The Reserve Bank of India Occasional Papers contains contributions by the Staff of Reserve Bank of India. Articles, notes and reviews published in this journal do not necessarily reflect the views of the Editorial Committee or of the Reserve Bank of India. Responsibility for the views expressed and for the accuracy of statements contained in the contributions rests with the author(s).

There is no objection to the material published herein being reproduced, provided an acknowledgement of the source is made.

tions would together cover a period of 15 years during which the Indian economy experienced many structural changes.

The data for such a long period (from 1968-69 to 1983-84) provide ample scope for undertaking studies of analytical nature which throw insights into the changing pattern of inter-industrial linkages across the board as well as over time. Recent studies on the subject demonstrated that inter-industrial analysis is of enormous relevance not only for identifying the sources of growth but also for guiding policies in regard to investment allocation. Such studies have in fact been successfully undertaken in many developing countries in planning exercises. Dissemination of data on I-O Tables in quick time is therefore of paramount importance particularly, when the policy makers have explicitly expressed their intent to reorient policies hitherto followed for bringing about allocative efficiency.

In India, the Input-Output tables have been used in the preparation of Five Year plans. An earlier study (Venkatramaiah, Kulkarni and Latika Argade, 1984) has attempted an 18 - sector classification of the I-O tables in order to analyse the structural changes in the Indian economy based on five input-output tables relating to 1951-52, 1952-53, 1959, 1961 and 1963, during the period 1951-63. The study makes a rigorous attempt at studying structural changes in the Indian Economy as a whole as well as the impact of changes in technology and final demand on production.

While the I-O Tables provide a major vehicle for an analysis of inter-industrial relationships for the economy as a whole as well as at sectoral level, rigorous attempts have also been made for estimating sector-specific changes using production functions and multiple regression analysis. The studies by Goldar (1986) and Isher J. Ahluwalia (1991) merit attention in this regard. While the former examined productivity and other related issues for the Indian industry at the aggregate level for 1951-79 covering roughly the first three decades of planned industrialisation in India, the latter study examines the various factors which lie behind the turn-around of the eighties in the manufacturing sector and suggests appropriate improvements in the planning and performance of the infrastructural sectors along with effecting limited flexibility in the industrial and trade policies. Ahluwalia's work points towards the need for policy reform at the micro level, combined with strong measures designed to bring about a macro economic environment which is conducive to growth and argues that these necessary corrections have to be pursued, if the momentum of the first half of the 'eighties should be sustained in the years to come.

The present paper analyses the inter-temporal changes by using the latest data on Input-Output Transactions Tables (IOTTs) published by CSO which

arc available on a comparable basis, for the years 1968-69, 1973-74, 1978-79 and 1983-84 and draws upon the major results of the earlier studies referred to above while interpreting the results.

There is, however, a need to enter a few caveats. The four I-O tables covered by us are not on a comparable basis as they are based on different series of National Accounts Statistics (NAS)[2]. There are changes, minor though, in classification after 1973-74[3]. But over the period, there has been marked improvement in the quality of the data base and refinements in methodology[4]. For purposes of analysis, however, these aspects may not influence the results very importantly, if the analysis is carried out at appropriate levels of disaggregation such as the ten-sector classification used in this paper. The ten sectors considered here are : 'Agriculture, Forestry and Fishing', 'Mining & Quarrying', 'Manufacturing', 'Construction', 'Electricity, Gas and Water Supply', 'Transport, Storage & Communication', 'Trade, Hotels & Restaurant', 'Banking and Insurance', 'Real Estate' and 'Personal and Social Services'. For identifying the key sectors of the economy that have played a strategic or critical role in the 'real' side of the economy, the analysis has been carried out using Rasmussen indices[5].

2. Inter-sectoral Linkages : Forward and Backward Linkages

Hirschman (1958) defined backward linkage effect as one in which a non-primary economic activity will induce production through domestic supplies of the inputs needed in that activity, and forward linkage effect as one in which the activity that does not by its nature cater exclusively to final demand, will induce attempts to utilise its outputs as inputs in some new activities. The Chenery and Watanabe (1964) formula defines backward linkage as *total non-primary input per unit of output for a sector and forward linkage as the ratio of that part of the i th sector which is utilised as inputs by other sectors to the total demand of the i th sector*. Saxena (1989) has also given an alternative way of measuring backward and forward linkages. In a demand driven input-output table, the inter-industrial relationship in a matrix form could be depicted as follows:

$$X = (I-A)^{-1} F$$

---

2. Divatia V.V. (1991).

3. CSO (1989), p.2, CSO (1990), p.2.

4. "The errors involved may be large in relation to the changes in technical coefficients which the analysis is seeking to measure" see Berman L.S., in Gossling (ed.), (1970), pp.31.

5. See Rasmussen, P.N.(1956) and Bhalla,G.S., et al. (1990).

where X represents the output vector, F is the final demand vector, A is the demand-driven input-output coefficient matrix and I is the identity matrix. Further, if L represents the elements of $(I-A)^{-1}$, then, the direct and the indirect input requirements of the i th sector could be computed as follows:

$$L_i = \sum_{j=i}^{n} L_{ij}$$

In the above representation, Li measures the backward linkage of the i th sector.

Similarly, after computing the input-output coefficient matrix from the supply-side input-output model, the following relationship is used for estimating the output vector X.

$$X = V [I-A^*]^{-1}$$

where V = primary input vector $[V_j]$

$A^* = [a_{ij}^*]$ and

$$a^*ij = \frac{X_{ij}}{X_{ij} + V_j}$$

Let $L^* = [L_{ij}^*] = (I-A^*)^{-1}$, then

$$L_i^* = \sum_{j=1}^{n} L_{ij}^*$$

The above formula gives us a measure of forward linkages of the i th sector.

The most popular method of measuring forward and backward linkages is by using Rasmussen indices, U_i and U_j, which are defined as follows :

$$U_i = \frac{1}{n} \sum_{j=i}^{n} b_{ij} \div \frac{1}{n^2} \sum_{i=1}^{n} \sum_{j=i}^{n} b_{ij}$$

$$U_j = \frac{1}{n} \sum_{i=i}^{n} b_{ij} \div \frac{1}{n^2} \sum_{i=1}^{n} \sum_{j=i}^{n} b_{ij}$$

where n = number of industries

$B = |b_{ij}| = (I-A)^{-1}$

I = Identity matrix of order n x n

A = Input-output coefficient matrix of order n x n

$U_j \geq 1$ means that industry j is "more than average" dependent for its input on the system of industries or, in other words, it has "stronger than average" backward linkages. Similarly, higher values of U_i indicate stronger forward linkages.

3. Key Sector Analysis

An important use of the input-output tables is that these tables bring into sharp focus, the inter-dependencies among the various sectors of the economy. More importantly, the I-O tables could be effectively employed for carrying out Key Sector Analysis. The identification of Key Sectors of the economy will be of immense use for purposes of economic policy formulation and for assigning priorities in investment allocation for inducing a faster rate of industrialisation.

4. Deflating Input-Output Tables

For capturing the inter-temporal changes in an economy, segregation of the 'nominal' changes from the 'real' changes is necessary. This is done primarily to avoid distortions arising from changes in technical coefficients as well as changes in the relative prices of various sectoral products. In order to separate the technological changes from the price changes, the common practice is to deflate all the cell entries in the Input-Output matrices by the corresponding price deflators. The resultant data would then be amenable for carrying out a meaningful (real) inter-temporal linkage analysis. The studies pioneered by Staglin and Wessels (1972) and Venkatramiah et.al. (1984) fall in this category. A problem that often confronts research workers in carrying out the analysis in 'real' rather than 'nominal' terms relates to the selection of an appropriate price deflator for the purpose. Ideally, cell by cell deflators are required to transform the nominal values of the elements of the inter-industry matrix to real terms. In the absence of such price deflators, the second best

position to take would be to choose an appropriate industrial classification keeping in view the availability of suitable price deflators relevant for such a classification and the degree of analytical rigour required.

It is assumed in this paper that a sector's general price deflator remains the same over all the consuming sectors. In other words, we have used the row-wise deflators in place of cell by cell deflators.[6] This procedure has the disadvantage of introducing white noise in the results. However, since the paper is concerned with an analysis of inter-temporal changes over a long period (1968 to 1983), the broad directional comparisons may not be affected due to this limitation if we assume that the variance-covariance matrix of errors over time in relation to the given level of sectoral disaggregation[7] would remain generally stationary.

The commodity x industry (CXI) form of the I-O tables published by the CSO formed the basis of analysis carried out in this study. For converting the 'nominal' cell values to values in 'real' terms, we preferred to use the implicit GDP price deflator rather than the wholesale price index. The reason for preferring the former is that wholesale price indices are not available for the services sector even though the services sector has of late been gaining increasing importance. We have accordingly classified the 60- sectors given in the I-O tables of CSO into 10 sectors corresponding to the 10 identified implicit GDP price deflators (vide Appendix I). The deflators for 'main' products have been used for converting the nominal total output (constituting the main products and the by-products) of an industry into real terms.

5. Derivation of the Input-Output Matrix and its Inverse

The input-output coefficient matrix (A-matrix) and the inverse matrix (B-matrix)[8] were derived from the commodity x industry (CXI) input-output transactions tables at 1980-81 prices, and these matrices were used in this study. A rigorous approach would have been to derive the inverse matrix from the commodity x commodity (CXC) matrix. Since data for the CxC matrix for all the four years (which are quinquennially spaced) are not available, the only alternative for us is to use the Commodity x Industry (CxI) matrix for carrying out the analysis. It may be noted that in a commodity x industry matrix, the column elements represent inputs to an industry while the row

6. This method has been used by Staglin and Wessels in Carter, A.P.,and Brody, A., ed. (1972).

7. For a rigorous treatment of aggregation in input-output models, see Kossov,V. in Carter, A.P. and Brody,A., ed. (1970).

8. $B = (I-A)^{-1}$

elements represent outputs of that industry going as inputs to other industries. The matrix is constructed in such a way that the by-products of an industry are transferred to the sector (commodity row) whose principal product is the same as the by-product under reference. Because of this adjustment, the row totals and column totals differ. However, this limitation as such may not affect our results adversely if we assume that the resultant errors would be of an offsetting nature.

6. Sources of change in Inter-temporal Inter-industrial Relationships

The major sources of change in the inter-temporal inter-industrial relationships mainly stem from changes in technology, changes in product mix, divergence of actual technical relationships from a linear production function, conventions relating to secondary production and competitive import, level of aggregation and certain random factors (e.g., differences in data sources, statistical methods used for estimating the technical relationship etc.). It is, of course, very difficult to establish the contribution of each factor to the change in co-efficients. Following Staglin and Wessels (1972), an attempt has, therefore, been made in this paper to decompose the real changes in total output into those caused by changes in final demand and those arising from changes in technology (commonly referred to as 'technical' change) in an inter-temporal context.

7. Analytical Underpinnings

We now discuss the analytical underpinnings of the model broadly under three groups viz; (A) Inter-temporal changes in total output due to price effect, (B) Decomposition of output changes into changes in final demand and changes in technology, and (C) Inter-temporal changes in inter-sectoral linkages.

A) Inter-temporal changes in total output due to price effect

Inter-temporal changes in nominal outputs could be decomposed into changes in prices and changes in real outputs. The former, i.e. changes in total output due to changes in prices was obtained by subtracting the nominal total output from the value of the total output expressed at 1980-81 prices for each of the reference years.

B) **Decomposition of inter-temporal changes in output into changes in final demand and changes in Technology.**

i) **Inter-temporal changes in output due to changes in Final Demand**

If 'F' represents the final demand vector with the superscript indicating the relevant year, and as stated earlier, 'B' represents the Leontief Inverse, the output changes due to changes in final demand (O_f) between years I and II may be shown as under:

$$O_f = B^I. F^{II} - B^I. F^I \qquad .. .. \quad (1)$$
$$\text{or}$$
$$O_f = B^{II}. F^{II} - B^{II}. F^I \qquad .. .. \quad (2)$$

In representation (1), technology (represented by B^I) of Year I has been held constant whereas in representation (2), technology of Year II (B^{II}) has been held constant while the final demand component is allowed to vary.

ii) **Inter-temporal changes in output due to changes in Technology**

The output changes due to changes in technology (O_t) with unchanged final demand were similarly computed as follows:

$$O_t = B^{II}. F^I - B^I. F^I \qquad .. .. \quad (3)$$
$$\text{or}$$
$$O_t = B^{II}. F^{II} - B^I. F^{II} \qquad .. .. \quad (4)$$

C) **Inter-temporal changes in Inter-sectoral linkages**

As mentioned earlier, for studying the inter-temporal changes in inter-sectoral linkages, we have used Rasmussen indices[9]. These indices are constructed to measure the relative strength of backward and forward linkages of industries and are computed using elements of the Leontief Inverse viz., Matrix 'B'. The indices are computed as follows.

$$\text{The index of forward linkage} = \frac{1}{n} \sum_{j=1}^{n} bij \div \frac{1}{n^2} \sum_{i=1}^{n} \sum_{j=1}^{n} bij$$

and

$$\text{the index of backward linkage} = \frac{1}{n} \sum_{i=1}^{n} bij \div \frac{1}{n^2} \sum_{i=1}^{n} \sum_{j=1}^{n} bij$$

9 Rasmussen,P.N.(1956) called them index of sensitivity and index of dispersion.

where n = No. of sectors and bij are elements of the matrix B.

8. Results of the study

A) Inter-temporal changes due to price effect

Recognising the need for commodity price adjustment as a pre-requisite for analysing the I-O tables for studying structural changes and comparing them over time, Venkatramaiah et al.(1984) observed that this task is perhaps, the most important, as well as complex and difficult. In this context, he noted that "this refers to the elimination of the dissimilarity and changing character of the prices endowed in the input-output tables of different vintage, by re-pricing them to a constant base, to satisfy the requirements of input-output theory which is cast in terms of volume coefficients in constant prices of a base year or even in physical coefficients in contrast to value coefficients at current prices".

Our results given in Table 1 amply corroborate the views of Venkatramaiah et al. that a study of structural linkages in real terms is superior to that carried out in nominal terms.

It may be seen from Table 1 that there are wide variations in the inter-temporal as well as inter-sectoral magnitudes. From this, it may be inferred that there is an imperative need for carrying out the analysis in real rather than in nominal terms in order to discern the underlying factors affecting the inter-temporal changes in inter-sectoral linkages.

Table 1 : Changes in Total Output due to Price effect

(Total output at 1980-81 prices minus total output at current prices)*

(Rs. crore)

Sectors\Year	1968-69	1973-74	1978-79	1983-84
1. Agriculture, Forestry and Fishing	24,003	18,045	15,430	18,651
2. Mining and Quarrying	1,093	995	597	3,220
3. Manufacturing	22,459	21,607	16,687	55,926
4. Construction	6,715	4,813	2,755	7,733
5. Electricity, Gas and Water supply	1,144	1,382	807	2,046
6. Transport, Storage and Communication	2,932	2,863	440	6,872
7. Trade, Hotels and Restaurant	8,253	8,170	8,049	5,833
8. Banking and Insurance	1,220	1,234	1,233	1,683
9. Real Estate	826	281	320	1,461
10. Personal and Social Services	6,076	5,141	2,217	1,811

* Values are given in absolute terms

B) **Inter-temporal changes in total output due to changes in Final Demand and changes in Technology**

Analysing the factors affecting the post-war industrial composition of real product, Vaccara (1970) found complementary behaviour of final demand change and technological change in influencing sectoral output levels. In this context, she noted that "..........the sectoral output changes due to final demand change, under conditions of constant technology or nil technological change

diverge less than the mean and the mean absolute deviation is smaller as compared to that for the actual total change in the sectoral output levels. This "narrowing" of the difference between sectoral output changes and the average change, if one considers output changes based on final demand changes only rather than actual total changes, is "almost universal". We endeavour to test Vaccara's hypothesis during the period of our study.

(i) Inter-temporal changes in total output due to changes in Final Demand (Technology held constant)

Inter-temporal (percentage) changes in output when technology is held constant at 1983-84 level between the years t and t+5 were computed by using the following formula :

$$
\left[\frac{B^{1983\text{-}84} \bullet F^{t+5} - B^{1983\text{-}84} \bullet F^{t}}{B^{1983\text{-}84} \bullet F^{t}} \times 100 \right]
$$

The results of the above exercise are given in Table 2.

Table 2 : Inter-temporal changes in total output due to change in final demand

(Technology held constant at 1983-84 level)

(Percentages)

Period / Sectors	Changes during		
	1968-69 to 1973-74	1973-74 to 1978-79	1978-79 to 1983-84
1. Agriculture, Forestry & Fishing	19.05	23.19	8.80
2. Mining & Quarrying	3.75	26.79	1.05
3. Manufacturing	36.77	31.74	-11.21
4. Construction	7.52	35.79	17.30
5. Electricity, Gas and water supply	42.91	26.22	4.07
6. Transport, Storage & Communication	22.69	25.62	13.74
7. Trade, Hotels & Restaurant	34.57	42.04	-33.00
8. Banking & Insurance	35.41	31.96	- 4.77
9. Real Estate	41.00	39.22	137.34
10. Personal & Social Services	21.73	21.60	38.89

Table 2 presents the percentage changes in the total real output within a period of 5 years due to changes in final demand (at constant prices) with technology held constant at the 1983-84 level.

It may be seen from Table 2 that most of the sectors experienced high growth rates in the first two quinquennial periods viz., 1968-69 to 1973-74 and 1973-74 to 1978-79. The growth rates recorded in the second quinquennium were particularly more pronounced than the first. On the other hand, during the quinquennium 1978-79 to 1983-84, the growth rates in respect of all the sectors (with the exception of Real Estate and 'Personal and Social Services' Sector) have decelerated, with some sectors registering even negative growth rates. During the first two quinquennial periods viz., 1968-69 to 1973-74 and 1973-74 to 1978-79, the results show that the growth in the economy as a whole was demand-driven, whereas during the quinquennium 1978-79 to 1983-84, only in respect of two of the sectors, namely, the real estate sector and the personal and social services sector was growth attributable to demand-driven factors.

(ii) Inter-temporal changes in total output due to changes in Technology (Final Demand held constant)

The percentage changes in total output due to changes in technology between year t and t+5 has been calculated by using the following formula :

$$\left[\frac{B^{t-5} \bullet F^{1983-85} \quad - \quad B^t \bullet F^{1983-84}}{B^{1983-84} \bullet F^t} \times 100 \right]$$

Table 3 : Inter-temporal changes in total output due to changes in technology

(Final demand held constant at 1983-84 level)

Period / Sectors	Percentage Changes during		
	1968-69 to 1973-74	1973-74 to 1978-79	1978-79 to 1983-84
1. Agriculture, Forestry & Fishing	2.76	-2.80	5.36
2. Mining & Quarrying	18.77	7.36	26.18
3. Manufacturing	-2.29	11.37	-12.34

| Period | Percentage Changes during | | |
Sectors	1968-69 to 1973-74	1973-74 to 1978-79	1978-79 to 1983-84
4. Construction	-7.35	1.64	0.79
5. Electricity, Gas & Water Supply	-5.25	30.96	40.23
6. Transport, Storage & Communication	5.72	9.29	12.26
7. Trade, Hotels & Restaurants	-3.27	20.89	-3.33
8. Banking & Insurance	-0.26	37.39	20.17
9. Real Estate	0	0	0
10. Personal & Social Services	-5.82	6.45	7.98

Note : Since the entire input of the 'Real Estate' emerged from the construction sector and the entire output of the former is allocated to final demand, the technical or structural relationship of this sector with the rest of the sectors remained the same for all years.

Table 3 shows in percentage terms the changes in real output due to changes in technology with final demand held constant at the 1983-84 level. The interpretation of Table 3 is as follows.

If a change is positive, the technical change has been such that the output has grown at a lower rate than the growth in inputs absorbed by that particular sector. In other words, a positive change implies increase in intermediation[10] i.e. increase in the proportion of input in the total output of a sector. Among the major factors contributing to increase in intermediation, mention may be made of changes in the quality of product, technological obsolescence (leading to more input intensive methods of production), large lumpy investment with long gestation periods (e.g. electricity, crude petroleum) and changing technical requirements (e.g. over the years, coal mining has been employing more capital intensive methods of production). It may be noted that increasing roundaboutness in production over time is common experience in many developing economies. In the case of agricultural sector, however, which witnessed the intensive use of

10. For a rigorous treatment of this phenomenon see Bhatia,D.K. (1985).

fertilizers and irrigation inputs over time, the Planning Commission[11] has recognised this phenomenon as reflective of modernization.

