0.18	25.82	17.93	11.46	7.96
41.	Electrical machinery, apparatus & appliances	35.58	24.71	56.37	39.14	1434.83	996.38	2273.16	1578.53
42.	Railway transport equipment	26.70	18.54	22.91	15.91	3082.84	2140.80	2644.70	1836.53
43.	Other transport equipment	7.70	5.35	16.43	11.41	306.43	212.79	654.18	454.28
44.	Miscellaneous manufacturing industries	2.18	1.51	2.50	1.74	97.54	67.73	111.84	77.67
45.	Construction	6.19	6.12	28.42	21.56	126.46	125.08	580.97	449.69
46.	Electricity	0.70	0.49	3.66	2.54	11.50	7.99	60.17	41.78
47.	Gas and water supply	7.12	4.94	89.78	62.35	362.20	251.52	4570.35	3173.77
48.	Railway transport service	62.28	43.25	7.23	5.02	0.51	0.36	0.06	0.05
49.	Other transport service	3.07	2.13	0.70	0.49	1.49	1.04	0.34	0.24
50.	Storage and warehousing	0.04	0.03	0.02	0.01	20.03	13.91	7.70	5.35
51.	Communication	10.67	7.41	4.62	3.21	244.35	169.68	105.72	73.41
52.	Trade	4.32	3.00	3.62	2.51	49.18	34.15	41.17	28.60
53.	Hotel and restaurants	0.05	0.04	0.10	0.07	2.11	1.47	4.09	2.84
54.	Banking	0.05	0.03	0.57	0.04	2.99	2.68	38.59	2.68
55.	Insurance	0.03	0.02	0.05	0.04	2.09	1.46	4.52	3.14
56.	Ownership of dwelling and real estate	0.05	0.05	0.05	0.05	1.07	1.04	1.05	1.03
57.	Education and research	29.02	20.15	11.89	8.26	681.13	472.99	433.42	300.98
58.	Medical and health	15.18	10.54	16.22	4.32	533.43	370.43	218.56	151.77
59.	Other Services	7.78	5.40	0.89	0.62	1550.98	1077.03	303.77	210.95
60.	Public administration and defence	0.36	0.25	0.04	0.03	484.68	336.57	55.49	38.54
TOTAL		670.90 (0.36)	467.79 (0.25)	667.42 (0.35)	458.08 (0.24)	18476.83 (0.74)	12868.56 (0.51)	22877.53 (0.92)	15881.00 (0.64)

Table 3 (Contd.)

Sector Number	Details of the Sector	FIRST ESTIMATE				SECOND ESTIMATE			
		Profits generated (in lakh rupees) under the pattern of				Employment created (in lakh persons) under the pattern of			
		Annual Plan, 1974-75		Sixth Five Year Plan		Annual Plan, 1974-75		Sixth Five Year Plan	
		Assumption one (S 1)	Assumption two (S 2)	Assumption one (S 3)	Assumption two (S 4)	Assumption one (S 5)	Assumption two (S 6)	Assumption one (S 7)	Assumption two (S 8)
		11.	12.	13.	14.	15.	16.	17.	18.
1.	Food crops	978.54	679.52	1046.76	726.89	75.75	59.97	81.03	64.15
2.	Cash crops	76.12	52.86	77.84	54.06	3.31	2.62	3.38	2.68
3.	Plantation crops	309.93	215.22	441.71	306.73	1.71	1.35	2.43	1.93
4.	Other crops	197.49	137.14	201.97	140.25	10.10	8.00	10.33	8.18
5.	Animal husbandry	216.27	150.19	191.72	133.14	28.14	22.28	24.94	19.75
6.	Forestry and logging	424.25	294.62	784.65	544.88	4.28	3.39	7.91	6.26
7.	Fishing	47.27	32.83	117.46	81.57	0.04	0.03	0.09	0.07
8.	Coal and lignite	8.16	5.67	21.70	15.07	0.32	0.25	0.85	0.67
9.	Petroleum and natural gas	47.76	33.16	58.25	40.45	0.15	0.12	0.18	0.14
10.	Iron ore	1.43	1.00	16.96	11.78	0.01	0.01	0.08	0.06
11.	Other minerals	10.17	7.06	6.78	6.78	0.13	0.10	0.09	0.07
12.	Sugar	1.52	1.06	0.65	0.45	0.14	0.11	0.06	0.05
13.	Food other than sugar	24.78	17.22	10.55	7.33	7.16	5.67	3.05	2.41
14.	Beverages	278.56	193.43	39.19	27.22	3.37	2.67	0.47	0.37
15.	Tobacco products	115.70	80.35	16.21	11.26	9.83	7.79	1.38	1.09
16.	Cotton Textiles	69.61	48.34	253.41	175.97	5.28	4.13	19.21	15.21
17.	Wool, silk and synthetic fibre textiles	15.89	11.04	35.12	24.39	0.58	0.46	1.27	1.01
18.	Jute, hemp and mesta textiles	6.43	4.47	2.74	1.90	0.72	0.57	0.31	0.24

Table 3 (Contd.)