Table 3 shows that the period commencing from 1973-74 witnessed an intensification of the phenomenon of roundaboutness in the production process. Before 1973-74, in most of the sectors, the increase in output was faster than the increase in input. The three sectors viz., 'Mining and Quarrying', 'Transport, Storage and Communication' and 'Agriculture, Forestry and Fishing' sectors, have, however, displayed high, moderate and low input intensities respectively between 1968-69 and 1973-74.

Between 1973-74 and 1978-79, the input intensity of all the sectors, with the exception of 'Agriculture, Forestry and Fishing' and Real Estate sectors has increased. The input intensity was particularly high in the case of Manufacturing, 'Trade, Hotels and Restaurants', 'Electricity, Gas and Water Supply' and 'Banking and Insurance' sectors. During the quinquennium, 1978-79 to 1983-84, the input intensity has increased in all the sectors excepting Manufacturing and 'Trade, Hotels and Restaurant' sectors. Thus a deepening of the roundaboutness in production process has been taking place in the economy particularly after 1973-74. How far this phenomenon is attributable to the changing production environment and inequitable distribution of income (leading to demand for more input intensive luxury or better quality goods) is an important question for indepth research, but is not relevant in the frame-work of this paper.

The intensification of roundaboutness in the production process could be traced to the slow pace of technology absorption in most of the sectors. This phenomenon has led to a slow-down in industrial growth. Ahluwalia (1991) had identified three major factors contributing to industrial stagnation viz., (i) slow-down in infrastructure investment and poor management of the infrastructure sectors, (ii) slow growth of per capita agricultural incomes, and (iii) the restrictive framework of industrial and trade policies. She notes that the industrial slow-down has been in evidence upto the year 1980 and thereafter, the early 'eighties witnessed a turn-around. Our results (in respect of the 10 sectors), however, do not bear this out, as the slow pace of industrial growth is in evidence even in the early eighties.

For examining the interrelationship between productivity and growth, Ahluwalia (1985) tested modified version of Verdoorn's law. Verdoorn (1949) has postulated a positive relationship between the growth in labour productivity

---

11. Planning Commission (1986) : A Technical Note on the Seventh Plan (P. 5).

and growth in output. The modified Verdoorn's law states that a faster growing industry will record a faster growth in total factor productivity. Her results show a positive effect of faster growth on productivity growth and a negative relationship between higher capital intensity and productivity growth. Certain other exercises undertaken by her also revealed a positive link between the scale of operations and productivity growth and a tendency towards fragmentation of firms possibly because of certain distortions created by the policy regime. When our results are set against the results obtained by Ahluwalia, it follows that the phenomenon of simultaneous existence of slow growth in some of the industrial sectors with roundaboutness in production process points out that there is scope for more efficient use of resources and achieving reduction in costs. Thus lack of technological absorption in the face of **infrastructural constraints** may have been responsible for the slow growth of the Indian industry during the period of our study.

(iii) Complementary Behaviour of Final Demand and Technological change

The existence of complementary behaviour between changes in final demand and changes in technology was well studied by Vaccara (1970). She observed that "in general, those industries which had above average increases in final demand (direct and indirect) were also faced with increasing demand for their product because of changing technical requirements, while those industries which experienced below average increases, or actually decreases, in final demand were also industries whose output was in lessened demand because of changes in the technical requirements of production" and notes further that "There is thus an indication that, in general, the two elements of change... reinforced rather than offset one another". We test this postulate from the results of our study. The results relating to the contributions of final demand and technology to changes in output are given in Table 4.

Table 4 : Inter-temporal changes in output: contributions of final demand and technology

(Percentages)

Period	1968-69 to 1973-74		1973-74 to 1978-79		1978-79 to 1983-84	
Sectors	Final Demand	Techno-logy	Final Demand	Techno-logy	Final Demand	Techno-logy
1. Agriculture, Forestry & Fishing	19.05	2.76	23.19	-2.80	8.80	5.36
2. Mining and Quarrying	3.75	18.77	26.79	7.36	1.05	26.18
3. Manufacturing	36.77	-2.29	31.74	11.37	-11.21	-12.34
4. Construction	7.52	-7.35	35.79	1.64	17.30	0.79
5. Electricity, Gas & Water supply	42.91	-5.25	26.22	30.96	4.07	40.23
6. Transport, Storage & Communication	22.69	5.72	25.62	9.29	13.74	12.26
7. Trade, Hotels & Restaurants	34.57	-3.27	42.04	20.89	-33.00	-3.33
8. Banking & Insurance	35.41	-0.26	31.96	37.39	-4.77	20.17
9. Real Estate	41.00	0.00	39.22	0.00	137.34	0.00
10. Personal & Social Services	21.73	-5.82	21.60	6.45	38.39	7.98

A look at Table 4 shows that Vaccara's postulate of complementary and reinforcing behaviour between changes in final demand and changes in technology do not hold good at the 10 major sectoral level of classification. In production function terminology, this implies that over the period of the study, there were imbalances as between growth in final demand and growth in technology. This needs to be corrected.

Technical progress was very much lagging behind in the case of Mining and Quarrying, 'Electricity, Gas & Water Supply', 'Transport, Storage and Communications' and the 'Banking and Insurance' sectors. The technical efficiency of the manufacturing sector during 1973-74 to 1978-79 was, however, at a low ebb. It may be noted that this period was characterised as a period of adjustment for the Indian economy following the first oil shock of 1973. The manufacturing sector, however, witnessed moderate levels of technical progress during 1968-69 to 1973-74 and a relatively high level of technical efficiency during 1978-79

to 1983-84. A study based on further disaggregation of manufacturing sector by Anjaneyulu and Ajay Prakash (1992) also revealed that metallic and non-metallic products within the manufacturing sector have recorded significant technical efficiency during the period 1978-79 to 1983-84.

The results showed that final demand rather than technological advancement constituted the driving force in contributing to changes in output during the period of the study and corroborate the generally held view that the recent economic reform measures aimed at reforming the banking sector (with accent on bringing about technological improvement), opening up of the power sector for direct foreign investment and improving the infrastructure industries (particularly those relating to trade and financial sectors) are indeed the steps in the right direction which could break the slow pace of technical progress and facilitate an accelerated growth of the Indian economy in the years ahead.

(C) Inter-temporal changes in inter-sectoral linkages

An industry with backward linkage index greater than one implies that the industry is "more than average" dependent for it's input on the system of industries. Similarly, an industry having forward linkage greater than one implies stronger than 'average' dependence of other industries on this industry. Higher values of indices indicate stronger linkages. Similar reasoning holds good in the case of sectoral classification. The results of the exercise carried out for analysing the inter-temporal changes in forward and backward linkages of each sector are discussed below:

i) Forward Linkage Analysis

The results of forward linkage analysis carried out using Rasmussen indices are given in Table 5.

Table 5 : Forward Linkages[12]

Year Sectors	1968-69		1973-74		1978-79		1983-84	
	Index	Rank	Index	Rank	Index	Rank	Index	Rank
1. Agriculture Forestry & Fishing	1.22	2	1.36	2	1.17	2	1.28	2
2. Mining & Quarrying	0.87	5	0.85	6	0.79	7	0.82	7
3. Manufacturing	1.99	1	1.97	1	2.15	1	1.79	1
4. Construction	0.83	7	0.80	7	0.75	8	0.75	9
5. Electricity, Gas & Water Supply	0.92	4	0.92	4	0.96	4	1.05	4
6. Transport, Storage & Communication	0.86	6	0.92	4	0.92	5	0.99	5
7. Trade, Hotels & Restaurants	1.03	3	1.04	3	1.12	3	1.08	3
8. Banking & Insurance	0.79	9	0.77	8	0.81	6	0.83	6
9. Real Estate	0.65	10	0.65	10	0.61	10	0.61	10
10. Personal & Social Services	0.83	7	0.73	9	0.73	9	0.82	7

The above table shows the value of the Rasmussen indices and the relative rank of each sector (if two sectors share the same rank, then the next sector below them has been given the next to next rank). The Manufacturing, 'Agriculture, Forestry and Fishing''Trade, Hotels and Restaurants' and 'Electricity, Gas & Water Supply' sectors ranked first, second, third and fourth respectively during 1968-69 and retained the same ranking during the subsequent years. The index of 'Electricity, Gas and Water Supply' sector (rank 4) though remained steady initially, tended to increase later. In the case of other sectors,

12. Here the linkages have been calculated without taking import leakages into consideration. Moreover, the linkages measure the effect on output only. The income and employment linkages are not calculated here. For details see Bhalla,G.S., et al. (1990) pp. 65-67.

the indices have fluctuated on either side. The forward linkage is the weakest in the case of 'Real Estate' sector throughout the period. The ranks of 'Mining and Quarrying' and 'Construction' sectors have declined over the years while the ranking of 'Banking and Insurance' sector has moved up.

ii) Backward Linkage Analysis

The results of backward linkage analysis carried out using Rasmussen indices are given in Table 6.

' Table 6 : Backward Linkages

Year \ Sectors	1968-69		1973-74		1978-79		1983-84	
	Index	Rank	Index	Rank	Index	Rank	Index	Rank
1. Agriculture, Forestry & Fishing	0.90	6	0.90	6	0.88	6	0.87	6
2. Mining and Quarrying	0.78	9	0.79	8	0.82	8	0.87	6
3. Manufacturing	1.32	1	1.34	1	1.33	1	1.54	1
4. Construction	1.30	2	1.28	2	1.32	2	1.22	2
5. Electricity, Gas & Water	1.06	4	1.15	4	1.16	4	1.19	3
6. Transport, Storage & Communication	1.22	3	1.17	3	1.23	3	1.11	4
7. Trade, Hotels & Restaurant	0.84	8	0.87	7	0.92	5	0.92	5
8. Banking & Insurance	0.78	9	0.78	9	0.76	9	0.77	10
9. Real Estate	0.85	7	0.78	9	0.73	10	0.71	9
10. Personal & Social Services	0.95	5	0.94	5	0.85	7	0.79	8

It may be seen from Table 6 that Manufacturing, Construction and 'Agriculture, Forestry & Fishing' sectors have ranked 1, 2 and 6 respectively, during 1968-69. These ranks remained unchanged for the subsequent years as well.

While the backward linkages of 'Electricity, Gas & Water Supply' and 'Mining & Quarrying' sectors grew stronger, those of 'Transport, Storage and Communication' and 'Banking & Insurance' sectors tended to weaken. The backward linkages of 'Personal and Social Services' sector became weaker over the period while that of 'Trade, Hotels and Restaurants' strengthened further.

iii) Key Sector Analysis

As a further step at unfolding the growing importance of sectors in a contemporaneous as well as in an inter-temporal context, we have also attempted key sector analysis. The criterion used by us for a sector to be judged as 'key' sector is that the values of backward and forward linkages considered separately should exceed unity. Empirical results based on this criterion reveal that during the quinquennium 1968-69 to 1978-79, the manufacturing sector is the only sector that emerged as a key sector. During the period 1978-79 to 1983-84, infrastructural sectors like 'Electricity, Gas and Water Supply' 'Transport, Storage and Communication' and 'Trade, Hotels and Restaurant' sectors tended to intensify their linkage effects to figure under the 'key' sector category.

In the above analysis, for identifying the key sectors, we followed a stringent criterion viz., the magnitudes of forward and backward linkages when considered separately should be greater than unity. While this criterion has helped us in identifying the manufacturing and infrastructure sectors as the key sectors, a more plausible criterion for judging the key sector status seems to be to consider the sum of the forward and backward linkages equal to or exceeding a value of 2^{13}. This approach seems to have yielded more consistent results in the identification of key sectors over the period as compared to the first criterion as is evident from the discussion that follows.

---

13. This suggestion was made to us by Dr. S.L. Shetty.

Table 7: Key Sector Analysis (Based on the criterion that the sum of the
          forward and backward linkages to exceed a value of 2)

Year Sectors	1968-69		1973-74		1978-79		1983-84	
	Index	Rank	Index	Rank	Index	Rank	Index	Rank
1. Agriculture, Forestry & Fishing	2.1	2	2.3	2	2.1	3	2.2	2
2. Mining and Quarrying	1.7	8	1.6	8	1.6	7	1.7	7
3. Manufacturing	3.3	1	3.3	1	3.5	1	3.3	1
4. Construction	2.1	2	2.1	3	2.1	3	2.0	5
5. Electricity, Gas & Water Supply	2.0	5	2.1	3	2.1	3	2.2	2
6. Transport, Store & Communication	2.1	2	2.1	3	2.2	2	2.1	2
7. Trade, Hotels & Restaurant	1.9	6	1.9	6	2.0	6	2.0	5
8. Banking & Insurance	1.6	9	1.6	8	1.6	7	1.6	8
9. Real Estate	1.5	10	1.4	10	1.3	10	1.3	10
10. Personal & Social Services	1.8	7	1.7	7	1.6	7	1.6	8

It may be seen from Table 7 that based on the alternative criterion,
'Agriculture, Forestry and Fishing', Manufacturing and infrastructure indus-
tries (comprising 'Construction', 'Electricity, Gas & Water Supply', 'Trans-
port, Storage & Communication') have been identified as the key sectors of the
economy during the entire period of our study viz., 1968-69 to 1983-84. This is
in line with the broad objectives of planning in India, namely, achieving
balanced development in major sectors of the economy. The structural retro-
gression in the Indian economy noticed by Shetty (1978) for the period 1965-66
to 1974-75 is thus not in evidence during the period of our study viz., 1968-69
to 1983-84.

It may, however, be pointed out that though balance has been maintained in the development of premier sectors of the economy, it may, however, be conceded that there was ample scope for stepping up the growth of the economy through technological upgradation and promotion of entrepreneurial skill which would have arrested the growing predominance of roundaboutness in the production processes observed during 1978-79 to 1983-84. Though I-O data for recent years is not available, one could infer that the process of roundaboutness in production still persists in the recent period as well. **The current policy stance of direct foreign investment with appropriate accent on infrastructure[14] development and enhancing technological capability would certainly help the Indian economy in breaking the low equilibrium growth profile and in accelerating the growth process.**

9. Assumptions and Limitations

The analysis in this paper (using Rasmussen indices) is carried out based on the data available for the four snap shot time points viz., 1968-69, 1973-74, 1978-79 and 1983-84. Non-availability of continuous time series data, therefore, has constrained us in undertaking rigorous analytical work. However, it is not unreasonable to assume that for a sector as a whole, changes are slow and steady particularly during a 5-year period. Though new materials, new techniques and new products were introduced over time, the relevant changes are gradual and do not occur at once in case of industry as a whole or in the case of an individual sector. As Carter and Brody (1970) observed : "The existing capacity in good working order is rarely scrapped because a newer, different or more efficient production process has been introduced. Rather, it is the newly created capacity that may utilize newer process".[15] The relative stability of input-output co-efficients observed by Venkatramaiah, et al. (1984) over an 8-year period may be noted in this context.

As pointed out by Hirschman, linkage effects take time to unfold.[16] Hence, over time, more sectors may develop stronger backward and forward linkages and thus more sectors may emerge as 'key' sectors of the economy. The present paper confined its analysis at a more aggregative level. However, attempting the analysis at a more disaggregative level may yield interesting results. The studies by Venkatramaiah et al. (1972), Goldar (1986), and Anjaneyulu and

---

14. See Sarkar P.C.(1988) who established a high degree of correlation between the production of infrastructure group of industries and the overall industrial production.

15. See Carter,A.P. and Brody,A., ed. (1970 Vol.II) pp.239

16. See Hirschman, Albert, O. (1958).

Ajay Prakash (1992) covering a wider level of disaggregation certainly corroborate this contention. Similarly, the rigorous disaggregated analysis carried out by Ahluwalia on productivity and growth in Indian manufacturing sector also yielded valuable insights in policy areas, prescribing *inter alia* policy reform at the micro level, combined with strong measures designed to bring about macro economic environment which is conducive to growth.

The I-O tables are available to research workers with considerable time lag, considering the fact that the I-O Tables for 1983-84 having been published in late 1990. Since the I-O data provides a useful analytical tool for studying the structure of the economy, timely publication of data gains paramount importance, particularly in the context of the ongoing economic reforms. The I-O data allows us in drawing inferences on important aspects of the economy like (a) studying the implications/impact of an increase in the prices of sensitive commodities such as petroleum products, steel, fertilizers, rice, wheat etc. on the overall price level, (b) analysing the input intensity of production processes and final demand and (c) as a tool for studying the changes in the inter-temporal and inter-sectoral linkages of the economy. More importantly, the I-O data could be gainfully employed for studying the impact of budgetary operations of the Government on the wholesale prices. Recognising the important applications of this technique, Planning Commission[17] has been updating the I-O data from time to time for studying specific aspects of the economy. Divatia (1991), has been urging the CSO to bring forth I-O data quickly and within a time-frame so as to reap the benefits of this highly powerful tool of analysis for studying the structural changes in the Indian economy.

The analysis of inter-temporal linkages carried out in this paper, however, has not dealt with the impact of inter-temporal changes on income and employment. Schultz (1989)[18] has revealed the usefulness of such studies for assigning priority investments in accordance with set goals in regard to income and employment. Undertaking of such studies in the Indian context could form a part of future research agenda. It may also be noted that in the present framework of analysis, the inter-sectoral linkages have been calculated without considering import leakages. This is primarily due to the fact that in the I-O Tables as published by CSO imports have been treated as negative final consumption and no distinction has been drawn between the intermediate consumption of imports by various sectors and the final consumption. Nor has a distinction been drawn between competitive and non-competitive imports which

17. See Hashim, S.R. and Satyanarayana J.(1992) who have updated the I-O data available upto 1983-84 to 1989-90 based on information available subsequently.

18. See Schultz, Siegfried (1989)

could have facilitated the analysis of imports in a more meaningful way. It may also be mentioned that the availability of a more detailed price deflators data could have facilitated the task of undertaking studies with appropriate levels of disaggregation for drawing valid inferences for purposes of industrial and trade policy formulation.

10. Conclusions

The present paper adopted a comparative static approach for analysing the input-output transactions of the Indian Economy covering the four snap shot time points viz., 1968-69, 1973-74, 1978-79 and 1983-84. The paper has analysed the inter-temporal changes in inter-sectoral linkages as well as the relative importance of final demand and technology in influencing changes in output witnessed during the period 1968-69 to 1983-84 by compressing the economy-wide input-output tables into ten broad sectors. In order to correct the likely distortions due to changes in prices, the analysis was carried out in real terms (i.e.) by deflating the I-O cell entries by the deflators for Gross Domestic Product appropriate for the selected ten sector level of disaggregation.

The results show that most of the sectors experienced high growth rates in the first two quinquennial periods viz., 1968-69 to 1973-74 and 1973-74 to 1978-79, the growth rates recorded in the latter quinquennium being much more pronounced than in the former period. During the quinquennium 1978-79 to 1983-84, however, growth rates in general (excepting in respect of "Real Estate" and 'Personal and Social Services' sectors) have decelerated. Identifying the sources of growth in output, the study finds that the growth in the economy for the period encompassing 1968-69 to 1978-79, is primarily demand-driven. During the quinquennium 1978-79 to 1983-84, however, it was found that only in respect of two of the sectors viz. the 'Real Estate' and 'Personal and Social Services' sectors, however, growth was attributable to demand-driven factors. The other sectors, particularly, Manufacturing, 'Trade, Hotels and Restaurants', and 'Banking and Insurance' have witnessed negative (inter-temporal) growth rates in real outputs during the period owing to depressed demand. **In regard to the impact of changes in technology on the changes in output, the paper shows that the year 1973-74 represents a distinct structural break in the phenomenon of roundaboutness in the production process. Over the period (1973-74 to 1983-84), the input intensity of most of the sectors has increased.** During 1973-74 to 1978-79, the input intensity was particularly high in the case of Manufacturing, 'Trade, Hotels and Restaurants', 'Electricity, Gas and Water Supply' and 'Banking and Insurance' sectors. It may be noted that in the case of the Banking sector, the period coincided with the phenomenon of accelerated branch expansion.

During the period 1978-79 to 1983-84, the input intensity in the case of Manufacturing and 'Trade, Hotels and Restaurant' sectors declined indicating steady absorption of technical progress in these sectors. The results of Ahluwalia (1991) and Goldar (1986) also corroborate our observations. Based on the results obtained, Ahluwalia felt that "the positive experience of the 'eighties on the productivity front has provided reassurance of the potential that exists. But it has also driven home the importance of several constraints .... The momentum of growth, if it is to be sustained, would make increasingly stringent demands on the quantity and quality of infrastructure". Goldar has also observed a falling trend in total factor productivity in the case of Metals and Chemicals in the manufacturing sector.

At the present juncture, when the Indian economy is undergoing structural adjustment, there is concern about the slow growth in industrialisation, partly attributable to weakening demand from the Public Sector enterprises (owing to cuts in fiscal deficits) and partly due to the uncertainty hovering over the industry in the wake of expectations regarding the nature and quantum of expected foreign investment flows. As the reforms programme gathers momentum following the easying of fiscal, trade and financial restrictions alongwith the announcement by the Government of India of cuts in several tax rates (particularly in excise and customs duties) in the recent Union Budget for 1994-95 and as foreign investment flows (portfolio and direct) stabilise, the industrial activity would surely pick up. In such a scenario,it is imperative to put in place necessary industrial policy frame-work for guiding the broad contours of industrial growth. **Conceding that the market should rule the roost in an open economy, developing an industrial structure that would gear-up the foreign investment flows towards generating growth impulses still rests within the ambit of state policy.** In such a scenario, the role of the State as a *friend, philosopher and guide* in promoting industrial growth and diversification need to be recognised. The adoption of this *soft state* approach in the Japanese economy has undoubtedly yielded rich dividends. It is in this context, that the task of identifying the key sectors of the economy and channelising investments into these sectors for faster growth should form the core of current and future industrial strategy of the Indian economy. The paper shows that accent on infrastructure development and revival of Banking and Insurance sectors is imperative for an accelerating growth of the Indian Economy. The paper also reveals the imperative need to tone up the technological base of the Indian economy so as to reduce the growing trend of roundaboutness in the economy. Only then could the recent slow-down in industrial growth be reversed and the industry could be propelled to a higher growth path.

References

1. Ahluwalia,I.J. (1991): *Productivity and Growth in Indian Manufacturing*, Oxford University Press, Oxford, New York.

2. Anjaneyulu, D., and Ajay Prakash (1992): "Inter-temporal Comparison of Inter-Sectoral Linkages in the Indian Economy", *The Journal of Income and Wealth*, Indian Association for Research in National Income and Wealth, Volume 14, No.2.

3. Bhalla, G.S., Chadha, G.K., Kashyap, S.P. and Sharma, R.K. (1990) : "Agricultural Growth and structural changes in the Punjab Economy : An Input-Output Analysis", *A Research Report No.82 of International Food Policy Research Institute.*

4. Bhatia, D.K.(1985) : "Intermediation in Indian Economy - An Input Output Approach", *paper presented at the XV General Conference*, Indian Association for Research in National Income and Wealth.

5. Brahmananda,P.R. (1982): *Productivity in the Indian Economy: Rising Inputs for Falling Outputs*, Himalaya Publishing House, Bombay.

6. Carter, A.P. and Brody, A. ed, (1970): *Contributions to Input Output Analysis - Proceedings of the Fourth International Conference on Input-Output Techniques, Volumes I & II*. North Holland Publishing Company, Amsterdam, London.

    - (1972) : Input-Output Techniques - Proceedings of the Fifth International Conference on Input-Output Techniques, North Holland Publishing Company, Amsterdam, London.

7. Central Statistical Organisation   (1970) : *Applications of Input-Output.*
    - *(1972): Input-Output Techniques*
    - *(1978): National Accounts Statistics*
    - *(1981): Input-Output Transactions Tables, 1973-74*
    - *(1989): Input-Output Transactions Tables, 1978-79*
    - *(1990): Input-Output Transactions Tables, 1983-84*

8. Chenery, Hollis B., and Clark, Paul G. (1964) : *Inter-Industry Economics*, John Wiley and Sons Inc., New York.

9. Dhar, P.N. (1990): *Constraints on Growth : Reflections on the Indian Experience*, Oxford University Press, Delhi.

10. Divatia, V.V. (1991): "Structure of Indian Economy: As seen from CSO's Input-Output Tables", *Economic and Political Weekly*, May.

11. Goldar, B.N. (1986): *Productivity Growth in Indian Industry*, Allied Publishers Private Limited, New Delhi.

12. Gossling, W. F. (ed.) (1970): "Input-Output in the United Kingdom", *Proceedings of the 1968 Manchester Conference.*

13. Hashim, S.R., and Satyanarayana, J. (1992): "Input Intensity of Production Processes and Final Demand in Indian Economy", *The Journal of Income and Wealth* ed. by the Indian Association for Research in National Income and Wealth, Vol.14, No.2.

14.   Hashim, S.R. (1991): "Forty years of Indian Economy: Structure and Dimension of Growth" Vera Anstey Memorial Lecture, *The Indian Economic Journal (January-March)*, Vol.18, No.3.

15.   Hazari, B.R., and Krishnamurty, J (May 1970): "Employment Implications of India's Industrialization: Analysis in an Input-Output Framework", *The Review of Economics and Statistics*.

16.   Hazari, B.R. (August, 1970): "Empirical Identification of Key Sectors in the Indian Economy", *The Review of Economics and Statistics*.

17.   Hebden, Julia (1983): *Applications of Econometrics* (chapters 9 and 10).

18.   Hirschman, A.O. (1958): *The Strategy of Economic Development - Linkages in Economic Development*, New Haven, Yale University Press.

19.   *Journal of Policy Modelling* (1989, spring): Various papers on Structural Decomposition.

20.   Leontief,W.W.(1953): *Studies in the Structure of the American Economy*, Oxford University Press, New York.

21.   Nayyar, D. (1978): "Industrial Development in India : Some Reflections on Growth and Stagnation", *Economic and Political Weekly*, Special Number.

22.   Planning Commission (1986) : A Technical Note to the Seventh Plan (1985-90).

23.   Ragnar Nurkse (1953): *Problems of Capital Formation in Underdeveloped Countries*, Oxford University Press.

24.   Raj, K.N. (1976): "Growth and Stagnation in Indian Industrial Development", *Economic and Political Weekly*, Annual Number.

25.   Ranis, G, and Fei, J.C.H. (1965): "Innovation, Capital Accumulation and Economic Development", *American Economic Review*.

26.   Rao, V.K.R.V. (1979): "Changing Structure of Indian Economy as seen through National Income Data", *Economic and Political Weekly*, Vol. XIV, No.50.

27.   Rasmussen, P.N. (1956): *Studies in Intersectoral Relations*, Copenhagen, Einer Harks.

28.   Reserve Bank of India Bulletin (1978, November): "Inter Industry Transactions".

      -     May,1982.
      -     September, 1983.

29.   Sarker, P.C. (1988): "Performance of Infrastructure Industries and their Prospects in the Seventh Five Year Plan", *Reserve Bank of India Occasional Papers*, Vol.9, No.2.

30.   Saxena, K.K. (1989):" Key sectors of the Indian Economy, (Based on I-O Exercise)", *Indian Journal of Quantitative Economics*,Vol. 5, No. 2.

31.   Schultz, Siegfried (1989): "Approaches to Identifying Key Sectors Empirically by Means of Input-Output Analysis", *Journal of Development studies*, Vol. 2, No.1, spring.

32.   Shetty, S.L. (1978): "Structural Retrogression in the Indian Economy Since the Mid-Sixties", *Economic and Political Weekly*, Annual Number.

33.   Solow, R.M. (1957): "Technical Change and the Aggregate Production Function", *Review of Economics and Statistics*.

34.   Solow, R.M. (1960): "Investment and Technical Progress" in *Mathematical Methods in Social Sciences*, edited by Arrow, Karlin and Suppes, Stanford University Press.

35.   Star, S. (1974): "Accounting for the Growth of Output", *American Economic Review*, March 1974.

36.   Stone, Richard et al. (1962) : *A programme for growth* - many volumes dealing with theory and building of a model and obtaining forecasts.

37.   Uma Datta Roy Chowdhary (1954): "A Preliminary Study of Inter-industry Relations in India", *Studies Relating to Planning for National Development*, Indian Statistical Institute (SPNO, ISI), No.7, (Mimeo).

38.   Vaccara, B.N. (1970): "Changes Overtime in Input-Output Coefficients for the United States", in *Applications of Input-Output Analysis, Input-Output Techniques*, eds., Carter, A.P. and Brody, A., North Holland Publishing Company, Amsterdam, London.

39.   Venkatramaiah, P., Kulkarni, A.R, and Latika Argade (1972): "Input-Output Tables for India, 1963", *Artha Vijnana*, Vol.14.

40.   Venkatramaih, P., Kulkarni, A. R., and Latika Argade, (1984): "Structural changes in Indian Economy : An analysis with Input-Output Tables, 1951-63", *Artha Vijnana* (March-June), VOL.XXVI, No.1 & 2.

41.   Verdoorn, P.J. (1949): "Fattori che Regolano lo Sviluppo della Produttivita del Lavoro", *L' industria*.

42.   Virmani, A. (1991): "Demand and Supply Factors in India's Trade", *Economic and Political Weekly* (February 9).

43.   Woodland, A.D. (1976): "Modeling the Production Sector of an Economy : A Selective Survey and Analysis", Working Paper No.0.04, University of British Columbia, Melbourne, 1976.

44.   World Bank Country Study, (1989): *India : An Industrializing Economy in Transition*, Washington, DC.

45.   World Bank Report, (1990): *World Development Report*, Washington. DC, Oxford University Press.

APPENDIX - I

Sectoral Classification

Sr. No.	Sectors	Sector Nos. of the 60 sectors classification given in the CSO publication
1.	Agriculture, Forestry and Fishing	1 to 7
2.	Mining & Quarrying	8 to 11
3.	Manufacturing	12 to 44
4.	Construction	45
5.	Electricity, Gas and Water Supply	46 and 47
6.	Transport, Storage & Communication	48 to 51
7.	Trade, Hotels & Restaurant	52 and 53
8.	Banking and Insurance	54 and 55
9.	Real Estate	56
10.	Personal and Social Services	57 to 60

APPENDIX - II

Implicit Gross Domestic Product(GDP) Deflators
(1980-81 = 100)

Sr. No.	Sectors	Years			
		1968-69	1973-74	1978-79	1983-84
1.	Agriculture,Forestry, Fishing	45.08	66.10	75.67	124.71
2.	Mining & Quarrying	27.11	37.75	73.02	195.50
3.	Manufacturing	36.72	54.21	75.82	198.72
4.	Construction	37.45	55.30	81.64	143.26
5.	Electricity, Gas and Water Supply	34.20	43.84	80.05	130.16
6.	Transport, Storage and Communication	51.20	62.58	95.98	144.72
7.	Trade, Hotels and Restaurant	33.43	50.33	70.14	129.96
8.	Banking and Insurance	31.83	51.07	71.51	130.38
9.	Real Estate	56.59	70.89	91.44	116.48
10.	Personal and Social Services	41.00	54.61	85.22	132.38

Import Liberalisation and Industrial Growth

The Indian Experience

Jayanta Kumar Mallik*

The opening of a foreign trade, ... sometimes works a sort of industrial revolution in a country...

John Stuart Mill

This paper is an attempt to examine the effects of import liberalization policies pursued in India since late seventies on the output growth of industry. The traditional apprehension that the growth of import owing to the policies of trade liberalization would pose a danger to the domestic industry has been examined in this paper, and it is observed that import growth could help domestic industrial growth by stimulating demand via improvements in the supply situation. The paper argues that notwithstanding a significant rise in import, the growth performance of industry has been quite impressive during the post-liberalization period owing to the stimulus provided by import. The findings of the paper, besides providing an explanation for the observed higher industrial growth during the eighties, also suggest that the much debated 'industrial stagnation in the Indian economy after the mid-sixties' and 'the deceleration in industrial growth in the early- nineties' were due to depressed demand owing to restrictions on import.

Introduction

Far-reaching policy changes are underway in India under the 'Structural Reforms Programme',[1] intended to eliminate the distortions in the economy created in the regulatory policy environment and to attain market induced efficiency.[2] The rationale for the policy changes are debated at various levels.

1. See the Memoranda of August 1991 and June 1992 of the Finance Minister of India to IMF on Economic Policies for 1991-92 and 1992-93 (CMIE, December 1991 and July 1992).

2. Distortions of various forms like the inefficiency in resource use and technological obsolence giving rise to a high cost industrial structure are documented in Bhagwati and Desai (1970), Bhagwati and Srinivasan (1978) and Ahluwalia (1985).

While those in the policy making circle consider the changes essential and the process irreversible, those opposing them argue that these are not in the best interest of the country, and are imposed and dictated by the multilateral donor agencies. But the policy changes are not entirely new. The Indian economy has an experience of about 15 years in working with the policy changes. What is the lesson that one learns from this experience ? The present paper addresses itself to this task, with the objective of analysing some of the effects on the domestic industry of the policies of import liberalization pursued in India beginning the late-seventies.

The liberalization process

Selective liberalization measures - in the form of relaxations in the import control procedures - were initiated in India during the seventies, particularly in the late-seventies, and the policy was pursued further during the eighties. A number of important steps were taken in the year 1978-79 to facilitate the import of capital goods. Relaxations were also made for the import of certain raw materials which were not manufactured indigenously. The major changes in trade policy were, however, mainly in the direction of making capital goods imports easier.[3] After a forceful emergency brake on import applied in the early-nineties,[4] the Indian economy is moving towards a more liberal trade regime aimed at a more radical overhauling of the import strategy under the current 'Structural Reforms Programme'.

Liberalization and Import Growth - the evidence

In this section, we provide empirical evidence on import growth attributable to the policies of liberalization which helps us in designing the study. Data on quantum indices of import, plotted on a graph (Figure-1), show a distinct upward trend in the post-liberalization period. The rising trend continued during the eighties except for a decline in 1984-85. During this period, a higher growth is observed in the case of the capital goods imports, the liberalization policies being tailored towards them (Figure-2 and Table-1). There was a decline in import in the year 1991-92 as a result of the import compression measures. A revival of

---

3   For an elaborate discussion on the process of import liberalization during this period, see Centre for Monitoring Indian Economy (1990). Kholi (1989) presents an excellent discussion on the process of liberalization, including the nature, pace and the dynamics of the policy changes.

4. The severe import compression measures taken by the Government and the Reserve Bank of India during 1990-91 in view of the external payments criss. See RBI, Report on Currency and Finance 1990-91 for a detailed discussion.

import growth is observed after the restrictions were removed and a few more liberalization measures were announced.
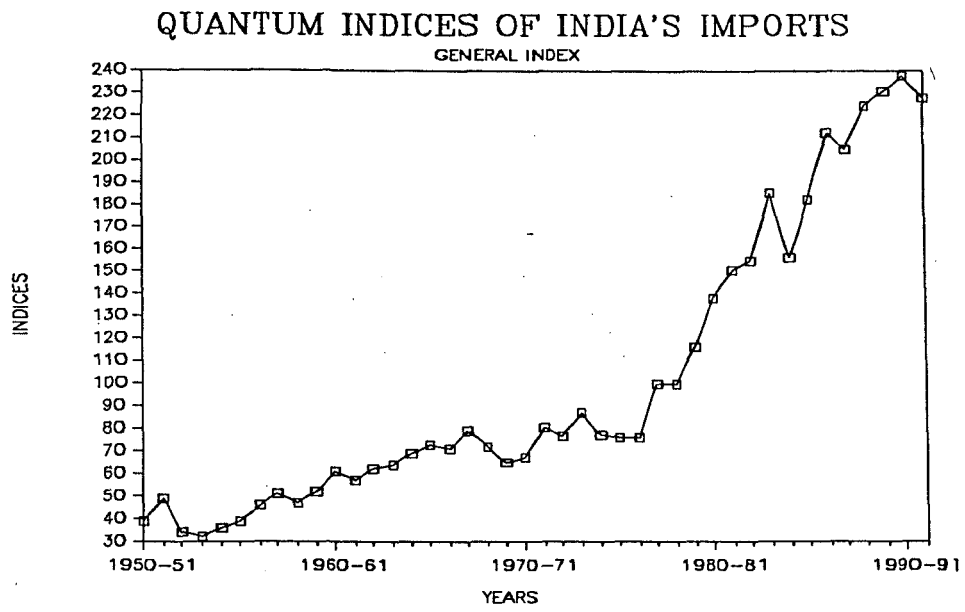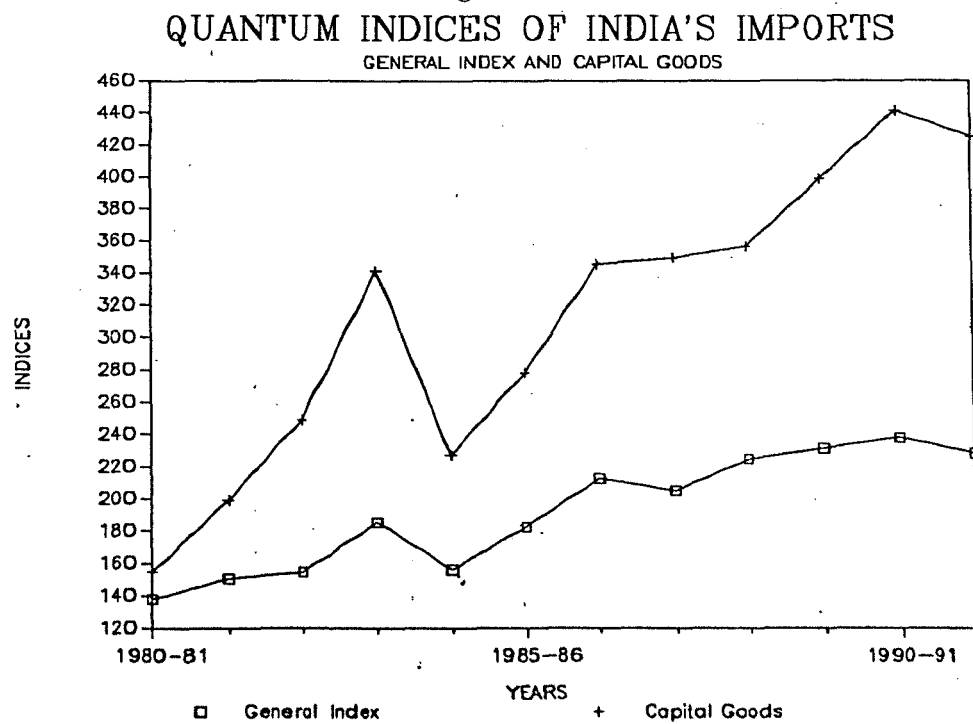
Figure - 1

QUANTUM INDICES OF INDIA'S IMPORTS
GENERAL INDEX

YEARS

Figure - 2

QUANTUM INDICES OF INDIA'S IMPORTS
GENERAL INDEX AND CAPITAL GOODS

YEARS

□   General Index   +   Capital Goods

Table-1: Growth Rates of India's Imports (per cent)
(in terms of US Dollars)

Commodity group	1980-85	1985-90	1980-90*	1990-91*	1991-92	1992-93#
I. Bulk Imports	2.5	0.3	1.4	28.3	-20.8	12.2
II. Non-Bulk Imports Of which:	9.3	16.3	12.8	3.0	-18.2	11.7
Capital Goods	8.1	14.8	11.4	10.0	-27.5	5.4
III. TOTAL IMPORT	5.0	8.1	6.5	13.2	-19.4	11.9

Growth rates for the period 1980-81 to 1989-90 are annual compound growth rates (per cent) and those for the years 1990-91, 1991-92 and 1992-93 are annual percentage changes over the corresponding previous year's imports.

* Based on partially revised data for the year 1989-90.
# Based on provisional data for the year 1992-93.

Source: RBI, *Report on Currency and Finance 1991-92* and *Annual Report 1992-93.*

The Literature - a bird's eye view

A systematic study showing the desired positive effects of import liberalization is, perhaps, conspicuous by its absence, whereas quite a few studies have expressed serious concern over the adverse effects of import liberalization on the growth of the domestic industry pointing at the rise in 'import-availability ratio'/ 'import-intensity'/ 'import-dependence' of the Indian industry.[5] One study goes to the extent of saying, "the possibilities, therefore, of domestic industries being adversely affected - or even wiped out - by a massive inflow of under-priced imports cannot be ruled out" (Singh and Ghosh, 1988). Analysing the financial performance of the Indian capital goods industries, Goldar and Renganathan (1990, p.18) observe, "the domestic capital goods industry taken as a whole was not seriously affected by the liberalization of import policy (though for certain types of capital goods demand problems might have arisen due to increases in imports); at least the effect was not as alarming as is often made out". Implicitly, this study also assumes that import growth would lead to a reduction in the demand for the domestic industries and would adversely affect their performance.

---

5 See Chandrasekhar (1987), Singh and Ghosh (1988), Sarma (1990), Mani (1991) and Narayana and Joseph (1993).

Fortunately, the domestic industries have not been wiped out even with a higher import facilitated by a more liberal import policy during the later part of the eighties.[6]

Table-2: Growth of Industrial Production in India

Industry group (End-user category)	Annual average percentage growth			
	1981-85	1985-90	1990-91@	1991-92@
Basic goods	8.8	7.4	9.7	6.2
Capital goods	6.3	14.8	5.4	-12.8
Intermediate goods	6.1	6.5	9.5	-0.7
Consumer Goods	5.3	7.3	9.1	-1.1
Non-durables	4.0	6.5	9.1	1.2
Consumer Durables	14.4	11.8	9.1	-12.5
GENERAL INDEX	7.0	8.5	8.6	-0.5

@   Data are Based on 155 selected industries carrying 85.5 per cent weight in the
     General Index.