	11.	12.	13.	14.	15.	16.	17.	18.
19. Other textile products including wearing apparel	6.33	4.40	22.83	15.86	0.25	0.20	0.89	0.70
20. Wood and wood products except furniture	7.28	5.06	7.35	5.10	0.26	0.21	0.26	0.21
21. Furniture and fixtures	204.97	142.40	206.83	143.67	0.92	0.73	0.93	0.74
22. Paper and paper products	51.10	35.48	114.68	79.63	1.31	1.04	2.94	2.33
23. Printing, publishing and allied industries	6.25	4.35	3.34	1.85	0.21	0.17	0.09	0.07
24. Leather and leather products	2.93	2.03	6.56	4.56	0.10	0.08	0.22	0.17
25. Plastic and rubber products	18.86	13.10	30.06	25.36	0.49	0.39	0.78	0.61
26. Petroleum, miscellaneous	690.86	479.75	1583.66	1099.74	4.27	3.38	9.78	7.74
27. Petroleum and coal products	15.56	10.81	8.31	4.61	1.55	1.31	0.70	0.56
28. Inorganic heavy chemicals	24.16	16.78	9.71	6.74	0.59	0.47	0.24	0.23
29. Organic heavy chemicals	20.01	13.90	22.49	15.62	0.05	0.04	0.05	0.04
30. Fertilisers	230.52	160.08	182.20	126.53	11.30	8.94	8.93	7.07
31. Paints, varnishes and lacquers	17.58	12.21	14.08	9.78	0.19	0.15	0.15	0.12
32. Other chemicals & chemical products including pesticides	120.03	83.33	113.31	78.68	3.90	3.09	3.68	2.92
33. Cement	10.94	7.60	10.21	7.09	3.39	2.68	3.16	2.50
34. Non-metallic mineral products other than cement	7.22	5.02	11.82	8.21	0.81	0.64	1.32	1.05
35. Iron & steel industries & foundries	3302.88	2293.61	2735.71	1899.72	476.82	377.48	394.94	312.66
36. Other basic metal industry	52.66	36.57	22.00	15.28	2.99	2.37	1.25	0.99
37. Metal products except machinery & transport equipment	15.25	10.60	6.49	4.52	1.05	0.83	0.45	0.35
38. Agricultural machinery	3.25	2.26	1.38	0.96	0.13	0.11	0.06	0.05
39. Industrial machinery for food industries	4.56	3.17	2.02	1.40	0.05	0.04	0.02	0.02

Table 3 (Contd.)

		11.	12.	13.	14.	15.	16.	17.	18.
40.	Other machinery	19.12	13.28	8.49	5.90	0.83	0.56	0.37	0.29
41.	Electrical machinery, apparatus & appliances	1092.26	758.49	1730.44	1201.65	52.18	41.31	82.57	55.45
42.	Railway transport equipment	614.96	427.04	527.56	366.35	39.16	31.00	33.59	26.59
43.	Other transport equipment	207.54	144.11	443.06	307.67	11.28	8.93	24.09	19.07
44.	Miscellaneous manufacturing industries	68.55	47.60	78.60	54.58	3.19	2.52	3.66	2.90
45.	Construction	312.62	309.21	1436.23	1089.45	6.26	6.22	38.90	32.04
46.	Electricity	2.63	1.83	13.74	9.55	1.02	0.81	5.36	4.24
47.	Gas and water supply	702.32	487.72	8862.18	6154.12	10.44	8.26	131.69	104.25
48.	Railway transport service	25.00	17.36	2.90	2.02	91.35	72.32	10.59	8.38
49.	Other transport service	110.78	76.92	25.06	17.40	4.50	3.56	1.02	0.81
50.	Storage and warehousing	0.23	0.16	0.09	0.06	0.05	0.04	0.02	0.02
51.	Communication	47.82	33.21	20.69	14.37	15.65	12.39	6.77	5.36
52.	Trade	22.93	15.92	19.19	13.33	6.33	5.01	5.30	4.20
53.	Hotel and restaurants	3.70	2.57	7.19	4.99	0.07	0.06	0.14	0.11
54.	Banking	1.88	1.31	24.28	1.69	0.06	0.05	0.08	0.07
55.	Insurance	1.48	1.03	3.20	2.22	0.03	0.03	0.07	0.06
56.	Ownership of dwelling and real estate	2.69	2.60	2.65	2.58	0.05	0.05	0.05	0.05
57.	Education and research	328.64	228.22	209.13	145.22	39.93	31.62	25.41	20.12
58.	Medical and health	544.20	377.91	222.98	154.84	22.27	19.36	9.12	7.22
59.	Other services	351.63	244.18	68.87	47.82	17.56	13.90	3.44	2.72
60.	Public administration and defence	2107.34	1463.37	241.29	167.56	0.52	0.41	0.66	0.05
TOTAL		14211.40 (1.56)	9961.76 (1.10)	22386.53 (2.46)	15628.40 (1.72)	984.48 (0.52)	782.43 (0.41)	970.90 (0.51)	769.47 (0.41)

SOCIAL SECURITY AND GROWTH

Table 3 (Contd.)