Source: RBI, *Annual Report 1989-90* and *Report on Currency and Finance 1991-92.*

The growth performance of the domestic industry has been quite impressive during the post-liberalization period (Table-2). This, however, may not necessarily imply that import growth had no adverse effect on domestic output growth. For, it may be argued that while import growth affected the domestic industry adversely, increase in domestic demand due to expansionary fiscal and monetary policies has facilitated their output growth (Singh and Ghosh 1988). A recent study (Ahluwalia 1991) extensively discusses the proposition of a 'turnaround' in productivity and growth in the Indian economy in the eighties, which, according to the study, is attributable to a multiplicity of factors including the improvements in the planning and performance of the infrastructure sectors, and the changes in industrial and trade policies, also maintains that the stimulus to growth was provided by the Keynesian demand factors, while attributing a supportive role to the policy framework. We quote: "Obviously, the expansionary fiscal/monetary policies created demand conditions in which the growth was possible. But the fact that the surge in demand could be translated into higher growth and better productivity performance necessarily had to do with the evolution of the industrial

---

6   The Report of the Committee on Trade Policies (Chairman: Abid Hussain) provided a major
     impetus to the liberalization process during this period.

and trade policy regime which enabled a supply response to the increased demand" (Ahluwalia 1991, p.96).

2. Import and Domestic Demand -the negative impact ?

The market-expanding role of import substitution is attached a great deal of importance in the trade literature, especially in the Indian literature on import substitution. Verdoorn's law states that the widening of market through trade gives rise to scale economies and it leads to a reduction in cost. This is the usual argument advocated for export expansion. An extension of this proposition to the case of import substitution (positive/ negative) would imply that a decline/ increase in import would increase/reduce the size of the market available to the domestic manufacturers of the concerned product and would affect their productive performance positively/negatively. The direct effect would be on the import competing industries, and the indirect effect on the suppliers of input. We use an inter-industry framework of analysis to capture both the direct and indirect effects of import growth. We decompose the sources of sectoral output growth in terms of the contributions of the constituents of demand, viz., domestic demand expansion, export expansion, import substitution, and technical change (inter-industry demand) between two time periods. *While decomposing the sources of growth, we make a distinction between the overall growth of the economy expressed in terms of value added growth, and the non-proportional growth of different sectors arrived at by netting out the overall growth from the actual growth of the individual sectors.* The idea is analogous to 'the removal of trend in analyzing cyclical variation' (Chenery et al. 1962).[7]

Sources of Output Growth: Decomposition of Demand

Details of data and methodology adopted for the decomposition exercise has been given in Appendix. The exercise has been carried out at a 60-sector level of disaggregation for two different time periods, viz. - Period-1: 1973-74 to 1978-79 and Period-2: 1978-79 to 1983-84. This periodization is adopted primarily due to the availability of input-output tables for the relevant years. We take the first one as the pre-liberalization period and the second as the post-liberalization.[8] For

---

7   If the rate of growth of value added in the economy between two time periods is defined by the ratio k ($k=V_2/V_1$, where V_1= value added in period 1, and V_2 = value added in period 2), the deviation of the growth rate of sector i from this rate can be measured by the expression: $\delta X_i = X_{i2} - kX_{i1}$, where, X_{i2} is the actual output of the ith sector in period 2, kX_{i1} is the predicted output of the ith sector in period 2 (assuming that the sector grew at the rate of k between period 1 and period 2, and δX_i is the non-proportional growth of output of the ith sector.

8.   A significant growth of import is observed only in the terminal year of Period-1, the effect of which may not be expected immediately, and one would reasonably expect the effects in Period-2.

analytical convenience, the detailed results for the related industrial groups (given in Appendix 1) have been added up into three broad sectors - primary, manufacturing and services, and they have been given in Table-3. The results for the capital goods sector (a sub-sector of manufacturing) have also been given here. It would be appropriate to mention that all imports have been assumed as competitive imports in our model. The inference regarding the negative contribution of import would be correct if this assumption holds. Moreover, the data used in this exercise are in nominal terms.[9]

It may be mentioned that the trend growth rate (growth of value added in the economy in nominal terms), which has been netted out from the actual growth rates of individual sectors, has been significantly higher in period 2 (109 per cent) than that in period 1 (65 per cent). A part of this would no doubt be due to the higher inflation rate in period 2 (70 per cent rise in WPI in period 2 as against 33 per cent rise in period 1). Nevertheless, the higher growth of value added in period 2, even after discounting for the price rise is noteworthy. The observed non-proportional growth are, however, lower in period 2 in comparison to those in period 1. This would imply that the divergence between the growth of value added in the economy and the growth of individual sectors has been less in period 2.

We shall now turn to the contributions of the constituents of demand. Hereafter, for convenience, we will use the term growth in place of non-proportional growth. What is striking about the results for Period-2 is a 259 per cent negative contribution of import substitution and a 430 per cent positive contribution of domestic demand to the growth of the capital goods sector, and a 138 per cent positive contribution of inter-industry demand in case of the total output growth in the economy. These results would support the argument that in the post-liberalization period, import growth adversely affected the output growth, especially in the capital goods sector, and that output growth was primarily due to the expansion in domestic demand (both final and inter-industry). But how did this growth of domestic demand come about? This prompts us to undertake a further decomposition of domestic final demand.

Sources of Growth of Domestic Final Demand

Data given in Table-4 would show that investment demand (Gross Domestic Capital Formation) was the major contributor to the growth of domestic final demand in Period-2. The growth of consumption demand, which accounted for 47 per cent of total domestic final demand expansion in Period-1, showed a negative contribution (-64 per cent) in Period-2. In the case of the capital goods sector, consumption demand has changed from a 169 per cent positive contribution in Period-1 to a 60 per cent negative contribution in Period-2.

9.   On this point, please see Appendix.

Table-3: Sources of Output Growth in the Indian Economy

	Non-proportional growth (Rupees lakhs)	Percentage contributions of			
		DD	EE	IS	TC
Period-1					
1. Primary	-960337	80	-3	-6	29
2. Manufacturing Of which:	1000724	53	24	-15	38
Capital Goods	100962	26	37	-3	40
3. Services	1541848	47	10	-3	46
Total	1582235	31	26	-8	51
Period-2					
1. Primary	-298625	207	3	-7	-102
2. Manufacturing Of which:	360909	75	-84	6	103
Capital Goods	23536	430	-114	-259	42
3. Services	637718	78	-18	-6	46
Total	700001	21	-61	1	138

DD: Domestic Demand Expansion; EE: Export Expansion;
IS: Import Substitution; and TC: Technical Change.

Table-4: Sources of Growth of Domestic Final Demand

	DD (Rupees Lakh)	Percentage Shares of		
		C	I	S
Period-1				
1. Primary	-764110	97	-2	5
2. Manufacturing Of which:	527886	88	25	-13
Capital Goods	25881	169	6	-75
3. Services	723151	70	32	-2
Total	486907	47	78	-25
Period-2				
1. Primary	-617175	100	-1	0
2. Manufacturing Of which:	269072	5	87	8
Capital Goods	101256	-60	149	11
3. Services	497541	102	-2	-0
Total	149438	-64	152	12

C: Consumption demand; I: Investment demand (GDCF); and S: Change in Stock.

To sum up the results of this exercise, it may be said that a significant growth of inter-industry demand and investment demand has led to the growth of the domestic industry which has outweighed the negative contributions of import in the post-liberalization period. These findings would suggest a different nexus between import and domestic demand. We talk of the technical change - the changes in the input coefficients as manifested in the rise in inter-industry demand. In the Leontief formulation, the input coefficients are assumed to be constant, and output is allowed to change with a given change in final demand. This assumption would hold in a situation where there are no scarce factors. Ghosh(1968) argues that the input ratios, in a situation of controls, are conditioned by the assigned quota, and any alteration of the assigned quota will alter those ratios. The stability of production coefficients can not be assured for a change in the final demand of the commodity. Therefore, with the change brought about by the easing out of the scarcity of imported material, the industries might have used the inputs in such proportions which would suit their technical considerations. This as well as the higher growth of investment demand (demand for capital goods) would suggest that growth of import leading to an improved domestic supply situation, has

helped in boosting demand. However, it is not possible to arrive at such a firm conclusion within the framework of this analysis. All that one could say is that the observed growth of demand can be viewed as being facilitated by liberalized import growth.

3. On Explaining the Industrial Growth of the Eighties

A notable feature of the industrial growth during this period is a significantly higher growth of the capital goods industries, notwithstanding a still higher growth rate recorded by the consumer-durables industries during 1981-85. However, the capital goods industries showed maximum dynamism with the improvement in growth performance even while sailing against the tide of growing import. Therefore, in this section we focus our attention on the growth performance of the capital goods industries. Traditionally, the growth of the capital goods industries in India (or the absence of it) is explained in terms of the growth of public investment.[10] It is usually argued that in India a significant part of private investment goes for construction activities, and hence growth of private investment does not generate adequate demand for machinery and equipments, and that a high level of demand for these industries can be maintained only by a high rate of growth of public investment. Another facet of the argument is that public investment stimulates private investment, and that private investment moves more or less in unison with public investment assuming thereby a complementarity between the two. This view is different from the usual 'crowding out' approach which postulates that growth of public sector investment leads to a decline in private sector investment by crowding the later out.

Data given in Table-5 would show that in the eighties, the relation between the two has been neither complementary nor competitive. First of all, the growth rate of investment has been much higher in the private sector than that in the public sector. In fact, the initial lead in investment growth is provided by the private sector. With public investment growing at a slower and a declining rate, the trend in the growth of total investment is primarily shaped by the growth of non-public investment (Figure 3).

---

10. See Shetty (1978), and Ahluwalia (1985, 1991).

Table-5: Growth of Gross Capital Formation in India
(At 1980-81 prices)

Sectors	Average Annual Percentage Change		
	1981-85	1985-91	1981-91
Public Sector	9.76	3.18	6.47
Private Corporate Sector	36.90	4.19	20.54
Household Sector	1.32	17.19	9.25
Total	7.50	6.92	7.21

Source: Computed from CSO, *National Accounts Statistics*.

Figure - 3

GROSS CAPITAL FORMATION
AT 1980-81 PRICES
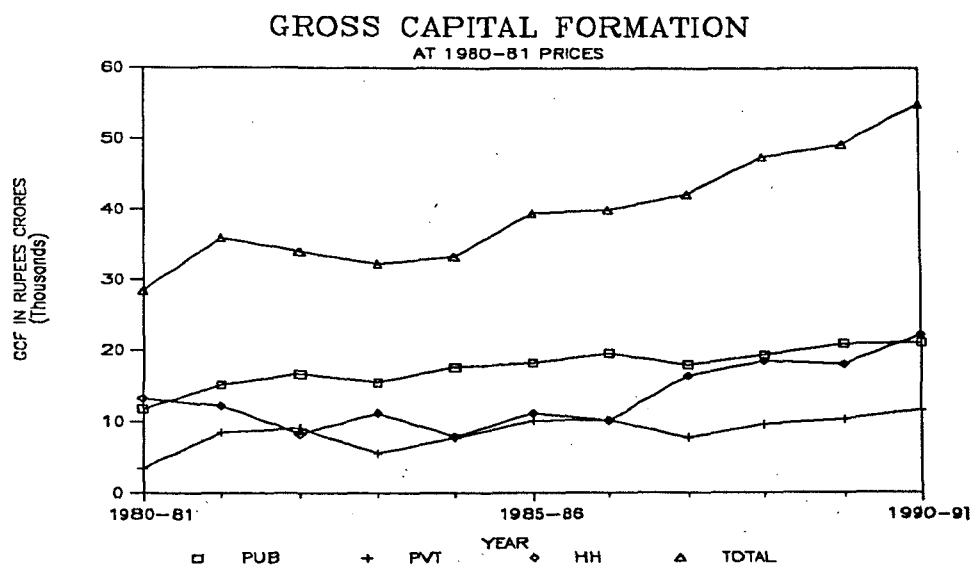
With these brief remarks about the pattern of investment growth in the eighties, we would emphasise that the main determinant of growth, viz., investment, is itself determined by other variables, and this deserves attention in an analysis of the growth performance of the capital goods industries.

Towards an Explanation

Taking clue from trade theory, we examine some of the positive effects of import on the growth of domestic industry operating via the supply side. Theoretically, the effect can be explained in a number of ways.[11] Keeping in mind

---

11. Corden (1971) provides a lucid presentation of the effects of the policies of opening up of an economy to foreign trade on the rate of growth in the economy.

the pointed focus of our study, we shall consider the ways in which the growth of capital goods import would favourably affect the output growth of the capital goods industries. We make it clear that we are not discussing their effects on the supply side in terms of their contribution to technological upgradation. Without undermining the importance of this aspect, we would argue that the benefits of technical change, if any, would be accruable to all the users of capital goods, and this shall not be confined to the domestic capital goods manufacturers.

Import and Domestic Price

Drawing on the theoretical formulations of Corden(1971), we expect that the observed growth of capital goods import would lead to a decline in the relative price of capital goods.[12] If we assume a constant saving propensity,[13] a decline in the relative price of capital goods would raise the ratio of investment to consumption. This would be the income effect of a price change. The substitution effect would be a shift in the economy's absorption from consumption to investment. Earlier, we have observed a more than proportional growth of investment demand and a less than proportional growth of consumption demand during the post-liberalization period. This is indicative of a switching over of the economy's absorption from consumption to investment attributable to the income and substitution effects of relative price changes. We shall examine this relation empirically. In the first place, we shall verify the change, if any, in the relative prices of investment goods, in the post-liberalization period. If found so, we shall link this to the demand for investment goods. We take the wholesale price index of machinery and transport equipment as the price of capital goods (PCG) and the wholesale price index of all commodities net of PCG as the price of non-capital goods (PNCG). We calculate the relative price of capital goods (RPCG) as follows:

RPCG = PCG / PNCG x 100

---

12. Corden (1971) speaks of the relative price of investment goods vis-a-vis consumption goods. For our empirical exercise, we define this as the price of capital goods vis-a-vis non-capital goods.

13. The domestic saving ratio in India (gross domestic saving as per cent of GDP at current market prices) has not changed much during the eighties in comparison to that achieved during 21.2 per cent (standard deviation 1.3) during 1975-80, 19.7 per cent (standard deviation 1.2) during 1980-85, and 20.5 per cent (standard deviation 1.3) during 1985-90. Only in 1989-90, the saving ratio was significantly higher (24.6 per cent), raising thereby the average during 1985-90 to 21.3 per cent (standard deviation 2.0). The average saving ratio during the entire period from 1975-76 to 1989-90 works out to 20.7 (standard deviation 1.7).

Data on RPCG have been plotted on a graph. The line representing RPCG remains below the straight line parallel to the horizontal axis showing PNCG as 100, and it shows a downward movement during the eighties except towards the end of the decade (Figure-4).

Figure - 4

RELATIVE PRICE OF CAPITAL GOODS
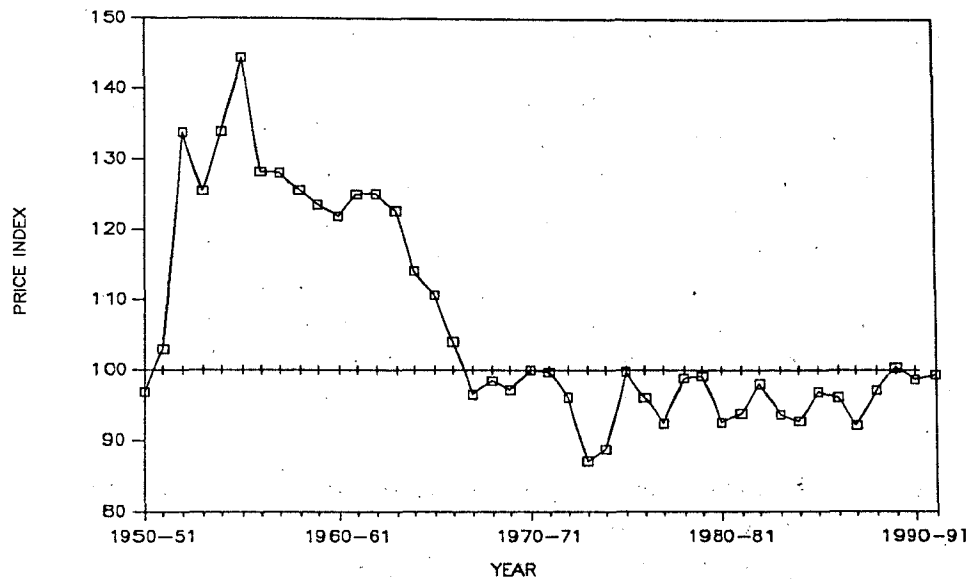
Domestic Price and Demand

Having got evidence of a depressed RPCG with a downward movement during the post-liberalization period, we shall calculate the price elasticity of demand for investment goods. We take data on Gross Domestic Capital Formation at constant (1980-81) prices as the dependent variable, and RPCG as the independent variable for the period 1950-51 to 1990-91 for this purpose.

We predict, $\delta GDCF/\delta RPCG < 0$
where $GDCF = f(RPCG)$;[14]

We estimate the relation using OLS technique specifying a double log functional form. Corrected for autocorrelation, we get:

---

14. This would be due to the income and substitution effects of a change in the relative price of capital goods. A decline in RPCG would increase the real income of the investors (the consumers of capital goods) so that they could buy more capital goods, and it induces them to deploy more capital and less labour. See Corden (1971) for a theoretical discussion.

LOG GDCF =   15.43 - 0.82 LOG RPCG + e
                 (8.54) (-2.59)
$R^2 = 0.96$,   D-W statistic = 2.03,   N = 40
(Figures in parentheses are values of the t-statistic)

The variable RPCG is significant at one per cent level. The estimated price elasticity of demand is near unity.

Output With and Without Import Liberalization

Finally, we shall compare the growth performance of the capital goods sector during the post-liberalization period with the same during the earlier period of import substitution and during the recent brief phase of import compression to see the nature of association between import and output growth. Data on growth rates of import of capital goods, GDCF and output of the capital goods industries have been given in Table-6. As already stated, during the post-liberalization period, a higher import growth was associated with a higher growth of GDCF, and thereby a higher output growth of the capital goods industries. We find that the reverse process worked during both the import substitution and import compression phases.

Table-6 :   Growth Rates of Import and Output of Capital Goods Industries and GDCF in India
(Average annual percentage changes)

Period	Import	GDCF	Output
1960-65	5.1	8.9	20.5
1965-70	-11.8	3.4	1.3
1970-75	-1.7	4.7	6.5
1975-80	1.2	6.4	4.4
1980-85	14.3	1.9	6.3
1985-90	12.4	11.0	14.8
1990-91	10.7	7.3*	5.4
1991-92	-3.6	-8.8*	-12.8

Import: Quantum Indices of Import. GDCF: GDCF at Constant (1980-81) Prices. Output: Indices of Industrial Production.

* Figures for 1990-91 and 1991-92 relate to Gross Capital Formation based on provisional estimates and quick estimates respectively.

Source: Computed from DGCI&S, CSO, *National Accounts Statistics* and Press Note of Government of India, Chandhok, H.L. and the Policy Group (1990), and RBI, *Report on Currency and Finance*, various issues.

During the period 1965-70, there was a significant decline in import, the steep downward trend of RPCG was arrested (Figure-4), the growth rate of capital formation decelerated sharply, and output growth was low. Similarly, during the period of import compression, there was a decline in import and a decline in GDCF resulting in a negative output growth in 1991-92. One may not get a one-to-one correspondence among the variables, but the transmission channel is clear. Earlier studies refer to the presence or absence of a positive association between import substitution and the output growth of the capital goods industries.[15] Our findings show that the relation is equally true if we say that import substitution and output growth are inversely related. It seems, the market-expanding/ protecting capacity of import substitution is more than offset by its demand-depressing effects. The policies of import restriction contribute to a considerable extent, to the deceleration in the growth of the capital goods industries, be that after the mid-sixties or that during the early-nineties.