Sector Number	Details of the Sector	SECOND ESTIMATE							
		Employment created (in lakh persons) under the pattern of				Emoluments generated (in lakh rupees) under the pattern of			
		Annual Plan, 1974-75 Under		Sixth Five Year Plan Under		Annual Plan, 1974-75 Under		Sixth Five Year Plan Under	
		Assumption one (S 5)	Assumption two (S 6)	Assumption one (S 7)	Assumption two (S 8)	Assumption one (S 5)	Assumption two (S 6)	Assumption one (S 7)	Assumption two (S 8)
		19.	20.	21.	22.	23.	24.	25.	26.
1.	Food crops	1768.80	1400.31	1892.11	1497.93	1435.32	1136.31	1535.38	1215.52
2.	Cash crops	191.89	191.92	196.24	155.36	111.64	88.38	114.17	90.39
3.	Plantation crops	326.43	258.42	465.22	368.30	454.61	359.90	647.90	512.92
4.	Other crops	444.08	351.56	454.14	359.53	289.68	229.33	296.24	234.53
5.	Animal husbandry	515.79	408.34	457.23	361.98	317.23	251.14	281.21	222.62
6.	Forestry and logging	446.89	353.79	826.52	654.33	622.30	492.65	1150.93	911.16
7.	Fishing	50.81	40.23	126.28	99.97	69.32	54.83	172.29	136.39
8.	Coal and lignite	17.67	30.99	47.02	37.22	11.96	9.47	31.82	25.19
9.	Petroleum and natural gas	129.37	120.42	157.79	124.92	70.04	55.45	80.43	67.63
10.	Iron ore	2.87	2.27	34.12	27.01	2.09	1.66	24.87	19.69
11.	Other minerals	20.27	15.36	13.78	10.91	14.19	11.80	9.93	7.86
12.	Sugar	5.81	4.60	2.47	1.96	2.23	1.76	0.95	0.75
13.	Food other than sugar	40.65	32.19	17.30	13.69	66.35	28.78	15.47	12.24
14.	Beverages	115.38	91.34	16.23	12.85	408.59	323.46	57.46	45.49
15.	Tobacco products	221.55	175.39	31.02	24.56	169.72	134.35	23.77	18.82
16.	Cotton Textiles	156.40	123.82	569.41	450.78	102.09	80.83	371.70	294.26

Table 3 (Contd.)

	19.	20.	21.	22.	23.	24.	25.	26.
17. Wool, silk and synthetic fibre textiles	21.45	16.98	47.40	37.53	23.30	18.45	51.50	40.78
18. Jute, hemp and mesta textiles	27.03	21.40	11.50	9.10	9.43	7.47	4.01	3.18
19. Other textile products including wearing apparel	13.37	10.59	48.24	38.19	9.28	7.35	33.48	26.51
20. Wood and wood products except furniture	12.25	9.70	12.36	9.79	10.67	8.45	10.77	8.53
21. Furniture and fixtures	264.23	209.24	266.63	211.13	300.68	238.11	303.41	240.25
22. Paper and paper products	47.13	37.31	105.76	83.73	74.95	59.34	168.20	133.16
23. Printing, publishing and allied industries	29.33	23.23	12.48	9.88	9.17	7.26	3.90	3.09
24. Leather and leather products	7.18	5.69	16.12	12.76	4.29	3.40	9.62	7.62
25. Plastic and rubber products	21.49	17.02	34.26	27.12	27.66	21.09	44.09	34.90
26. Petroleum, miscellaneous	1672.78	1324.30	3834.52	3035.66	1013.36	802.25	2329.94	1838.99
27. Petroleum and coal products	14.03	11.11	5.97	4.72	22.82	18.07	9.71	7.69
28. Inorganic heavy chemicals	19.61	15.52	7.88	6.24	35.42	28.04	14.23	11.26
29. Organic heavy chemicals	13.68	10.83	15.37	12.17	29.35	23.24	32.98	26.11
30. Fertilisers	267.71	211.93	211.59	167.51	338.12	267.68	267.25	211.58
31. Paints, varnishes and lacquers	12.96	10.26	10.38	8.22	25.79	20.41	20.65	16.35
32. Other chemicals & chemical products including pesticides	114.17	90.39	107.79	85.33	176.05	139.37	166.21	131.58
33. Cement	54.01	42.76	50.41	39.90	16.04	12.70	14.97	11.85
34. Non-metallic mineral products other than cement	16.21	12.84	26.55	21.02	10.58	8.38	17.33	13.72
35. Iron & steel industries & foundries	6713.12	5314.58	5560.30	4401.91	4844.72	3835.43	4012.76	3176.77
36. Other basic metal industry	112.53	89.09	47.00	37.21	77.23	61.14	32.26	25.54

SOCIAL SECURITY AND GROWTH

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Table 3 (Contd.)

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	19.	20.	21.	22.	23.	24.	25.	26.
37. Metal products except machinery & transport equipment	31.85	25.22	13.56	10.73	22.37	17.72	9.52	7.54
38. Agricultural machinery	6.40	5.07	2.72	2.15	4.75	3.77	2.02	1.60
39. Industrial machinery for food industries	8.58	6.79	3.79	3.00	6.68	5.29	2.95	2.34
40. Other machinery	27.87	29.98	16.80	13.30	28.05	22.20	12.44	9.85
41. Electrical machinery, apparatus & appliances	2104.62	1666.17	3334.29	2639.66	1602.14	1268.36	2538.22	2009.44
42. Railway transport equipment	4521.96	3579.91	3879.26	3071.10	902.03	714.11	773.82	612.61
43. Other transport equipment	449.47	355.83	959.56	759.65	304.41	240.99	649.87	514.49
44. Miscellaneous manufacturing industries	143.06	113.26	164.05	129.88	100.53	79.59	115.28	91.27
45. Construction	127.94	127.19	795.25	654.98	316.30	314.44	1965.97	1619.19
46. Electricity	16.87	13.35	88.25	69.86	3.85	3.05	20.15	15.96
47. Gas and water supply	531.28	420.60	6703.87	5307.25	1030.18	815.58	12999.21	10291.07
48. Railway transport service	125.84	99.62	14.59	11.55	36.67	29.03	4.25	3.36
49. Other transport service	274.32	217.17	62.03	49.11	162.48	128.63	36.74	29.09
50. Storage and warehousing	29.37	23.26	11.29	8.94	0.33	0.26	0.13	0.10
51. Communication	358.40	283.74	155.06	122.76	70.15	55.53	30.35	24.03
52. Trade	72.12	57.11	60.39	47.80	33.62	26.62	28.15	22.29
53. Hotel and restaurants	3.09	2.44	5.99	4.75	5.43	4.30	10.55	8.35
54. Banking	4.38	3.47	5.66	4.48	2.76	2.18	3.56	2.82
55. Insurance	3.07	2.43	6.62	5.24	2.17	1.72	4.69	3.71
56. Ownership of dwelling and real estate	1.12	1.08	1.09	1.07	2.81	2.73	2.76	2.69

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Table—3 (Conld.)

		19.	20.	21.	22.	23.	24.	25.	26.
57.	Education and research	999.08	790.94	635.75	503.31	482.05	381.63	306.75	242.84
58.	Medical and health	782.44	680.05	320.59	253.79	798.24	693.78	327.06	258.92
59.	Other services	2275.00	1801.04	445.57	352.74	515.77	408.32	101.02	79.97
60.	Public administration and defence	710.93	562.82	81.40	64.44	3091.07	2447.10	353.92	280.19
	TOTAL	27528.39 (1.10)	21880.26 (0.88)	33506.82 (1.34)	26551.96 (1.06)	20701.82 (2.28)	16515.52 (1.82)	32659.17 (3.59)	25918.64 (2.85)

NOTES :—

- (i) & (ii) as in Table 1.
- (iii) Figures in parenthesis refer to percentage shares, in respect of employment, to total workers estimated ; in respect of emoluments, to the compensation of employees ; and, in respect of profits to operating surpluses ;
- (iv) Emoluments are defined as wages and salaries paid to all employees and the imputed value of benefits in kind; with regard to those shown against sectors 1-11, 45, 48, 49 and 51-58, they refer only to wages.

Appendix : The Employees' Provident Fund Scheme

Three inter-related aspects of the Employees' Provident Fund Scheme (EPFS), which has been selected for the present study are discussed here: the structure of the scheme, its progress and its role in mobilising savings.

A. Structure

The EPFS is open to all persons employed in the establishments covered by it, provided they have put in a continuous service for six months or 120 days of actual work during the period of six months and their pay, defined as basic wages, dearness allowance, cash value of food concessions and retaining allowance, if any, does not exceed Rs. 1,000 per month. Employees who do not satisfy these conditions are also admitted on voluntary basis with the concurrence of their employers. But those who are not in the establishment covered, are not eligible for participation. The Central Government has the powers to extend the scope of the scheme to any industry/establishment.

The financing of the scheme is based on accumulation principle under which revenues far exceed disbursements. This method builds up substantial surplus funds with the scheme. The objective is to deploy these funds in such a way as to improve output in the future at least to the extent of meeting the claims arising from those past subscribers who are qualified to receive benefits. Employees subscribe to the scheme at a minimum rate of 6.25 per cent of their pay and the rate can be raised upto 8 per cent at the discretion of the Government. Presently, the Government is contemplating to raise these rates by 2 per centage points. Employers make matching contributions. Members are allowed to subscribe more — in fact encouraged to do so through fiscal incentives — but the additional amounts do not attract the employers' matching contributions.

The administration vests with the Provident Fund Commissioners. Towards the cost of administering the scheme, a special levy, known as 'administrative charges', if the establishment is unexempted, and 'inspection charges', if it is exempted, is levied on the employers¹.

¹. An establishment is exempted from the direct day-to-day control of the Provident Fund Commissioner, if the benefits envisaged compare favourably with that prescribed for unexempted category. The exempted category should also follow the pattern prescribed for investments of surplus funds by the Provident Fund Commissioner. Exemption granted may be withdrawn, if either of these conditions are not fulfilled and/or if the members in the establishment request for such a step.