4. Conclusion and Policy Implications

We conclude by saying that notwithstanding a higher growth of import, the growth performance of the domestic industries in India has been quite impressive during the post-liberalization period owing to the demand stimulating effects of import. We started with the proposition that import growth would adversely affect domestic industrial growth. Using an inter-industry framework of analysis, we found a significant negative contribution of import to the growth of domestic output, especially in the capital goods sector. However, the positive contribution to output growth came primarily from the growth of investment demand and inter-industry demand, which outweighed the negative contribution of import growth. The contribution of consumption demand to output growth was negative, and we did not find evidence on an overall growth of demand. In the subsequent exercise, we found supportive evidence on a demand stimulating effect of import liberalization. We observed that the relative price of capital goods remained lower and it showed a downward movement during the post-liberalization period. This, as per our estimated price elasticity of demand, has helped in boosting investment, and has thereby contributed to the growth of the domestic capital goods industries which record the highest growth rate during this period. The opposite scenario is observed during the periods which saw restrictions on import. That the changes in supply situation can influence demand and thereby output growth, and that

---

15. The theoretical rationale for a positive association between import substitution and output growth has been discussed earlier in Section 2. Some observers used to advocate 'the exhaustion of the possibilities of import substitution' as an explanation for the deceleration in industrial growth in India after the mid-sixties. However, Ahluwalia (1985) has observed that declaration in growth of the capital goods industries was associated with continuing import substitutions.

import liberalization can be a major source of such changes, come out as an important policy implication of our study. The industrial growth in the eighties indeed could be referred to as import-led growth. Thus, the rationale for opening up of an economy to foreign trade may not be sought only in terms of improvements in export performance. To the extent the open trade policy supports domestic industrial growth, directly or indirectly, this would provide a rationale for the policy changes.

APPENDIX

Methodology of Multi-sector growth accounting

Data Base

Data for the inter-industry analysis have been taken from the Input Output Transactions Tables for the Indian economy for the years 1973-74, 1978-79 and 1983-84, published by the Central Statistical Organization. The Commodity x Commodity Tables have been used for this purpose.[1]

Methodology

The Leontief static-linear input-output model provides the framework of this analysis. Following the works of Chenery, Shishido and Watanabe (1962), a number of scholars have analyzed the sources of output growth at disaggregated level in terms of the contributions of the constituents of demand - domestic demand, export, import substitution and inter-industry input use, and several refinements have been made to the methodology since then.[2] In the present study, we have used a modified version of the methodology of Chenery and Syrquin (1980).

Assumptions

1) Each sector is characterized by a single production process;

2) Each product is supplied by only one sector and there are no joint products (there is a one-to-one correspondence between 'n' sectors and 'n' kind of goods);

3) The underlying production function is of fixed proportions;

4) There are no technological externalities;

5) Domestic demand, export and import variables are exogenously determined;

6) All imports are competitive.

1. These Tables are derived from the absorption matrices (Community x Industry) by transferring the secondary products of technology assumption to get the column totals equal to the row totals. This assumption considers the input structure of a secondary product to be similar to that of the industry it has been produced. See Input-Output Transactions Tables 1983-84, Appendix II for detailed discussion on this assumption and description of the methodology.

2. See Balassa (1979), Cherry and Syrquin (1980), Kubo and Robinson (1984), Kubo, Robinson and Syrquin (1986).

Variables

X_{ij} =   Output of commodity i used as input by industry j;

X_{ij} = $X_{ij}^d + X_{ij}^m$;
(The superscripts 'd' and 'm' relate to the domestic and import component of the input.)

Z_i = (X_i+M_i)= Total supply of commodity i;

X_i =   Total supply of commodity i produced domestically;

M_i =   Total import of commodity i;

X_j =   Level of activity of industry j;

W_i = $\sum X_{ij}$ = Total inter-industry use of commodity i;

Yi = $C_i^P+C_i^G+I_i+S_i+E_i-M_i$ = Total final demand of commodity i;[3]

D_i = $C_i^P+C_i^G+I_i+S_i$ = Total domestic final demand for commodity i;

E_i =   Total export of commodity i;

a_{ij}= X_{ij}/X_j= Total or combined input coefficient;

u_i = X_i/Z_i= Domestic supply ratio for sector i;

m_i= M_i/Z_i= Import share of the market for commodity i;
Z, X, M, W, D and E are n-order vectors of Z_i, X_i, M_i, W_i, D_i and E_i respectively;

A = $[a_{ij}]$= Matrix of technical coefficients;

α=   Diagonal matrix of domestic supply ratios(u);

αA =   Matrix of domestic input coefficients;

R^d = $[I-\alpha A]^{-1}$;

ΔA = $A_2 -A_1$;

$\Delta\alpha$ = $\alpha_2 -\alpha_1$;
(The subscripts 1 and 2 refer to the initial and terminal year of the time period analyzed)

δX_i = $X_{i2} -kX_{i1}$ = Non-proportional growth of sector i;

δD_i = $D_{i2} -kD_{i1}$ = Non-proportional growth of domestic demand for the ith sector;

δE_i = $E_{i2} -kE_{i1}$ = Non-proportional growth of export of ith sector;

Equations

The following relations can be established from the elements of an input-output table:

$$Y = C + I + S + E - M \qquad (1)$$
$$V = \sum_j V_j \qquad (2)$$

---

3.   where C^P_i,C^G,Ii, Si, Ei, and Mi are private consumption (PFEC), government consumption (GFCE), investment (GFCR), change in stock (CIS), export and import respectively. mport comes as a negative entry, implying thereby that part of demand which does not accrue to domestic production.

$$Z_i = X_i + M_i = W_i + D_i + E_i \tag{3}$$
$$X_i = W_i + D_i + T_i \tag{4}$$

(where T_i = the net trade of sector i)

$$X_j = \sum_i X_{ij} + V_j = U_j + V_j \tag{5}$$

$$\sum_j X_j = \sum_j U_j + \sum_j V_j = \sum_i W_i + \sum_i D_i + \sum_i T_i \tag{6}$$

In matrix form, equation (3) can be written as:

$$Z = W + D + E \tag{7}$$
$$X = \alpha(W + D + E) \tag{8}$$
$$W = AX \tag{9}$$

Substituting (9) into (8), and inter-changing the terms, we get,

$$X = [I - \alpha A]^{-1} \alpha(D+E) = R^d \alpha(D+E) \tag{10}$$

A change in output growth between two time periods:

$$\alpha X = X_2 - kX_1 \tag{11}$$

Substituting the value of $X = R^d \alpha(D+E)$ from (10) for X_2 in (11), we get:

$$\delta X = R^d_2 \alpha_2 (D_2 + E_2) - kX_1 \tag{12}$$

After some algebraic manipulations, the following can be derived from (12):

$$\delta X = R^d_2 \alpha_2 \delta D + R^d_2 \alpha_2 \delta E + R^d_2 \Delta \alpha k z_1 + R^d_2 \alpha \Delta A k \ X_1 \tag{13}$$

The four constituents of the right hand side of equation(13) measure the direct and indirect contributions of the non-proportional growths of domestic final demand, export, import substitution (as measured by the change in the domestic supply ratio, and technical change (as measured by the changes in the input use coefficient).

Decomposition Domestic Final Demand

We write the first component of the right hand side of equation (13) in the following manner:

$$R^d_2 \alpha_2 \delta D = R^d_2 \alpha_2 \delta C + R^d_2 \alpha_2 \delta I + R^d_2 \alpha_2 \delta S \tag{14}$$

where, C denotes consumption (Private Final Consumption Expenditure + Government Final Consumption Expenditure), I denotes investment (Gross Fixed Capital Formation), and S denotes change in stock.

Some issues

Treatment of Import

The assumption that all imports are competitive is an important limitation of this model. It has been pointed out in United Nations (1973) and Bulmer-Thomas (1982) that this type of treatment might give inaccurate results. Thus, one has to exercise caution in interpreting the results. However, owing to the non-availability of separate data regarding the composition of each of the cell $[a_{ij}]$, it is assumed that each sector/user allocates its absorption between domestic and imported inputs in proportion to its composition in total, thus making no distinction between the sources of supply. Using a different method, Panchamukhi (1967 and 1978) has developed two import matrices, one for the year 1962 and another for 1968 based on the information regarding allotment of import to actual users from the Daily List of imports.[4] His results are in disagreement with the view that a sector having a larger share in the total flow of a commodity should have a larger share in its import. However, he writes, "As everyone is aware, the import licenses are sold in the black market with fabulous premiums. Even though the indenting refers to the licence holder of the Actual-user licence (for official purposes), the real user of import might be somebody else. The possibility that the purchaser in the black market might belong to an industrial category different from that of the license holder, provides a note of caution in using these data." (Panchamukhi 1967, p. 487). In the absence of information about such transactions, we may expect that the flow of import from the licence holder to the ultimate user would depend upon the net profitability considerations in their alternative use. In case of a licensed exporter who also produces for the domestic market, the decision to use the imported material would depend upon the profitability considerations from export and home sales. Since we have no information to quantify such transfers, we rely upon the assumption that total import of a commodity, constituting an inseparable part of its total supply, gets distributed among the users in proportion to their share of the commodity.

Treatment of Export

In our model, final demand consists of private final consumption expenditure, government final consumption expenditure, change in stock, gross fixed capital

---

4. The first one is based on information from three major ports - Bombay, Calcutta and Madras. The second one is based on the same information from the Bombay port only.

formation and export. Some analysts do not include export in final demand for calculating the import ratio. For example Kubo, Robinson and Syrquin (1986) have netted out export in defining the domestic demand and import ratio. They argue this treatment to be appropriate when there is no direct re-export of import. However, in our model we have retained export because, barring some bulk items of consumption, most of India's import are intermediate goods which are demanded for inter-industry use. That means, all imports should be taken as flowing into inter-industry use either as current input or as part of capital formation. Since there are no data on the uses of import, and since no distinction is made among the type of imported goods, the analogy by which domestic consumption demand forms a part of the total final demand, export is also included in total final demand under similar assumption. This becomes quite important in view of the thrust of the import policy changes, making provision for liberal import by the exporters.

Price Effects

All the data obtained from the input-output tables are at factor cost at current market prices. The estimated non-proportional growth are, therefore, as mentioned earlier, magnitudes in nominal terms.[5] Let us see whether and to what extent the current price estimates place constraint to our inferences. Since the focal point of our analysis has been the import and the output of capital goods, we need to consider the movement in domestic and import price indices of capital goods vis-a-vis the general prices. It is well known that whereas the rise in domestic price of capital goods was higher than the general price rise in period 1, the same was lower in period 2. This would imply that the non-proportional growth of the capital goods sector, estimated in real terms, would be lower in period 1 but higher in period 2. Coming to import prices, we find that the rise in import price is significantly lower in period 2, and that the import prices of capital goods show a decline. Thus, in real terms, the share of imports (m =M/Z) would be higher in the economy, and that in the capital goods sector would be still higher. The negative contribution of import growth in real terms would, thus, be even more than that estimated by us. It is, therefore, possible to hold the view that analysis in nominal terms would not pose a serious problem.

---

5. In order to estimate the sectoral non-proportional growth and the contributions of the constitutents of demand in real terms, it is necessary to derive price deflators for each cell entry of the input-output table. This being a tedious, data-intensive and time consume procedure, a vector of price deflators is commonly used. This procedure has been adopted by Venkatramaih et.al (1984). The problem with this approach is that it takes a uniform price for the absorption of a commodity sector, which would be far from reality.

Table : Domestic and Import Prices of Capital Goods

Period	Percentage rise in			
	Wholesale Price Indices		Unit Value Indices of import	
	All Commodities	Machinery & Equip.	General	Machinery & Equip.
1973-74 to 1978-79	33.1	49.9	104.5	129.7
1978-79 to 1983-84	70.1	57.5	25.8	-24.0

Source: Computed from Chandhok, H.L. and the Policy Group (1990).

References

Ahluwalia, I.J. (1985), *Industrial Growth in India: Stagnation since the Mid-sixties*, Oxford University Press, Delhi.

_____(1991), *Productivity and Growth in Indian Manufacturing*, Oxford University Press, Delhi.

Balassa, B. (1979), "Accounting for Economic Growth: the case of Norway" *Oxford Economic Papers*, 31(3), pp. 415-36.

_____(1985), "Exports, Policy Choices, and Economic Growth in Developing Countries after the 1973 Oil Shock", *Journal of Development Economics*, 18(1), pp. 23-35.

Bhagwati, J.N., and Desai, P. (1970), *India: Planning for Industrialization: Industrialization and TradePolicies since 1951*, Oxford University Press, London.

_____and Srinivasan, T.N. (1975) *Foreign Trade Regimes and Economic Development: India*, National Bureau of Economic Research, Columbia University Press, New York.

Bulmer-Thomas, V. (1982), *Input-Output Analysis in Developing Countries: Sources Methods and Applications*, John Wiley and Sons Ltd, New York.

Centre for Monitoring Indian Economy (1990), *The Liberalization Process*, February, Bombay.

_____(1991), *Management of Economic Crisis and Memorandum to IMF on Economic Policies for 1991/92-1992/93*, December, Bombay.

_____(1992), *Memorandum to IMF on Economic Policies for 1992-93*, June, Bombay.

Chandhok, H.L. and The Policy Group (1990), *India Database: The Economy*, Living Media India Ltd., New Delhi.

Chandra Mohan, N. (1994), "GATT, and after", *Business India*, Issue No. 413, January 3-16, Bombay.

Chandrasekhar, C.P. (1987), "Investment Behaviour, Economics of Scale and Efficiency in an Import Substituting Regime: A Study of Two Industries", *Economic and Political Weekly*, 22(19,20, and 21), pp. AN 61-72.

Chenery, H.B., Shishido, S. and Watanabe, T. (1962), "The Pattern of Japanese Growth, 1914-1954",*Econometrica*, 30(1), pp. 98-139.

_____and Syrquin, M. (1986), "A Comparative Analysis of Industrial Growth", in R.C.O. Matthews (ed.) *Economic Growth and Resources, Vol. 2: Trends and Factors*, Macmillan, New York.

Chow, P.C.Y.(1987), "Causality between Export Growth and Industrial Development: Empirical Evidence from NICs", *Journal of Development Economies*, 26(1), pp. 55-63.

Corden, W.M. (1971), "The Effects of Trade on the Rate of Growth" in J.N. Bhagwati et al. (ed.) *Trade, Balance of Payments and Growth: Papers in International Economics in Honour of Charles P. Kindleberger*, North-Holland, Amsterdam/London.

Esfahani, H. S. (1991), "Exports, Imports and Economic Growth in Semi-industrialized Countries", *Journal of Developing Economies*, 35(1), pp. 93-116.

Ghosh, A. (1968),*Planning Programming and Input-Output Models: Selected Papers on Indian Planning*, Department of Applied Economics, University of Cambridge, Cambridge University Press, Cambridge.

Goldar, B.N. and Renganathan, V.S. (1990), *Liberalisation of Capital Goods Imports in India*, Working Paper No. 8/90, National Institute of Public Finance and Policy, New Delhi.

Government of India, (1981, 1989 and 1990), *Input Output Transactions Tables* for 1973-74, 1978-79 and 1983-84, Central Statistical Organisation, New Delhi.

_____(1984), *Report of the Committee on Trade Policies* (Chairman Abid Hussain), Ministry of Commerce, New Delhi.

Kavousi, R. (1985), "International Trade and Economic Development: The Recent Experience of Developing Countries", *The Journal of Developing Areas*, 19(3), pp. 379-392.

Kelkar, V.L. and Kumar, R. (1990), "Industrial Growth in the Eighties: Emerging Policy Issues" *Economic and Political Weekly*, 25(4), pp. 209-22.

Kohli, A. (1989), "Politics of Economic Liberalization in India", *World Development*, 17(3), pp. 305-28.

Kubo, Y. and Robinson, S. (1984), "Sources of Industrial Growth and Structural Change: A Comparative Analysis of Eight Economies" in UNIDO, *Proceedings of the Seventh International Conference on Input-Output Techniques*, United Nations, New York, pp. 233-54.

Kubo, Y., Robinson, S. and Syrquin, M. (1986), "The Methodology of Multisector Comparative Analysis, in H. B. Chenery, et.al. *Industrialization and Growth: A Comparative Study*, World Bank, Oxford University Press, New York.

Kurien, C.T. (1989) "Indian Economy in the 1980s and on to the 1990s", *Economic and Political Weekly*, 24, pp. 787-98.

Leontief, W.W. (1951), *The Structure of the American Economy*, Oxford University Press, New York.

Mallik, J. K. (1991), *Import Liberalization, Industrial Growth and Structural Change in India: 1973-74 to 1986-87*, M. Phil Dissertation submitted to Jawaharlal Nehru University, New Delhi.

Mani, S. (1991) "External Liberalization and Import Dependence: A Note", *Economic and Political Weekly*, 26(27 & 28), pp.1693 96.

Mill, J.S. (1965), *Principles of Political Economy with some of Their Applications to Social Philosophy*, Edited by W.J. Ashley, Reprint of Economic Classics, A. M. Kelly, New York.

Narayana, D and Joseph, K. J. (1993), "Industry and Trade Liberalization: Performance of Motor Vehicles and Electronics Industries, 1981-91" *Economic and Political Weekly*, 28(8 & 9), pp. M13-M20.

Panchamukhi, V.R. (1967), "Planning for Import Substitution", *Artha Vijnana*, 9(3 & 4), pp. 466-501.

_____(1978), *Trade Policies of India: A Quantitative Analysis*, Concept Publishing Company, Delhi.

Rangarajan, C. (1990), "Industrial Growth in the Eighties: Facts and Some Issues", *Reserve Bank of India Bulletin* May, pp. 361-67.

Sarma, A. (1990), "Import Intensities of Indian Industries in the Context of the New Economic Policy: An Analysis in Input-Output Framework", *Man and Development*, 12(3) pp.7-20.

Shetty, S.L. (1978), "Structural Retrogression in the Indian Economy since the Mid-Sixties", *Economic and Political Weekly*, Annual Number, February,1978, pp. 185-244.

Singh, A. and Ghosh, J. (1988), "Import Liberalization and the New Industrial Strategy: An analysis of their impact on Output and Employment in the Indian Economy", *Economic and Political Weekly*, 23(45, 46 & 47), pp. 2313-42.

Tyler, W. G. (1981), "Growth and Export Expansion in Developing Countries: Some Empirical Evidence", *Journal of Development Economics*, 9(1), pp. 121-30.

United Nations (1973), *Input-Output Tables and Analysis: Studies in Methods*, Series F, No.14, Rev.1 New York.

Venkatramaiah, P., Kulkarni, A.R. and Argade, L. (1984), *Structural Change in the Indian Economy: Analysis with Input-Output Tables, 1951-63*, Gokhale Institute of Politics and Economics, Pune.

NOTES

Impact of Import Liberalisation on Exports

D. Singh*

This paper attempts to test empirically the hypothesis underlying India's trade policy being followed ever since the late 'seventies stipulating a positive link between the import liberalisation and export promotion. The evidence adduced by the study suggests robust positive impact of import liberalisation *albeit* in varying degrees on exports in chemicals, cotton textiles and engineering industries, especially in the latter half of the 'eighties. More importantly, the sensitivity of exports to price signals - direct or indirect - assumes crucial significance in the context of the on-going debate relating to the relative effectiveness of price *vis-a-vis* non-price factors.

Introduction

One of the highly debated and critical issues in development economics centres around the question whether a country should follow an inward-oriented policy or outward-oriented policy. It is worth recalling that Raul Prebisch and Gunnar Myrdal strongly advocated an inward-oriented policy for the developing economies. Myrdal's thinking is generally considered to have influenced India's trade policy in the early years of the planning era. India's trade policy in the 'sixties was characterised by import-substitution strategy. The import-substitution strategy in conjunction with the high level of duties on imports had two effects: one was in the nature of bolstering government revenues and the other was to give protection to the domestic industries. Bhagwati and Srinivasan (1975) observed that following this strategy, imports into India were restricted since the mid-'fifties. In fact, this has been the case upto 1984-85 with the result the significance of exports for the growth of the economy was severely underestimated.

The 'eighties represent a watershed in the official thinking and actions on the strategy. There was as a result a shift in India's trade policy. It may be recalled that the Alexander Committee had suggested way back in 1978 a thorough overhauling of India's export and import policies through delicensing of imports.

The Tandon Committee on trade policy had recommended in 1982 a package of export promotion measures which underscored the need for trade policy reforms with the twin objectives of achieving a favourable trade balance and efficiency in resource use.

Import liberalisation initiated in the process has gathered considerable momentum following the introduction of the two long-term Import-Export policies covering the period 1985-86 to 1990-91. Imports of raw materials, spare parts and technical know-how required by the manufacturing sector were almost made free from licensing formalities. What is more, over one thousand items were placed under the Open General Licence (OGL) category. As a result, there resulted an import-led export growth. Critics of the import liberalisation policy point out that liberal imports of raw materials, capital goods and foreign equity participation would most likely be used to meet the pent-up domestic demand rather than that of the highly competitive international market.