Benefits available are in lumpsum and are in the form of refunds and advances. Refunds are made only after a subscriber ceases to be a member of the scheme due to any of the following eight reasons: death, superannuation, permanent invalidation, resignation, termination of service, retrenchment, dismissal and migration to other countries. As for the quantum of refunds, in all cases, the member's own subscription is payable in full along with interest accrued, which is lower than the market level, but the share of the employer's contribution admissible varies with the duration of the membership. It is paid in full only if the membership of the outgoing member exceeds 15 years and, if the membership is less than 15 years, only a proportion is payable. If the membership is for a period less than 3 years, only 25 per cent is payable; if the membership is between 3 and 5 years, the proportion is 50 per cent; between 5 and 10 years, 75 per cent; and between 10 and 15 years, 85 per cent. The amount forfeited by the outgoing member is credited to the forfeiture account, which is created to pay death benefit at a flat rate of Rs. 750 per case and to compensate the employer's failure to contribute his matching contribution. However, virtually, the entire amount accruing to this account is invested in Government securities.

Advances are granted to the members for any of the following nine purposes: to pay life insurance premia, to purchase/construct site/house, to purchase shares in consumer cooperative/credit/housing societies, and to meet expenses during temporary closure of the establishment, illness of the member and/or his family, daughter's marriage, post-matriculation education of the children, damage to property due to a calamity of exceptional nature, and retrenchment of the member.

The difference between the receipts and disbursements refers to the surplus funds of the scheme. These are invested according to the pattern of investment prescribed by the Government every year. The entire surplus funds accrue to the State because the funds are invested either in Government securities or deposited in post offices as time deposits. Every year, approximately three-fourths of subscriptions collected are thus invested.

B. Progress

As a measure of social insurance, the EPFS came into existence in 1952 after obtaining legislative sanction in 1951. Ever since, it has been making rapid strides due mainly to the deliberate policy pursued by the Government to extend its scope to as large a segment of population as possible. The number of indus-

tries covered multiplied from 6 in 1953 to 159 in 1980. Also, eligibility conditions for inclusion in respect both of establishments and employees were continuously liberalised. Originally, only those establishments which had completed five years of their existence and were employing a minimum of fifty people were covered. In 1971, the minimum period of existence was reduced to three years and in 1960, the minimum number of employees required was reduced to twenty. Similarly, originally, only those employees who had a continuous service of one year or 240 days of actual work in twelve months and whose pay is less than Rs. 300 per month were eligible for coverage. The service requirement was halved in 1976 and the ceiling on pay was raised to Rs. 1,000 in 1962. Besides, since 1963, the enhanced rate of subscription at 8 per cent is made applicable uniformly to all establishments covered employing fifty or more employees. The number of industries thus contributing at the enhanced rate stood at 94 as at the end of March, 1980.

Reflecting the effects of these liberalisations, the number of subscribers rose from 12.0 lakhs employed in 6 industries comprising 1,400 establishments at the time of launching to 10,466.0 lakhs, employed in 159 industries having 93,094 establishments by end-March, 1980. Consequently, the ratio of subscribers to total working force spurted from 0.8 per cent to 4.9 per cent. Subscriptions collected since its inception upto end-March, 1980 was Rs. 6,433.7 crores of which, Rs. 5,847.4 crores (90.9 per cent) were invested. As at the end of March 1980, these investments accounted for 41.4 per cent of total outstanding internal public debt (excluding treasury bills) of the Central Government.

On an annual basis, subscriptions collected per year multiplied from Rs. 7.1 crores in 1952-53 (0.08 per cent of Net National Product) to Rs. 653.79 crores in 1979-80 (0.73 per cent of NNP). Similarly, annual investments of the surplus funds of the scheme surged from Rs. 20.3 crores in 1953-54 (2.6 per cent of the combined capital receipts of the Central and State Governments), to Rs. 844.13 crores in 1979-80 (8.1 per cent of such receipts); the share of these surpluses in the total developmental outlays rose from 0.6 per cent to 4.4 per cent.

C. The Scheme as a Means of Mobilising Savings

Extension of the scope of the EPFS is often claimed to reflect the authorities' concern to promote welfare of the participants. However, it is also often accepted that this scheme is a means of mobilising savings and, what more, preferable to other forms on various considerations. At the outset, subscriptions are a form

of taxation because it is compulsory for the people covered, the rates are predetermined, and the revenues accrue to the State. However, it faces least resistance from the participants. The subscribers are under the financial illusion, i.e., perceiving the tax element as insurance premium which is capitalised for the future. The employers favour paying matching contribution under the scheme to paying higher salaries because, in the former instance, they can shift the incidence either on labour or on consumer or on both. In fact, it has now been established that in the long run, the burden of the employers' contribution is borne by the employees. The State prefers this method mainly because of its high elasticity of yield arising from the rapid expansion in the base; moreover, though the subscriptions received impose a liability, it is only a long-term obligation which can be met with a fraction of the subscriptions in the future; meanwhile, the collections are regular, certain, economical, and easy to administer; and it facilitates, on the one hand, mobilisation of savings and, on the other hand, promotion of welfare, besides curbing aggregate consumption expenditure as the schemes cover only the relatively poor with higher marginal propensity to consume.²

Use of the EPFS as a means of mobilising savings is discernible in the benefit structure as well as in the historical trends. The drawbacks of payment of benefits in lumpsum is well recognised.³ The **Report of the Study Group on Social Security**, in fact, has recommended the conversion of lumpsum benefits into periodic pension. Nevertheless, no change has been made in the structure of benefit. On the other hand, the Government has liberalised eligibility conditions for coverage and proposes to raise the rates of contributions by 2 per centage points.