The import liberalisation policy, analytically speaking, would impart buoyancy to the export sector, as many of the new non-traditional items of exports are import-intensive. This has in the 'eighties helped export houses, many of which were set up by multinational corporations, although as an empirical study (Rao 1987) has pointed out, these export houses have exported goods produced by small scale units rather than act as direct exporters themselves. The liberalisation policy has been more generalised since about the middle of 1991. In the first place, the Industrial Policy announced by the Government in July 1991 was to promote exports by making Indian goods highly competitive. This can in effect be achieved by exposing Indian industries to outside competition through liberalised trade and fiscal policies as well as through foreign investment policy. Second, the import licensing mechanism has been radically altered with the result that the duty-free import licences - Advance Import Licences and Special Imprest Licences - which constitute an important vehicle of trade policy would help improve export growth.

This paper attempts to study whether there exists a positive link between the import liberalisation and export promotion, which is theoretically taken for granted. The study has been organised into five sections. The survey of literature on the subject has been presented in Section II. Section III provides a measurement and an analysis of import intensity of Indian industries both at industry and macro levels. The assessment of the impact of import-intensity on exports has been spelt out in Section IV. The main findings emerging from the present study and the policy implications have been summarised in Section V.

SECTION II

Survey of Literature

In order to assess the impact of import liberalisation on exports, it is necessary to know the import-intensity of exports . On this subject, there are a number of empirical studies with reference to India. Bhattacharya (1989) constructed an index within the input-output framework to show the import-intensity of exports for 1973-74 and 1979-80. The study showed that the policy of export-linked import liberalisation followed in India, raising the import content in a large number of sectors, has enabled the export sector to increase its capacity to pay for its imports. Atul Sarma (1990) also examined the relationship between export growth and import-intensity during 1983-87 within an input-output framework. One of the findings of the study is that the rank correlation between the sectoral export growth and the respective import-intensity is very high at 0.94 reflecting a strong positive association between the growth in export and import demand.

An empirical study carried out by Pitre (1989) on the basis of company finance data had shown an increasing net outgo of foreign exchange during 1978-79 to 1987-88 in sharp contrast to the net inflow of foreign exchange during 1974-75 to 1977-78. This outflow is attributed to a number of factors - demand recession in the Indian economy, oil price hike, delinking of the Indian rupee from pound sterling and pegging it to a basket of currencies, and increase in remittances, to name the major ones. A more recent empirical study by Pitre (1992) within the framework of input-output analysis has also shown that import intensity has increased from 0.027 in 1968-69 to 0.052 in 1983-84 but subsequently diminished to 0.047 in 1987-88.

Siddharthan (1989) carried out a study on the basis of data culled out from large public limited companies published by the Reserve Bank of India. The number of observations for the pooled cross section time-series sample is 57. The study has brought out a sharp uptrend in import-intensity immediately after liberalisation and its continuation at that high level. In sharp contrast, the export intensity of many industries declined following the intensification of liberalisation process since 1985 for large companies thereby contributing to a large trade gap during the sample period.

A study done at the Indian Institute of Foreign Trade (1990) showed that import liberalisation had a very positive impact on the Indian economy in terms of accelerated production and exports. The impact of import liberalisation measures, viz., widening the coverage of the OGL list and reduction in tariff rates, had been very significant in the food sector. Production was also found to have

had strong impact on both imports and exports. The rapid rise in incremental exports of food, garments, engineering and textile groups during 1980-81 to 1986-87 may be attributed to growing imports of capital goods in the wake of increasing import liberalisation.

Mani (1991) has attempted to assess the import dependence of the Indian economy in terms of a host of indicators - the Net Foreign Exchange Inflow Rate (NFIR), the Import Intensity Rate (IIR) and the Direct Cost of Technology Import Rate (DCTR). The NFIR is the ratio of net exports to total exports of a specific industry. The IIR represents the ratio of imports to net value added expressed as a percentage. The DCTR is defined as the ratio of the sum of royalty, technical fees and dividends to net value added and expressed in percentage terms. The application of these measures suggests that the level of import dependence has shown a perceptible increase during the period 1986-87 to 1988-89. The author has not, however, examined the impact of import intensity on exports.

An empirical study on the subject by the Export Import Bank of India (EXIM Bank) (1991) showed that the index of import intensity of exports increased gradually from 21.2 per cent in 1980-81 to 41.7 per cent in 1988-89 but declined subsequently to 38.1 per cent in 1989-90 while those of manufactured exports went up from 38 per cent in 1980-81 to 52 per cent in 1989-90. Exclusive of the gems and jewellery sector, the import-intensity of manufactured exports spurted from 32 per cent to 42 per cent. The study is based on primary data collected through firm level responses covering the five sectors, namely, leather products, readymade garments, chemicals and drugs, engineering products and gems and jewellery. The intrinsic limitation of the study lies in its coverage based upon the responses received from five major firms which may not be representative of their industrial group. However, an important contribution of the study lies in the derivation of a relatively realistic norm of import-intensity of exports at a detailed product and sub-product level apart from analysing a trend in these norms.

An empirical study by Dholakia (Ravindra H), Dholakia (Bakul H) and Kumar (1992) has shown that the import-intensity of export-oriented sectors is higher than the import-intensity of the rest of the economy. These authors have applied two alternative measures of import-intensity, *viz.*, (a) imported inputs in relation to total inputs used for tradables and (b) proportion of imported input to the value of exports. The weighted average of these ratios for the 10 export-oriented sectors has been found to be 7.96 per cent as against the national average of 4.99 per cent. In sharp contrast, the weighted average for 10 export-oriented sectors on the basis of the second measure worked out to 3.48 per cent as against the national average of 2.19 per cent.

SECTION III

Measurement of Import-Intensity

Since the 'eighties, there has been a sharp shift in the stance of economic policy, in which external liberalisation forms an important ingredient. The components of external liberalisation include, *inter alia*, a relaxed import regime for exporters, extension of fiscal and monetary concessions for exports, improvement of external competitiveness by acting on exchange rates, and simplification of import-export policies with a view to making Indian exports competitive in the international markets. The underlying rationale is that liberalisation of imports would increase the production of 'tradables' and that such goods would actually be exported eventually.

Imports of capital goods and their growth could be taken as one of the important indicators of external liberalisation. There was a striking acceleration in the average share of imports of capital goods in total imports. The share of capital goods constituted 26.4 per cent (in value terms) during the Seventh Five Year Plan as against 18.4 per cent and 21.9 per cent during the Fifth and the Sixth Five Year Plans, respectively. The share of capital goods imports, however, declined to 24.1 per cent in 1990-91 but this was because of the exceptional balance of payments problems faced in the year giving rise to import compression. On the other hand, the number of capital goods placed on OGL list increased from 443 in 1980-81 to 985 in 1985-86 and further to 1,339 in 1990-91 and the share of machinery and parts in the country's total value of imports declined from the peak level of 31 per cent in 1986-87 to about 24 per cent in 1989-90.

A look at the composition of import licences issued reflects the commitment of the Government to achieve the import-led export growth. The linkage of import liberalisation to export promotion may be discerned from the persistent uptrend in import licences issued to the Registered Exporters during the 'eighties and the early 'nineties. The share of licences issued to the Registered Exporters in total import licences issued increased gradually from about 23 per cent in 1981-82 to about 61 per cent in 1988-89 and further to about 68 per cent in 1991-92 after a short slide in 1989-90 and 1990-91 (Table I). It is important to note that the share of Registered Exporters in the total import licences issued averaged much higher at 51.5 per cent per annum during the post-liberalisation period (*i.e.*, 1985-86 to 1991-92) as against an annual average of 28.6 per cent in the pre-liberalisation period. Furthermore, under the Duty Exemption Scheme, the Registered Exporters have access to duty-free inputs for export production at international prices so as to make the exports competitive in international markets. The duty-free import licences issued during 1988-89 to 1991-92 at Rs.12,167 crore accounted

for about 29 per cent of the total import licences issued to the Registered Exporters. The duty-free import licences constituted an important instrument of trade policy especially since tariff levels were high and has risen during the greater part of the 'eighties in an effort to move away from quantitative restrictions.

At the macro level, the ratio of imports to GDP is generally regarded as an indicator of import-intensity. An analysis of import data on payments basis indicates that the ratio of imports to GDP at current prices was fractionally higher at 8.4 per cent during the Seventh Plan period as against 8.3 per cent in the Sixth Five Year Plan. In sharp contrast, import-GDP ratio, on the basis of DGCI&S data, stood lower at 7.3 per cent in the Seventh Plan period as against 8.0 per cent during the Sixth Plan period. As the DGCI&S data exclude certain types of imports, data on payments basis are expected to reflect a more realistic picture. Import-GDP ratio on payments basis stood still higher at 9.3 per cent in 1990-91.

The uptrend in rupee value of imports could be explained in terms of three factors, i.e., the steady depreciation in the value of rupee, the increase in the unit prices of imports and the persistent uptrend in the volume of imports. With a view to knowing the trend in overall volume imports and imports of capital goods, linear trend equations have been estimated for the period 1980-81 to 1989-90. 'Capital goods' is proxied by machinery and equipment quantum index. A dummy variable has been introduced to capture the structural break in mid 'eighties emanating from the intensification of import liberalisation. The statistical significance of time has been tested by the usual 't' tests and goodness of fit measures. Although the number of observations is small and the degrees of freedom limited, the equations could fulfil the limited objective of finding out whether the much discussed trade liberalisation since the mid 'eighties has in fact had an effect on the volume of imports. This is a purely indicative exercise and is not sought to be used for any futuristic projection.

Equations

QIM = a + bt + D
QIME = a + bt + D
Where
QIM   :   Quantum Index of Imports
QIME :   Quantum Index of Machinery and Equipments.
t   :   Time
D   :   Dummy

Volume Index

The results of the estimated equations are given below :

$$QIM = 70.714 + 5.190 t + 3.104 D$$
$$(3.913)@ \quad (0.375)$$

$$\bar{R}^2 = 0.869 \quad DW = 2.381$$

Capital Goods

$$QIME = 58.369 + 8.418 t + 2.066 D$$
$$(2.837)@ \quad (0.109)$$

$$\bar{R}^2 = 0.764 \quad DW = 2.141$$

@ Significant at 1 per cent level.
Figures in brackets indicate t-statistic.

Rising trends in overall real imports and imports of capital goods are discernible during 1980-81 to 1989-90 and the co-efficient of time is statistically significant. The co-efficients of dummy variable are, however, not statistically significant, thus showing that liberalisation *per se* has not given rise to structural break in the overall import-intensity.

Import-Intensity in Industrial Sector

According to the Economic Survey 1990-91, "the rapid industrial growth during the `eighties has been characterised by an increase in import-intensity". The Survey has also underscored the need for a greater balance in terms of import-intensity. This issue has been examined here at the industry-specific level, based on the data relating to the large public limited companies in view of the fact that the benefits of import liberalisation are generally reckoned to accrue to large corporations. For purposes of analysis, four industries, *viz.*, Chemicals, Engineering, Cotton Textiles and Paper and Paper Products have been selected on the basis of the degree of import-intensity. The period covered is 1975-76 to 1989-90. There has been a gradual increase in imported raw material consumption (*i.e.*, imported raw materials consumed as a percentage of total raw materials consumed) during 1975-76 to 1989-90. The import-intensity of raw material consumption for all the industries covered by company finance studies, referred to earlier, increased gradually from 10.1 per cent in 1975-76 to 20.7 per cent in 1989-90, reflecting an increase of over 10 percentage points in value terms over the period. As is expected, the levels varied strikingly across the industries. The paper and paper products industry experienced the sharpest increase in the import

intensity of imported raw material consumption from 3 per cent in 1975-76 to about 31 per cent in 1989-90; the corresponding figures for cotton textiles were 7 per cent and 31 per cent. The ratio in the case of chemical industry surged from about 15 per cent in 1975-76 to 27 per cent in 1989-90. Similar was the trend for the engineering industry. The phenomenon of rising import-intensity could also be adduced from the uptrend in the share of imported raw material and imported capital goods (*i.e.*, plants, machinery, etc.) in total raw material and capital goods consumed (Table - II).

The trends in the earnings and expenditures in foreign exchange of the aforesaid industries have also been taken as yet another indicator of import-intensity. The earnings and expenditures of the companies indicate that net outflow of foreign exchange increased following the introduction of trade reforms in 1978-79. Industry-wise analysis of data indicates that import-intensity was most pronounced in the chemical industry and the engineering industry (Table III).

Public sector companies also witnessed negative foreign exchange earnings throughout the 'eighties. The data relating to public sector as a whole are available in US dollar terms and are presented in Table IV. The deficit in foreign exchange averaged $ 2,128 million per annum during the Seventh Five Year Plan period as against $ 1,935 million per annum during the Sixth Five Year Plan period.

Imports of machinery and parts at current prices recorded an average annual growth rate of 20 per cent during 1980-81 to 1990-91. Even in real terms, the growth rate in unit value of imports (base 1978-79 = 100) was 11.4 per cent. The average annual growth rate which was 17.6 per cent during the Sixth Five Year Plan accelerated sharply to 21.8 per cent during the Seventh Five Year Plan. Imports of machinery and parts on an average annual basis accounted for about 25.4 per cent of total imports during 1985-86 to 1990-91 as against 16.9 per cent in the Sixth Plan period.

SECTION IV

Impact of Import-Intensity on Exports

The sharpness of import-intensity in general and across the industries covered by company finance studies is expected to have a positive impact on exports. Import of technology including capital goods would impact on exports with a time lag, while imports of raw materials and spares are expected to have positive impact on exports even in the short-run. *Prima facie*, as imported raw materials constitute a sizable portion of total imports, exports should go up in the

short-run with import liberalisation. The positive impact of intensification of import liberalisation following introduction of the first long-term import-export policy in the year 1985-86 is distinctly discernible in respect of chemicals, cotton textiles and engineering industries. The chemical industry experienced a rise in export to total sales ratio from 3.9 per cent in 1986-87 to 6.1 per cent in 1989-90. The impact of import liberalisation on exports was rather more perceptible in the case of cotton textile industry. The export to total sales ratio increased gradually from about 3.1 per cent in 1986-87 to more than 9 per cent in 1989-90 reflecting a rise of 6 percentage points over the period. The engineering industry, however, witnessed a somewhat modest impact: its export to total sales ratio, which hovered around 3.5 per cent level during 1985-86, increased to 4.4 per cent in 1988-89 and further to 5.6 per cent in 1989-90. Paper and paper products industry also experienced a mild impact of import liberalisation on its exports during 1989-90. Thus, the available evidence suggests the positive impact of import liberalisation *albeit* in varying degree on exports of chemicals, cotton textiles and engineering industries during the second half of the 'eighties. The improved exports of these industries were also facilitated by depreciation in the real effective exchange rate of the rupee of about 35 per cent between 1985 and 1989, which would have resulted in raising the relative prices of tradables to non-tradables (home goods) and thus enabling an increase in the production of tradables (Table V).

Econometric Analysis

In order to test the effect of import liberalisation on exports, we conducted a regression analysis on annual data for the period 1975-76 to 1989-90. The ordinary least square (OLS) method has been used for the purpose of estimation. The dependent and explanatory variables used for the purpose of regression analysis are detailed below:

Dependent Variable

$(X/TS)_t$: Ratio of export sales to total sales in period t

Independent Variables

$(MRMC/TRMC)_{t-1}$: Ratio of imported raw materials consumed to total raw materials consumed in period t-1
REER : Index of real effective exchange rate with base 1978-79 = 100, Or
NEER : Index of nominal effective exchange rate with base 1978-79 = 100

The regression analysis shows that the growth in exports have had a positive link with the ratio of consumption of imported raw materials to total raw materials consumed in the previous period in respect of chemicals and engineering

(Annexure). The sensitivity of engineering export-sales ratio to the ratio of imported raw material consumed to total raw material may be attributed to the International Price Reimbursement Scheme (IPRS) whereby engineering exporters are reimbursed the difference between international and domestic prices of steel. The exchange rate policy had no impact on exports of engineering goods presumably because the positive impact of depreciation was swamped by incentives provided through the IPRS. The response of export of chemicals and chemical products with respect to REER is high. With every one per cent depreciation, exports to sales ratio of chemicals and chemical products have increased by 0.929 per cent. The responsiveness is, however, not so evident with respect to nominal effective exchange rate. Since India is an important supplier of textiles in the international market where prices are fixed in terms of foreign exchange, a downward adjustment in the exchange value of the rupee will give rise to an increase in the volume of exports. This may be seen from the detailed results of the estimated equations presented in annexure.

SECTION V

Conclusions & Policy Implications

The stance of trade policy followed since the late `seventies has been to accelerate export promotion through import liberalisation. The positive link between export promotion and import liberalisation was sought to be achieved through import licensing mechanism. A striking increase in the licences issued to the Registered Exporters *vis-a-vis* the total licences issued during late `eighties and early `nineties as well reflects the commitment of the Government to spur exports through import liberalisation. Increasing reliance on duty-free import licences constituted an important instrument of trade policy in our situation characterised by high tariff structure across large segments of the manufacturing sector. These duty-free import licences assumed special significance in a scenario characterised by a shift from quantitative restrictions to tariff- based measures for import compression during mid `eighties.

Regression analysis suggests that import liberalisation has had a positive impact on exports of chemical and chemical products, cotton textiles and engineering industries. The estimated regression equations suggest that exchange rate depreciation have had positive impact on exports of chemicals and cotton textiles industries. The responsiveness of exports to price incentives assumes crucial significance in the context of the effectiveness of price factor in the promotion of exports.

The success of the strategy of import-led export growth has far-reaching policy implications in the context of the decision of the Government to bring down

substantially the degree of protection to internationally comparable level. An import-led export growth is sought to be promoted by the Export Promotion Capital Goods (EPCG) Scheme announced as a part of the EXIM policy 1992-97 whereby import of capital goods is allowed at a concessional rate of Customs duty of 15 per cent provided the manufacturer-exporters undertake an export obligation of four times the CIF value of imports within a period of five years from the date of issue of the import licence. As is inevitable, the EPCG Scheme in conjunction with improved Advance Licensing Scheme will strengthen the positive link between imports and exports.

The level of protection is sought to be brought down through reduction in tariff rates. Since mid-1991, the maximum rate of import duty has been reduced gradually from over 300 per cent to 85 per cent in the Central Government Budget for 1993-94. According to a recent World Bank estimate, the import-weighted average tariff level has reportedly come down from 85.5 per cent in 1987-88 to 47 per cent in 1993. With the reduction in the imported component of the cost structure of the Indian manufactured products resulting from rationalisation of import tariff rates, the domestic prices of manufactured products which are at present higher than international prices, will come down and the domestic industries would become internationally competitive. The resultant alignment of the domestic industrial prices with the international prices would inevitably induce the large public limited companies to augment the production of tradables. The expansion in exports would be further facilitated by the fact that tariff barriers of developed countries do not pose a serious constraint to growth of India's manufactured exports. A study by Kumar (1990) has shown that the applicable import tariff imposed by developed countries on Indian products is too low to be a serious barrier to export expansion.

The sensitivity of exports to price incentives as reflected in the exchange rate movements augurs well for the external sector of our economy, the elasticity of exports with respect to REER as reported in Rangarajan (1991) being -0.66. The unification of exchange rates, effective March 1, 1993 has signalled the advent of exchange rate neutral regime and would augur well for India's exports assuming that there is relative price stability in India vis-a-vis its trading partners. As Bhagwati and Srinivasan have observed, a step-by-step reduction in import duties in conjunction with the depreciation of real exchange rate have made Indian tradable goods more competitive than that in the years prior to reforms. This position needs to be strengthened by obtaining relative macro-economic stability.

References

1. Bhagwati, J.N. and Srinivasan T.N. (1975), "Foreign Trade Regimes and Economic Development", New York, cited in Harmann Sauttar "Underdevelopment Through Isolation? Dependency Theory in Retrospect" in H.W. Singer and others, *Economies and New World Order*, Ashish Publishing House, New Delhi, 1981, p482.

2. Bhattacharya, Manas (1989), "Import-Intensity of Exports", *Indian Economic Journal*, Vol.36.

3. Datta, Bhabatosh (1991), "Foreign Controlled Rupee Companies", *Business Standard*, September 11.

4. Debroy, Bibek (1992), *Foreign Trade Policy Changes and Devaluation : Current Perspective*, B.R. Publishing Corporation, Delhi.

5. Dholakia, D.H. and Dholakia, Bakul H. and Nagesh Kumar (1992), "Issues in Strategy for Export Promotion", *Economic and Political Weekly* (EPW), November.