². For detailed discussions on these aspects, see Brittain, J. A.: **Payroll Tax for Social Security**, Brookings Institution, Washington, (1972), Chapters II and III; NCAER: **Contractual Savings in Urban India**, NCAER, New Delhi, (1963), p. 65; Pechman, J. A. Aaron, H. J. and Taussig, M. K.: **Social Security: Perspectives for Reform**, Brookings Institution, Washington, (1968), pp. 175-183 and 186; Reviglio, F.: **Social Security: A Means of Saving Mobilisation for Economic Development**, **IMF Staff Papers**, Vol. 14, No. 2, (July 1967), pp. 338-347, and Velayudham T. K.: **Financing Public Sector Investment with Special Reference to the Role of Domestic Borrowings and Small Savings: Case Study of India**, **Economic Bulletin for Asia and the Far East**, Vol. 19, No. 2, (September 1968), pp. 48-91.

³. See, for instance, Godfrey, V. N.: **A Broader Role for National Provident Funds; Zambian Experience**, **International Labour Review**, Vol. 109, No., (February 1974), pp. 137-140; and G.O.I., **Report of the Study Group on Social Security**, G.O.I., New Delhi, (1964), p. 26.

In historical perspective, it would appear that the base of the scheme had been widened more significantly whenever there was a need for larger quantum of savings. Extension of the scheme to different industries amply testifies this contention. The number of industries covered showed substantial increases in 1957 (from 6 to 37), during 1962-65 (from 46 to 97) and in 1977 (from 137 to 153). All these periods were characterised by the need to raise larger resources. The year 1957 marked the launching of the ambitious Second Five Year Plan; the period 1962-65 followed the Sino-Indian conflict with emphasis on defence and development; and in 1977, the objective of the overall economic policy was to achieve price stability by increasing savings and correspondingly reducing consumption.

From the point of view of economic growth, the surplus funds of the scheme could be considered significant only if they represent additional savings of the economy. Both theoretical and empirical evidences suggest that they satisfy this criterion, particularly in the Indian context. Theoretical reasonings are four and are universally applicable. First, subscriptions are a form of regressive tax which are independent of the decision to save.⁴ Second, different forms of savings have different roles to perform. Savings in one form therefore cannot be substituted for another. Subscriptions to the EPFS, for instance, are long-term contractual obligations which cannot compete with other forms with regard either to liquidity and/or profitability.⁵ Thirdly, as mentioned earlier, the scheme covers relatively poor people whose savings are nominal if not absent altogether. Any savings effected by this segment of the population is additional savings in the economy.⁶ Finally, the scheme itself is so designed as not to adversely affect individual's economic activities. Benefits are meagre and are subject to stringent eligibility conditions.⁷ Participants perforce save more in other forms to supplement their nominal benefits.⁸ In this

⁴. Musgrave, R. M. & Musgrave, P. B., **Public Finance in Theory and Practice** McGraw-Hill Book Company, New York, (1973), p. 367; and Shome, P. and Saito, K. W.: *The Impact of Contractual Savings on Resource Mobilisation and Allocations: Experience of Malaysia*, **Malayan Economic Review**, Vol. 23, No. 1, (April 1978).

⁵. U. N.: *Measures for Mobilising Domestic Saving for Productive Investment* **Economic Bulletin for Asia and the Far East**, Vol. 13, No. 3, (December 1962), p. 9.

⁶. NCAER : *op cit.* p. 65ff; and Velayudham, T. K. : *op cit.* p. 85.

⁷. Nagarajan, N.: **Social Security and Economic Development: A Theoretical and Empirical Study**, unpublished Ph.D. thesis, University of Bombay, Bombay, (1978), Chapters 2 to 4.

⁸. Shome, P. and Saito, K. W. : *op. cit.*

context, it is pertinent to note that, in the USA, notwithstanding the anticipated widening of the Old-Age, Survivor, Disability and Hospital Insurance Scheme (OASDHI) and the consequent availability of larger benefits, private insurers are confident of enlarging their operations.⁹

Empirical evidences substantiate these contentions. In Malaysia, subscriptions to the provident fund are found not only to add to aggregate savings but also to promote additional saving habits among participants.¹⁰ The experience is repeated in India. Between 1952-53 and 1979-80, annual balances of the EPFS had increased from Rs. 6.6 crores to Rs. 590.8 crores. The increase in the surpluses was accompanied by a simultaneous increase in the total savings of the economy. Between 1956-57 and 1978-79, the ratio of household savings through subscriptions to EPFS to Net National Product tripled from 0.2 per cent to 0.6 per cent while the ratio of total savings of the household sector to National Income doubled from 7.7 per cent to 17.6 per cent¹¹.

In short, there can be little doubt regarding the importance of the EPFS in mobilising savings and in financing developmental expenditure. The Chief Provident Fund Commissioner had admitted that 'a country adopting a provident fund approach in the social security field could be sure of accumulating considerable funds for diverting the surplus provident fund contributions towards completion of national development programme'.¹² It is only a logical extension to enquire into the effects of these funds on the rate of economic growth.