6. ESCAP (1992), "Promotion of International Competitiveness and Exports of Manufactured Goods in Asian Countries - A Comparative Study", *Draft Report*, June.

7. EXIM Bank (1991), "How Import Intensive are Indian Exports?" *Occasional Paper*, No. 16, December.

8. Government of India, *Economic Survey*, 1990-91, 1991-92 and 1992-93.

9. Government of India (1993), *Tax Reforms Committee, Final Report*, Part II, (Chairman: Raja. J. Chelliah).

10. Government of India, *Export-Import policy*, (1992-97).

11. Gupta, S.B. (1992), *Black Income in India*, Sage Publications.

12. Holla, K.R. (1989), " India's Balance of Payments during the Four Decades of Planning", *RBI Occasional Papers*, December.

13. Indian Institute of Foreign Trade, (1990), *Impact of Import Liberalisation on Exports*.

14. Joshi, V. & Little, IMD (1993), " Future Trade and Exchange Rate Policy for India", *E.P.W.*, July.

15. Krueger, A. (1974), "The Political Economy of the Rent Seeking Society", *American Economic Review*, Vol. 64 (2), p291-303.

16. Mani, Sunil (1991), " Export Liberalisation and Import Dependence", *E.P.W.*, July.

17. Nagesh Kumar (1990), "Foreign Controlled Enterprises in Indian Industry", EXIM Bank *Occasional Paper*, April.

18. Pitre, Vidya (1989), "Net Foreign Exchange Earnings of Private Corporate Sector", *E.P.W.*, September.

19. Pitre, Vidya (1992), "Import Intensity in the Indian Economy", *RBI Staff Studies*, May.

20. Pindyck, Robert S and Rubinfeld, Daniel R (1981), *Econometric Models & Economic Forecasts*, McGraw - Hill Book Company, Second Edition.

21. Rangarajan, C. (1991), "Recent Exchange Rate Adjustments: Causes and Consequences", *Reserve Bank of India Bulletin*, September.

22. Rao, Chalapati K.S. (1987), "India's export policies and Performance - An evaluation", *IIPA Corporate Studies Group, Working Paper*.

23. Sarma, Atul (1990), "Import Intensities of Indian Industries in the context of New Economic Policy- An Analysis in input-output framework", *Man and Development*, September.

24. Siddharthan, N.S. (1989), "Impact of Import Liberalisation on Export Intensities - A Study of the Indian Private Corporate Sector", *Indian Economic Journal*, Vol.37, No.2.

25. Srinivasan, T.N. (1992), "Privatisation and Deregulation", *E.P.W*, April.

Annexure

Regression Results

1. Chemical Industry

a) $\log(X/TS)_t = 4.14 + 0.547 \log (MRMC/TRMC)_{t-1} - 0.929 \log REER$
     (1.752) (2.601)*   (-2.184)*

$\bar{R}^2 = 0.612$ D.W. = 1.813

b) $\log(X/TS)_t = -1.417 + 0.541 \log (MRMC/TRMC)_{t-1} - 0.323 \log NEER$
     (0.631) (1.977)*   (1.01)

$\bar{R}^2 = 0.462$ D.W. = 1.802

2. Cotton Textiles

$(X/TS)_t = 21.548 + 0.780 (MRMC/TRMC)_{t-1} - 0.167 REER$
   (4.370)@ (1.583)   (-4.217)@

$\bar{R}^2 = 0.856$ D.W. = 2.277

3. Engineering Industry

$(X/TS)_t = 0.189 + 0.155 (MRMC/TRMC)_{t-1}$
   (0.035) (2.311)*

$\bar{R}^2 = 0.794$ D.W. = 2.220

Figures in brackets indicate T-statistic.

@ Significant at 1 per cent.

* Significant at 5 per cent.

Table- I : Trends in Import Licences issued during 1980-81 to 1991-92

(Rs. crore)

Year	Total Licences issued	Licences issued to Registered Exporters	Col. 3 as % age of Col. 2
1	2	3	4
1980-81	5340.4	1422.0	26.6
1981-82	7755.3	1762.9	22.7
1982-83	7165.6	1963.5	27.4
1983-84	7030.3	2294.4	32.6
1984-85	8255.5	2786.1	33.7
1985-86	8417.1	2848.6	33.8
1986-87	9213.4	3553.0	38.6
1987-88	10415.1	4952.1	47.5
1988-89	13797.3	8468.9	61.4
1989-90	18634.1	10534.5	56.5
1990-91	19201.3	10395.2	54.1
1991-92	18065.0	12351.0	68.4

Source : Various issues of Report on Currency and Finance, RBI.

Table - II : Import Intensity of Selected Industries

(Per cent)

Year	Imported raw material and capital goods consumed as proportion of total raw material and capital goods consumed			
	Chemical Industry	Engineering Industry	Cotton Textiles	Paper and paper products
1975-76	4.65	6.05	1.83	1.89
1976-77	4.45	5.83	1.81	1.96
1977-78	6.78	5.62	4.30	2.04
1978-79	5.96	5.62	4.21	4.84
1979-80	7.01	6.94	3.35	5.77
1980-81	7.49	6.00	2.63	2.62
1981-82	6.60	6.94	5.03	2.82
1982-83	6.80	6.84	5.34	2.93
1983-84	5.73	6.11	3.17	4.25
1984-85	7.40	4.96	3.70	4.63
1985-86	9.19	6.47	2.34	10.05
1986-87	9.79	7.85	8.91	12.30
1987-88	8.42	8.02	5.51	8.99
1988-89	11.99	8.29	8.25	9.54
1989-90	11.36	9.14	6.43	9.09

Source: Articles on "Large Public Limited Companies" appearing in different issues of the RBI bulletins.

Table - III :   Net Inflow of Foreign Exchange Earnings of Large Public Limited Companies.

(Rs. crore)

Year	Chemicals			Engineering goods		
	Total earnings	Total expenditure	Net (2)-(3)	Total earnings	Total expenditure	Net (5)-(6)
1	2	3	4	5	6	7
1975-76	51.0	97.8	-46.8	150.6	199.6	-49.0
1976-77	67.1	112.2	-45.1	210.0	213.6	-3.6
1977-78	70.0	176.4	-106.4	233.9	228.7	5.2
1978-79	85.2	186.6	-101.4	258.9	292.7	-33.8
1979-80	114.8	223.4	-108.6	259.0	405.2	-146.2
1980-81	132.7	263.4	-130.7	305.5	481.6	-176.2
1981-82	184.9	308.4	-123.5	383.1	696.8	-313.7
1982-83	212.2	420.2	-208.0	457.2	733.8	-276.6
1983-84	203.7	369.1	-165.4	352.6	679.9	-327.3
1984-85	241.8	489.2	-247.4	429.7	627.6	-197.9
1985-86	273.7	684.1	-410.4	468.5	853.1	-384.6
1986-87	298.3	814.1	-515.8	455.6	948.0	-492.4
1987-88	375.6	803.7	-428.1	479.8	1,098.4	-618.6
1988-89	526.4	323.7	202.7	683.8	1,461.5	-777.7
1989-90	750.5	1,581.6	-831.1	1,043.8	1,937.5	-893.7

(Contd.)

Table - III :   Net Inflow of Foreign Exchange Earnings of Large Public Limited Companies (Concld.)

(Rs. crore)

Year	Cotton textiles			Paper and paper products		
	Total earnings	Total expenditure	Net (8)-(9)	Total earnings	Total expenditure	Net (11)-(12)
1	8	9	10	11	12	13
1975-76	67.2	25.4	41.8	2.2	9.1	-6.9
1976-77	102.3	28.4	73.9	2.5	8.5	-6.0
1977-78	92.4	67.4	25.0	4.6	11.0	-6.4
1978-79	88.4	75.2	13.2	4.2	24.2	-20.0
1979-80	105.9	66.3	39.6	4.2	34.2	-30.0
1980-81	114.8	62.3	52.5	6.1	23.1	-17.0
1981-82	93.2	127.5	-34.3	17.9	27.9	-10.0
1982-83	106.8	172.9	-66.1	10.1	34.8	-24.7
1983-84	77.8	108.8	-31.0	4.9	33.4	-28.5
1984-85	85.3	142.7	-57.4	2.6	45.5	-42.9
1985-86	110.0	63.5	46.5	2.8	111.3	-108.5
1986-87	117.7	326.9	-209.2	4.1	149.8	-145.7
1987-88	216.4	262.9	-46.5	8.0	109.9	-101.9
1988-89	242.9	408.1	-165.2	16.2	139.8	-123.6
1989-90	390.6	369.8	20.8	38.7	173.2	-134.5

Source : See Table II.

Table - IV : Earnings and Utilisations of Foreign Exchange by Public Sector Undertakings

(US $ million)

Year	Earnings	Utilisations	Net Earnings
1980-81	2,803	6,142	-3,339
1981-82	3,073	6,345	-3,272
1982-83	4,911	6,596	-1,685
1983-84	5,240	6,546	-1,306
1984-85	4,905	4,978	-73
1985-86	3,105	5,220	-2,115
1986-87	3,083	4,235	-1,152
1987-88	3,221	5,298	-2,077
1988-89	3,378	5,144	-1,766
1989-90	3,824	7,356	-3,532

Source: Various issues of Public Enterprises Survey, Department of Public Enterprises, Govt. of India.

Table - V : Exports to Total Sales Ratio

(Per cent)

Year	Chemical industry	Engineering industry	Cotton Textiles industry	Paper & Paper products
1	2	3	4	5
1975-76	3.08	5.73	6.35	0.81
1976-77	3.53	6.96	8.60	0.90
1977-78	3.34	7.49	6.48	0.97
1978-79	3.64	6.84	5.76	1.24
1979-80	4.41	5.68	6.17	0.51
1980-81	4.58	5.41	5.84	0.96
1981-82	4.72	4.98	4.40	3.05
1982-83	4.23	5.01	4.32	1.51
1983-84	3.82	3.67	2.98	0.42
1984-85	4.10	3.95	2.33	0.12
1985-86	4.13	3.53	2.99	0.24
1986-87	3.90	3.43	3.13	0.24
1987-88	4.28	3.21	6.36	0.51
1988-89	5.20	4.38	6.69	1.02
1989-90	6.14	5.60	9.24	1.22

Source : See Table II.

BOOK REVIEWS

Trade Policy, Industrialization, and Development: New Perspectives, edited by G.K. Helleiner, Clarendon Press. Oxford, 1992, Pp. x + 324, Price Rs.440

The book under review attempts to establish the inter-relationship between industrialization and trade policy under alternative assumptions relating to market structures and process of learning. It is based on a research project undertaken by the United Nations University's World Institute for Development Economics Research (WIDER). It is a collection of articles, focussing on the "new" or "strategic" trade theories which attempt to incorporate the institutional and structural characteristics of developing countries.

The importance of learning and productivity change in LDC manufacturing at both the firm and sector level is the focus of attention of the article of Howard Pack. It is by now well known that in the context of intra-industry variations in technology in developing countries, a pioneering firm which faces external diseconomies, due to spill-over effects, needs to be subsidised in the initial learning phase. However, the pioneering firm should satisfy the Mill-Bastable criterion, i.e. the discounted present value of social gains must exceed those of the social costs incurred during the period of learning. Pack points out that growth of Total Factor Productivity (TFP) can serve as an indicator in this context, though the welfare implications of the growth of TFP are still ambiguous. He rightly argues that rapid growth of TFP may have adverse effects on employment and income distribution if technology is labour-saving. An increase in investment beyond the level dictated by the "golden rule" may also lead to diminishing social returns. Moreover, the growth in TFP should be accompanied by an increase in price competitiveness of domestic firms, so that they can compete in the global market. Pack goes on to argue that countries following an outward-oriented trade policy have performed well in terms of economy-wide productivity than those following an inward-looking policy, and cites the cases of Korea and Taiwan which have developed a comparative advantage in the production of manufactures. Pack's conclusion, however, may not hold good for LDCs having a small share in world trade and a comparative advantage in the production of primary commodities, the income-elasticity of demand for which may well be below unity. A rise in exports in such a scenario (of adverse terms of trade) may therefore slacken the growth process.

While Pack deals mainly with the empirical evidence, Dani Rodrik discusses the theoretical aspects of technical progress. The failure of import-substituting

industrialisation strategy in most developing countries have prompted them to go in for trade liberalisation and export-oriented policies. The latter is expected to increase the competitiveness and efficiency of domestic industries through an expansion in their technological frontier. Rodrik, however, argues that the effects of liberalisation on the rate of growth of output or productivity is not certain. He contradicts the view that protection breeds monopoly and a "satisficing" behaviour on the part of the domestic entrepreneurs. The larger market share gauranteed by trade restrictions is expected to increase the marginal benefits of cost improvements and stimulate technological change. Citing the experiences of Korea and Taiwan, Rodrik argues that macroeconomic stability can be achieved without recourse to trade liberalisation. Removal of trade restrictions may encourage firms to expand their scale of production of tradeables. But Rodrik points out that liberalisation would fail to increase production, if the export sector does not enjoy increasing returns to scale. By using a few simple models in a partial equilibrium setting, he comes to the conclusion that selective protection and not complete liberalisation is expected to increase technical efficiency of domestic firms. However, it is difficult to agree with Rodrik's assertion that trade policies should be distinct from macroeconomic policies. Any macroeconomic imbalance arising out of a critical balance of payments situation has to be tackled by taking recourse to effective monetary, fiscal and trade policies. Trade policies (i.e. export and import policies) designed to reduce the deficit in balance of payments should form an integral part of any macroeconomic policy package to ensure policy consistency as between domestic and external sectors.

R. Albert Berry in his article "Firm (or Plant) size in the Analysis of Trade and Development" discusses the role of firm size in international trade. Contrary to the assumptions regarding returns to scale made in the Heckscher-Ohlin model, Berry shows the widespread prevalence of economies of scale in manufacturing industries. He asserts that production of exportables in most developing countries is undertaken by the larger firms, which use relatively high capital-intensive techniques of production. Thus, even for a labour-abundant economy, trade tends to increase the share of a scarce factor in national income. The structure of import controls and export subsidies is such as to benefit the larger firms. They also enjoy economies of scale in production and export marketing, product differentiation, advertising, preferential access to capital etc. Thus Berry concludes that once the distortions in foreign exchange and capital markets are removed, small scale industries using labour-intensive technology can be expected to perform well in the export market. An outward-oriented policy would then have the desired effect of improving the country's balance of payments situation, without having an adverse effect on employment and income-distribution.

In his article "Market Structure and Trade in Developing Countries", Norman Lee studies the interrelationships between market structures and international trade in developing countries. He extends the traditional S-C-P model (market structure-conduct-performance) to incorporate international trade and analyses the implications of different market structures in trade. Seller concentration, buyer concentration, entry barriers and product differentiation constitute the four major market-structure variables used in the S-C-P model. Lee observes high levels of domestic seller concentration in most developing countries having imperfect market structures. He points out that the complexity of the underlying relationships between market structure, conduct and performance in an open economy makes it difficult to understand the relationship between trade and market structures.

Frances Stewart and Ejaz Ghani discuss the effects of externalities on growth and their implications for industrial and trade policies. The authors feel the need for state intervention in the case of real externalities. In case of pecuniary externalities, state intervention is justified only "in the presence of indivisibilities, learning economies, or real externalities in one or other of some linked industries". In order to formulate policies to deal with externalities, one must have some measure of the latter. According to Stewart and Ghani, dynamic production externalities like attitudes and motives and human capital formation may be measured by the rates of capital accumulation as well as productivity change and "earnings associated with different levels of education/training" respectively. Technology transfer through networking and induced technical change may be difficult to measure. As the authors rightly argue, these externalities are widespread in the initial stages of industrialisation and firms experiencing such dynamic externalities require special support from the government. If the externality is widespread among industries, non-discriminatory industrial support has to be given to reduce the externalities. Firms may also resort to integration or bargaining, though the effectiveness of both diminishes with an increase in the number of firms involved.

Donald B. Keesing and Sanjaya Lall point out the importance of marketing and transmission of information in international trade. Classical and Neoclassical trade theories assume perfectly competitive markets where information is free and costless. However, Keesing and Lall argue that the assumption of costless information does not hold in case of market imperfections. Limited access to competitively priced inputs, services, infrastructure and relevant information are some of the problems faced by the exporters of manufactured goods in developing countries. The authors emphasize the fact that exports depend a lot on such non-price factors as quality, packaging, brand image and marketing arrangements. Thus, in order to improve export supply, developing countries should set up a

network to provide cost-effective "consultancy assistance" to the exporters of manufactured goods. This will enable them to learn the relevant techniques and skills and methods of quality control.

A part of the book under review deals with a few case studies. Winston Fritsch and Gustavo H.B. Franco, discuss the role of foreign direct investment in industrialisation and international trade in the case of newly industrialising countries (NICs). The increasing share of multinational corporations (MNCs) in domestic industrial production of the NICs and their important role in exports of manufactured goods were underscored by a number of observers. Empirical evidence shows that, unlike in the 1960s and early 1970s, MNC affiliates in leading Latin American countries in recent years have been increasingly orienting their policies towards export production. Illustrating this view, the authors maintain that direct private foreign investment in Brazil was largely responsible for a change in the country's comparative advantage in favour of manufactured goods in the eighties. Their calculations of revealed sectoral comparative advantage (RCA) indices for the Brazilian economy indicated that while RCA was higher in "Less technology - intensive sectors", it was higher in case of capital - intensive sectors when the coverage was restricted to foreign firms. Richard Baldwin considers the case of Brazilian Aircraft and tries to describe the logic of strategic trade policies with the help of a simple partial equilibrium model. His study aims primarily at developing a methodology and does not focus on the important policy issues. Chang-Ho-Yoon illustrates the case of Korean semi-conductor industry. He demonstrates how the private semi-conductor firms could compete successfully in the international market without direct subsidy or interventionist policies of the Korean government. Even though the Korean firms were late entrants in the export market, their steeply rising learning curves enabled them to market their chips profitably.

Leonard Waverman and Steven Murphy analyse the inter-relationships between growth in total factor productivity (TFP) and trade restrictive policies. Taking the case of automobile industry in several countries (Argentina, Mexico, Korea and Canada), the authors compare the changes in TFP and the impact of trade restrictions on it. They argue that the measured rates of TFP growth in the four countries cannot be explained by trade policy.

After going through the above writings, one is tempted to ask as to what lessons can be drawn from the "new" or "strategic" trade theories in the context of the Indian economy undergoing the process of liberalisation - an economy characterised by the presence of externalities, economies of scale, market imperfections, intra-industry heterogeneity, foreign collaborations etc. Driven by the infant industry argument and in a bid to achieve self reliance, the Government

had adopted a policy of import - substitution since the commencement of planning in India. This, in conjunction with domestic licensing policies in the industrial sector, led to growing inefficiencies and generation of rent-seeking activities, thus contributing to a low-growth profile of the Indian economy over the years. The policy of blanket protection adversely affected export performance, led to wasteful inter-industrial and inter-firm allocation of resources and encouraged expansion of excess capacity by blunting competition and thereby affecting incentives for cost consciousness and quality -improvement. Thus, contrary to Dani Rodrik's argument, protection did breed a "satisficing" behaviour on the part of the domestic entrepreneurs. India's performance on the industrial and export front improved substantially as the economy moved more and more towards an "outward oriented" strategy since the 1980s. As the process of liberalisation progresses, the foreign trade regime is expected to become competitive, achieving reduction in cost and improvement in quality and, as a result, the country would be in a position to effectively integrate itself with global markets. The presence of market imperfections and intra-industry heterogeneity in the manufacturing sector would however call for government support for the smaller firms which have limited access to foreign exchange, credit, subsidised inputs, information etc. This argument holds true for the small scale industrial sector which accounts for almost 25 percent of India's exports. Albert Berry's work testifies the adoption of such a policy stance from the point of view of employment and income distribution as well.

The relevance of the arguments put forth by Winston Fritsch and Gustavo H.B. Franco in favour of Direct Foreign Investment also need to be examined further in the Indian context in a cost-benefit framework. It may be underlined that in order to reap the optimum benefits from foreign direct investment, it is essential, as a part of overall trade strategy, to ensure that multinational corporations produce goods not merely for domestic markets but also for exports. Adoption of such a strategy is imperative for the achievement of an accelerated growth process. The rapid strides in economic growth achieved by the NICs amply endorses this approach. Empirical evidence suggests that multinational corporations in India have not so far contributed to exports to the degree that they have in Latin American countries. This implies that the MNCs price their products in a cost effective manner, which in turn would depend on the cost of raw materials used and of labour employed. Labour as much as industrial policies become relevant for trade in this context.