⁹ Ball, R. M.: Social Security and Private Pension Plans, *National Tax Journal*, Vol. 27, No. 3, (September 1974), pp. 467-471; and Seidman B.: Future Structure of Social Security System and Inter-relation with Private Pension Plan, *National Tax Journal*, Vol. 27, No. 3, (September 1974).

¹⁰ Shome, P. and Saito, K. W.: *op. cit.*

¹¹ Mujumdar, N. A., Venkatachalam, T. R. and Raghavachari, M. V.: High Saving Phase of the Indian Economy; 1976-79 — An Exploratory Interpretation, *Reserve Bank of India Occasional Papers*, Vol. 1, No. 1, (June 1980), pp. 29-32.

Recent studies by Feldstein, in this context, need only a passing mention. He holds that in the USA, the OASDHI has reduced aggregate savings and that, because the current revenues are spent to meet the current claims, the future liability of the scheme has risen. Munnell has however, pointed out the deficiencies in this approach and showed that the effects are neutral. In Indian context, neither of this approach holds good because the EPFS is based on accumulation method of financing as against assessment principle on which the OASDHI is based.

¹² G. O. I.: *Annual Report on the Working of the Employees' Provident Fund and Family Pension Scheme for the year 1974-75*, p. 5.

BOOK REVIEW

**"Aggregate Supply Response of Crops in a Developing Region",—
S. L. Bapna — Sultan Chand & Sons, New Delhi—Rs. 45—164 pages.**

Supply response of crops has been one of the areas of intensive research investigation by agricultural economists in the last quarter century. While the studies in the developed nations have been concerned with agricultural surpluses and adjustment problems, those in the developing world have been prompted by the emerging shortages in the face of growing population. These shortages have wide ramifications in their economic effects — on income distribution, price policy, credit control and balance of payments, to mention a few. Further, recent years have seen a revolution of rising (price) expectations among Indian farmers and controversies have been raised from time to time on the support prices announced by Government. Studies which seek to throw light on the factors determining the supply response of farmers are thus timely. These studies fall into two categories, viz., those that deal with the supply response of individual crops and those which relate to the aggregate supply response. The "aggregation problem" and the "fallacy of composition" that one runs into so often in economics necessitate the second type of study. Dr. Bapna's study is an important contribution in this area. As he says in the "Preface":

"...significant positive supply elasticity for individual crops does not necessarily lead to high supply elasticity for aggregate production also; because resource flows among crops are easier than between agricultural and non-agricultural sectors, and if the objective of the farmer is to get a fixed cash income, as argued by many, the hypothesis of perverse supply response of total agricultural production cannot be rejected. In the context of agricultural development more relevant is to know the nature of supply response for total farm produce, which measures the ability of agricultural sector to adjust to its terms of trade *vis-a-vis* non-agricultural sector."

The publication is an abridged and updated version of the doctoral dissertation of the author covering the period 1956-57 to 1976-77. The specific objectives of the study are:

to estimate the aggregate supply elasticity of total agricultural production in the short run; to determine the difference in supply elasticities during the periods of traditional and changing technology; to estimate the aggregate supply elasticity of basic components of the total agricultural production, viz., area and yield; and to indicate the

future data and research requirements in this field. Dr. Bapna has tested certain hypotheses with reference to Ajmer District in Rajasthan.

The main conclusions of the study are summed up below. Rainfall was the major factor causing variation in production. It accounted for 87 per cent of the total variation in aggregate production followed by time, price, fertiliser and irrigation. Price explained about 4 per cent of the total variation. The elasticity of supply coefficient was 0.24, which was statistically significant at 5 per cent level. Although the observed supply elasticity for technologically changing agriculture was more than the elasticity for traditional agriculture the difference was not much and was not statistically significant. The hypothesis of significant positive supply elasticity of area is rejected. The hypothesis of positive supply elasticity (0.22 or 0.26 depending on the equation) of the aggregate yield is confirmed.

Considering the objectives the author could be said to have made a successful study. Standard statistical procedures have been used. However, some of the conclusions are such that they could have been arrived at *a priori* without any elaborate model building. This is admitted by the author himself. It is a little disconcerting that one spends so much time and energy to reach the well-known conclusion that it was the weather which accounted for a large part of the variation in agricultural production. This was perhaps inherent in the scope of the study. But then it is uncharitable for a reviewer to suggest that the objectives should have been different! However, in the course of his analysis the author has brought out vividly the basic instability of agriculture in Ajmer which is true of large parts of the country. The inter-relationships between variables have been discussed well and the coefficients estimated are something hard to come by in the Indian context and should be useful to the policy maker.

A few points are noted below by way of a critical analysis of the study.

On a general level, it is to be pointed out that though the study is entitled "Aggregate Supply Response of Crops in a Developing Region", the district selected for the study, viz., Ajmer, can hardly be said to be a developing region, if one were to go by the data on its agro-economic features presented in the publication. Thus the absolute area under irrigation declined during the reference period of the study. The proportion of gross irrigated area to total cropped

area decreased from 28.59 per cent to 21.87 per cent. As a result, the index of intensity of cropping declined from 120.27 to 114.65. The low level of fertiliser use is also noted by the author. In view of these factors it is but natural that one does not get a definitive answer to the question of difference in aggregate supply elasticities as between traditional agriculture and the one which undergoes transformation to modern agriculture. It is rather tempting for this reviewer to speculate on the results that would have been obtained, if the selected district had been, instead of Ajmer, say, Ganganagar, in the same State of Rajasthan.

Index of fertiliser used (base: average of 1959-61 = 100) was 385 in 1966-67, 1038 in 1967-68 and 258 in 1968-69. The high value for 1967-68 and the sharp fall in the subsequent year need to be explained. The oddball observation in the time series would have affected the estimates.

Coming to the more technical side of the study, to test for multicollinearity the author has compiled a zero-order correlation matrix. While this is sufficient for the case of two explanatory variables it is not so when the regressors are more than two as in the case of this study. It is possible in the latter instance for simple correlations to be low and yet multicollinearity high. To detect multicollinearity in such cases it has been suggested that, besides examining zero-order and partial correlation coefficients, one should compute R_i between each X_i and the remaining $(k-1)$ variables in

X and the F statistic for each R_i . Farrar and Glauber suggest that the inspection of F_i will show which explanatory variables are most affected by multicollinearity and will thus indicate the direction to search for better and more fruitful data¹. However, some of these tests have also been challenged and the problem seems to be intractable as of now². The search for multicollinearity is essentially a fishing expedition!

The price variable, which is crucial, is defined in real terms, i.e., expected farm product prices ($P^e Q$) deflated by prices paid by farmers (R^e) ($P^e = P^e Q/R^e$). This is done in order to save on degrees of freedom and to avoid the problem of multicollinearity. But

1. D. E. Farrar and R. R. Glauber, "Multicollinearity in Regression Analysis: The Problem Re-visited", *Review of Economics and Statistics*, Vol. 49, 1967.
2. Y. Haitovsky, "Multicollinearity in Regression Analysis: Comment", *Review of Economics and Statistics*, November 1969 and G. S. Maddala, *Econometrics*, McGraw Hill Book Company, 1977.

then the assumptions, not spelt out by the author, are: (i) The prices paid by farmers have an effect on supply which is equal to that of expected farm product prices and (ii) the **absolute** levels of the two prices are not important. It is a moot point whether it is worth the price of one degree of freedom to allow the analysis bring out the separate effects of individual prices. No doubt, the problem of multicollinearity **may** then have to be faced. The choice before an econometrician seems to be often between Scylla and Charybdis!

Farm harvest prices have been considered as suitable for generating data on "responsible prices", i.e., prices used by farmers in their production decisions. They are stated to be better indicators of the prices received by farmers than wholesale prices; they are collected from a large number of centres and are generally available for the selected crops for the reference period of this study. The author admits that "the main limitation of the farm harvest prices stems from the fact that farmers sell a portion of the surplus later in the season and the difference in prices received from that portion is not taken care of. However, as the storage of farm products does involve costs and these costs normally may be commensurate with the increase in prices during the off-season, it can safely be assumed that the farm harvest price represents the true picture, i.e., any wholesale price at a later point in time minus storage costs and marketing margins" (P 51). A few studies have been cited in support of this statement.

Recent years have seen considerable speculative holding of agricultural commodities by big farmers as well as traders in anticipation of high prices in the off-season. This in turn has necessitated controls of various types, e.g., stock control and selective credit control. It is *naïve* to assume that those big farmers, who account for the bulk of agricultural production, consider the harvest price, which is generally the lowest in a year, as the norm for taking their production decisions. In fact the author says on p. 67: "Further, the pattern of sale in different months also changed. Earlier the farmers used to sell a very large proportion immediately after the harvest, but due to increased retention capacity and lower debt obligations and also better storage practices now an increasing proportion of surplus is sold in the off-season. These changes have increased the profitability of farming by reducing costs. However, these are gradual changes which cannot be fully accommodated in our model either in terms of increased realisations or as reduced costs."

Many economic relationships are recursive in nature and expectations play an important role in production decisions. As the author has pointed out, it would be useful to conduct a survey on farmers' price expectations. Such a study, if conducted through a suitably stratified sample, will bring out the basis of price expectations of different classes of farmers. At the aggregate level resource flows between agricultural and non-agricultural sectors may not be as easy to bring about as between crops. However, the fact remains that there have been substantial resource flows into what are called "allied activities", i.e., activities allied to agriculture, like dairying and poultry. What are the factors which have facilitated a high growth rate of output in, say, poultry? There are many more related questions which need to be investigated for formulating growth strategies. Again, in the Indian situation high prices do not seem to be sufficient to evoke a large production response at the level of individual crops. For example, the prices of pulses have been ruling high in recent years and yet there has been no perceptible growth in output. What are the causes inhibiting the farmer from increasing the production of pulses? Do they relate to relative profitability or risk or the absence of a break-through in technology? Dr. Bapna's study opens up new frontiers for further research in agricultural supply response and therein lies his contribution.

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