It may, however, be noted that the book opens up new vistas in the theory of international trade in which there is considerable scope for further empirical research. It questions the unrealistic assumptions underlying classical and neoclassical trade theories. The authors rightly point out that in the context of

dynamic changes in technology, factor-supplies, market imperfections, product or factor market distortions, scale economies and institutional bottlenecks, the case for government intervention in domestic and foreign trade policies very much exists. The authors are, however, silent on the issue of external factors which constrain the export performance of developing countries. The increasing incidence of protectionism in the industrialised countries, embodied in the escalated tariff structure and a range of unquantifiable non-tariff barriers, places a limit on the growth of manufactured exports from countries which are either not established as suppliers in the importing country or, are new entrants in the world market for a product. For example, quantitative restrictions embodied in the Multi Fibre Agreement (MFA) limit the growth in export of textiles from India. Moreover, market access is determined not only by the economics of competitiveness but also by the political economy of international relations. Notwithstanding these limitations, it needs to be emphasized that the inter-relationship between external trade and industrial growth and the identification of major sources of industrial growth based on firm calculations of revealed sectoral comparative advantage (RCA) indices becomes imperative while designing macroeconomic policy exercises.

Anindita Sengupta*

* Ms. Anindita Sengupta is Research Officer, Department of Economic Analysis & Policy.

Trade and Development Report, 1993, United Nations Conference on Trade and Development, United Nations, New York, 1993, Pp.xv + xi + 221, Price not given

Among the various multilateral official agencies, the one which shows the maximum unanimity with the consensual viewpoints of developing countries is undoubtedly the United Nations Conference on Trade and Development (UNCTAD). The Trade and Development Report, 1993 (TDR'93), a report prepared by the secretariat of the UNCTAD on the performance and prospects of the contemporary international economy, is no exception in this regard. It provides support to various long standing demands of the developing countries which include, among others, the need to curb the protectionist policies of the developed countries, the requirement of larger aid flows to them with greater certainty and for longer periods of time, the necessity to enhance policy coordination among various countries, and a meaningful conclusion of the Uruguay round of GATT negotiations. The report also adopts a pragmatic approach when it opposes in clear terms the view that, the end of the cold war in itself will bring out a golden age of market economy. The present international situation is, after all, very fluid, with many industrialised as well as developing countries facing serious problems and dilemmas. The TDR'93 argues that various multilateral agencies (e.g. OECD, IMF and even UNCTAD itself) have failed to capture the dynamics of the volatility of the contemporary global economy while forecasting growth in the international economy. This is reflected in the large deviations of the actual from those forecasted by these agencies. The agencies need to understand the changing functional relationships between various economic variables to make their predictions realistic.

The TDR'93 places a viewpoint that the industrialised countries are suffering from the problem of insufficient effective demand which has given rise to large scale unemployment in many of these countries. The emphasis on supply side policies in the United States during the eighties has resulted in a situation of mounting external current account as well as government deficit in the country. In the Western Europe, the objectives of reduction in public debt (which is a pre-condition for implementation of Maastricht Treaty), maintenance of exchange rate stability and internal balance have proved to be conflicting. While the removal of high unemployment rates requires counter cyclical policies (e.g. cut in interest rate), this could well constrain the attainment of exchange rate and price stability. In Japan, the external trade surplus has been high. This is

because the consumption levels including imports have been going down even as
exports have not been rising as before. The divergent economic circumstances
require to be therefore dealt with in a coordinated way. It is now feared that
uncoordinated but simultaneous attempts of these countries to reduce the
levels of public debt can trigger off a deep global recession. However,
coordinated efforts can help to reduce the rate of interest on debts and through
it the servicing costs. But the adjustment that would have to be undertaken in the
process should be expansionary rather than contractionary. It is felt that a
mixture of capital levy, privatization and monetary financing of government
deficit can take care of internal debt.

· Among the developing countries the worst performance has emanated
from the sub-Saharan Africa (SSA). These countries are facing serious
problems including natural calamities, war and civil war, a large accumulation
of external debt, terms of trade deterioration, decline in output and a poor export
performance. To address the widely divergent problems they have in recent
times entered into stabilisation and structural adjustment programmes (SAPs).
But recovery has eluded them so far. The TDR'93 argues that these countries
have not achieved good results of adjustment mainly because they have not
been able to diversify their production and export base. But it must be remembered
that simultaneous export promotion in similar commodities would often lead to
immiserising growth. The report, however, has tried to be objective while
examining the forms and contents of the SAPs and claims that, in sub-Saharan
Africa, SAPs are having an anti-investment bias. A more direct role of
government, a greater aid flow, a compensatory resource flow to counter the
terms of trade deterioration and an explicit industrial policy, to name a few,
have been suggested as the measures that the SSA should adopt to address their
problems.

The TDR'93 suggests that, except for a few countries (e.g. Brazil, Peru), the
Latin American economies have, more or less, recovered from the traumas of the
debt crisis of the '80s. In most of these countries, growth rates and exports have
revived, inflation is relatively low, fiscal deficits are below the corresponding
levels of the '80s and more importantly, international confidence in these
countries has improved. The last of these aspects is reflected in the large
external flows into these countries. However, there is a need to be cautious,
since the conditions which had fuelled the debt crisis during the '80s have not
disappeared altogether. The external capital flows to these countries are mostly
in the form of 'hot money' which has come in response to high short-term interest
rates and exchange rate arbitrage on their currencies which are gradually
becoming over-valued. There have virtually been no improvements in the
investment and domestic saving rates. The higher growth rates are thus due

to increase in consumption demand rather than increase in investment levels. Under such a situation any unfavourable shock can inflict a heavy blow to the reform efforts of these countries. The TDR'93 suggests that although the reforms in the direction of a market economy in the aftermath of the debt crisis have been successful in many cases (e.g. in Chile), the role of government has proved to be very crucial in bringing about the success.

The former socialist countries of Eastern Europe and the erstwhile USSR are going through a phase of instability where output levels and exports are falling sharply and unemployment, disguised unemployment and inflation have remained high. Though in some of these countries reforms are showing results, the crisis is still deep. The initial macro economic imbalances and supply shocks have played havoc in the eastern bloc. The TDR'93 suggests that a more gradualist approach towards reform together with efforts to create an entrepreneurial class rather than large scale privatisation of the public enterprises would be a more pragmatic one to solve the problems of these economies in transition.

The report views East Asia together with China as the new growth centre of the contemporary world. Both on output and export fronts, the performance of this group in recent years has been the best. Japan, together with the other newly industrialised nations of this area, is supplying capital, technology and export market to the developing countries in the area. Vertical division of labour and mutual complementarity of these nations have provided them a sustained high growth rate even against the recessionary backdrop of the global economy. Domestic factors like inflation and increase in labour-cost have no doubt resulted in loss of competitiveness of the East Asian Newly Industrialing Countries (NICs) (e.g. South Korea, Hong Kong) but compensating these factors were the increases in productivity and updating of technology. The NICs have moved towards technology intensive industries like electronics and in order to reap the fruits of low labour cost of the adjacent developing countries like China they have made direct investment in the labour-abundant countries of the region.

On the trade front, the TDR'93 shows that the volume of world trade is growing in a sluggish manner. The export growth in the developing countries has been higher than the global average, while their imports have grown even faster. But within the overall group of the developing countries, there have been large differences in performance. During the last decade though exports of the developing countries grew rapidly, their net barter terms of trade have deteriorated sharply. The income terms of trade, on the other hand, have shown an improvement. In particular, the manufacturing exports from these countries have risen very fast. The trade policies of the developing countries

and the economies in transition have shown marked liberalisation. However, in the developed countries, moves in this respect have been selective and their non-tariff measures have not shown any decline. Their trade practices outside the scope of the GATT are a matter of grave concern.

In the international capital markets, the flow of resources to the developing countries as a percentage of the total capital flow has remained modest. However, some of these countries, particularly in Latin America, have received considerable amount of external capital. East Asia including China has received good amount of foreign direct investments mainly originating from the same region. But, on the whole, the increased access of some of the developing countries to external funds has gone hand in hand with the continuing marginalisation of most of the developing countries and the economies in transition in the international capital market.

The debt crisis of the developing countries has changed considerably in its form since its emergence in the early '80s. The concept of debt overhang and the need for reduction of debt and debt servicing have been recognised by the international agencies. The Paris Club has made important head ways. Brady Plan has helped many developing countries to regain their credit worthiness. Many heavily indebted middle-income countries have passed the most critical stage. The eye of the crisis has, however, now shifted from the problem of commercial bank loan to the problem of repayment of the official debts by the low-income countries. The TDR'93 asserts that a close coordination between the Paris Club and the donor groups, a more flexible approach with respect to overhang of multilateral debt of the low-income countries and an augmented supply of bilateral concessional credit to the poor countries through SDR allocation and IMF gold sale are the needs of the hour.

Despite its analytical elegance and diversity of coverage, the TDR'93, however, has left some loose ends. The most glaring in this regard is the Report's approach towards primary exports of the developing countries. Primary exports have generally been discouraged and the need to move towards production and exports of manufactured items have been emphasised. The main reasons which have been advanced in favor of this argument include the elasticity pessimism for these products,the unfavourable movement of terms of trade, the possibility of immiserising growth due to productivity improvement and the emergence of large number of primary exporters coupled with the stagnant world demand (pages 25-31). These arguments, however, miss certain important issues. The primary sector in the developing countries generally enjoys a lower level of protection than the manufacturing sector. Various studies also show that developing countries generally have comparative advantage in this

sector. With larger investment and modernisation, this sector has, of late, received some importance. In such a situation the advice of the TDR'93 to the developing countries to change the composition of production and export in favour of manufacturing sounds unrealistic.The calculation of terms of trade movement between various sectors as well as the measures of export elasticities are ticklish issues because the values of these crucially depend on the methodologies used. Further, a movement in the terms of trade against a sector during a short period should not be the basis for advocating a change in production and export structures. It has been claimed by various studies that there has been really no long-term movement of terms of trade against the primary sector in this century. The arguments put forward in the TDR'93 give an impression that diversification, product differentiation, increase in value-added, with respect to both production and exports, are possible only in the manufacturing sector. However, this view is not plausible as there has been a large number of breakthroughs during the last decade in the biotechnology and related fields which have provided entirely new and promising fields for the primary sector. Again, developing countries have an edge over the developed countries in many of these fields. The real problem which the developing countries face in fact emanates not from the composition of their exports, but from underdeveloped marketing activities. Further, these countries have to improve a lot in the packaging and labelling of their products. These issues have not received adequate attention in the Report. Regarding the greater protectionist stance of the industrialised countries with respect to primary sector products, the developing countries can hope to counter it only if they unite. They can make further opening up of their economies contingent upon reduction of barriers to entry in the primary markets of the developed countries. In this context, it is important to mention that rather than seeking concessions from the multilateral agencies like GATT the developing countries should try to strengthen these agencies and through them put pressures on the industrialised countries to play within the rules of such forums.

The Report argues in favour of compensatory external resource flow for the terms of trade loss of the developing countries (p.93). This is close to one of the demands of the proponents of New International Economic Order where it was demanded that the export prices of the developing countries should be indexed to counter any terms of trade loss. Though it is sentimentally very appealing, particularly for the developing countries, it has very little economic rationale. The feasibility of such a scheme is also very much open to question.

A large portion of the TDR'93 has been devoted to critisising SAPs. The Report has criticised SAPs in Africa for their anti-investment and anti-growth bias (p.97-105). Evaluation of SAPs is a ticklish issue and the Report also

admits it (p.95). Almost all the countries under review have gone in for SAPs with severe initial imbalances. Though application of SAP is likely to reduce output during the transition period, recovery in the subsequent period could be obtained depending upon a successful implementation of the projects. However, both in Eastern Europe and Africa, countries do not show a good record in this regard (p.95 & 111). This does not mean that all the policies seen in SAPs are not conducive to growth. In fact, the TDR'93 gives a rather confused account of the performance of SAPs in Africa. It criticises SAPs for their anti-export bias (p.97 and 108), yet it notes that SAPs actually improved the export performance of the countries (p.96). A similar ambiguity could be seen in the Report in its treatment of the role of government. It has been argued that both liberalisation programmes and SAPs have marginalised the role of government. It has been further claimed that a strong government role has remained a crucial factor behind the success of the countries of East Asia. The Report suggests the need for a strong government role in poor countries (p.109) and at least a strong transitory role of the State in the economies in transition (p.159). It must be recognised that seldom does there exist an 'either or choice' between the government's role in the economy and the functioning of the market mechanism. What SAPs generally try to emphasise is that good governance is a scarce commodity, the use of which should concentrate on the core areas of public policy rather than on spreading it too thinly all over the economy. It has been observed as a general tendency that as government starts exerting control beyond these core areas it turns all pervasive and does more harm than good to the concerned economy. Further, the Report itself is apprehensive about the functioning of the government in poorer countries (p.111) as well as in economies in transition (p.159). Under such a situation a greater role of government for improving output has doubtful merit.

The methodologies employed in the Report to carry out numerous empirical measures are, in many cases, not beyond doubt. In particular, the methods used to measure the non-tariff barriers (NTBs) suffer from some obvious shortcomings. Two measures of NTBs have been used - 'frequency ratio' and 'import coverage ratio'. The 'frequency ratio' expresses the number of trade flows covered by NTBs as a share of the total number of trade flows (P.38). This measure is similar to the measurement of poverty by head count method where individual cases do not get appropriate weights and thus gives an incomplete picture. The other measure, 'import coverage ratio', estimates the value of imports affected by selected NTBs as a share of all imports (p.38). Here the criterion of selected NTBs is a source of problem. Even if one ignores that, it is clear that NTBs reduce the imports of the goods on which these have been applied. So the import coverage ratio underestimates the actual effects of NTBs. As a result, this measure also gives a misleading picture of

the actual levels of protectionism in the industrial countries. Again, while using the revealed comparative advantage criterion (p.134-135) the Report does not talk about the composition of covariance matrix among the commodity aggregates it has used. Here too, the analysis remains incomplete and at times misleading, without such information.

The complete exclusion of various regions (e.g. South-East Asia, West Asia, non-sub-Saharan Africa etc.) from the purview of the Report is a crucial omission which undermines the utility of the volume.

Notwithstanding these shortcomings, the Report gives a refreshing commentary on the contemporary world economic situation. It shows an unorthodox approach to the global problems. The volume, is an important source material for both academic purposes and policy formulations.

Sujan Hajra *

---

*Shri Sujan Hajra is Research Officer, Department of Economic Analysis and Policy.

Reserve Bank of India Occasional Papers
Index to Volume 1 (1980) to Volume 14 (1993)

ARTICLES

1. Ajit, D., (1993), **Capacity Utilisation in Indian Industries**, March, p.21.

2. Anjaneyulu, D., (1993), **Macro Economic Linkages in the Indian Economy : Inter-links between Imports, Output, Exchange Rate and External Debt**, December, p.297.

3. Arif, R.R., (1985), **The Differential Effect of Important Exogenous Factors on Selected Macro-Economics Aggregates**, June, p.20.

4. Arif, R.R., (1988), **Kharif Production and Monsoon Rainfall - An Empirical Study**, December, p.375.

5. Asha, P., (1986), **Trends in Growth and Pattern of Subsidies in Budgetary Operations of Central Government**, December, p.209.

6. Asha, P., (1987), **Instruments of Monetary and Credit Policies in Selected Countries**, June, p.17.

7. Avadhani, V.A., V.H. Motwani, and V.B. Angadi, (1987), **Mobilisation of Rural Savings - Banking Experience (Case Studies)**, September, p.101.

8. Balwant Singh, and S.K. Adhikary, (1990), **Bank Credit for the Chemical Industry (1970-71 to 1984-85)**, March, p.27.

9. Balwant Singh, and A.K. Mohapatro, (1991), **Deterministic and Stochastic Simulation of a Non-linear Macro-econometric Model Methodologies and Comparative Performance**, June, p.111.

10. Barman, R.B., and T.P. Madhusoodanan, (1993), **Permanent and Temporary Components of Indian Stock Market Returns**, June, p.81.

11. Bhatia, D.K., (1991), **Some Suggestions on Monetary Policy**, September/December, p.277.

12. Bhatia, D.K., and Deepak Mohanty, (1989), **Recent Trends in the Flow-of-Funds Accounts : 1980-81 to 1985-86**, September, p.221.

13. Bhoi, B.K., (1990), **On the Economic Performance of Major Eastern States of India : Some Issues**, March, p.1.

14. Chakrabarty, T.K., (1986), **Profitability of Banks**, June, p.63.

15. Chakrabarty, T.K., (1987), **Macro Economic Model of the Indian Economy : 1962-63 to 1983-84**, December, p.191.

16. Chakrabarty, T.K., and W. Varghese, (1982), **The Government of India's Budget Estimation : An Analysis of the Error Components**, December, p.175.

17. Chona, J.M., (1989), **Configuration of Industrial Growth in the Context of Indian Planning**, December, p.435.

18. Chona, J.M., (1991), **Role of Reserve Bank of India : Regulatory, Developmental & Constitutional Aspects**, September/December, p.251.

19. Das, R.K., (1990), **Indian Exports : Diversification and Instability**, March, p.47.

20. Gothaskar, S.P., (1988), **On Some Estimates of Rural Indebtedness**, December, p.299.

21. Gupta, Deepak, (1985), **Inter-State Industrial Disparities in India - The Changing Scene**, June, p.54.

22. Holla, K.R., (1989), **India's Balance of Payments during the Four Decades of Planning**, December, p.473.

23. Jadhav, Narendra, (1988), **Recent Financial Deepening and Disintermediation in India : Incidence, Impact and Issues**, June, p.71.

24. Jadhav, Narendra, (1989), **Weighted Monetary Aggregates : Rationale and Relevance for India**, March, p.39.

25. Jadhav, Narendra, (1989), **Analytics of Indian Plan Models**, December, p.283.

26. Jadhav, Narendra, (1990), **Monetary Modelling of the Indian Economy: A Survey**, June, p.83.

27. Jadhav, Narcndra, (1991), **The Unsettled State of Macroeconomics and Implications for the Conduct of Monetary Policy**, Scptcmber/ Dcccmbcr, p.155.

28. Joshi, Himanshu, (1989), **The Technical Efficiency of Jute Mill Industry**, March, p.57.

29. Joshi, Himanshu, (1992), **The Monetary Approach to Balance of Payments**, Dcccmbcr, p.275.

30. Joshi, Vijay, (1984), **The Nominal and Real Effective Exchange Rate of the Indian Rupee 1971-83**, Junc, p.27.

31. Kamcswara Rao, K., (1980), **An Econometric Model of the Indian Jute Textile Industry**, Junc, p.47.

32. Kamcswara Rao, K., (1981), **Fiscal Operations and Currency Supply in India - An Exploratory Model**, Junc, p.71.

33. Kamcswara Rao, K., (1982), **Demand for India's Exports and Imports - An Econometric Analysis**, Dcccmbcr, p.191.

34. Kannan, R., (1983), **Trade Instability - India's Experience (1956-57 to 1979-80)**, Dcccmbcr, p.152.

35. Kannan, R., (1985), **An Econometric Model of India's Foreign Sector (1956-57 to 1979-80)**, Junc, p.1.

36. Kannan, R., (1986), **India's Exports of Agricultural Commodities (1968-69 to 1981-82)**, June, p.1.

37. Kclkar, G.A., (1980), **House for the Rural Poor**, Dcccmbcr, p.195.

38. Khadyc, I.K., (1981), **The Responsiveness of Tax Revenues to National Income in India (1960-61 to 1978-79)**, Junc, p.23.

39. Khan, M.Y., (1980), **Trends in Industrial Production, 1951-1977**, June, p.71.

40. Khan, M.Y., (1988), **Physical Performance of Sugar Industry**, March, p.25.

55. Nagarajan, N., (1981), Social Security and Economic Growth : An Empirical Study, December, p.205.

56. Nagarajan, N., (1988), Financial Innovation : Determinants and Implications For Monetary Policy - A Model, December, p.329.

57. Nalini, M.S., (1986), Call Money Market - Recent Developments, June, p.167.

58. Nalini, M.S., (1986), Monetary Aggregates and Monetary Targeting in Selected Countries, December, p.251.

59. Pani, P.K., (1984), A Macro Model of Indian Economy with Special Reference to Output, Demand and Prices (1969-70 to 1981-82), December, p.113.

60. Pani, P.K., Kripa Shanker, and R.Satyanarayana, (1982), Trends in Profitability and Cost of Capital in the Indian Private Corporate Sector - 1960-61 to 1977-78, June, p.1.

61. Pani, P.K. and Kripa Shanker, (1982), Income and Associated Characteristics of High-Salaried Employees in the Indian Corporate Sector, 1975-76, December, p.114.

62. Patnaik, R.K., (1990), Fiscal Marksmanship in India, September, p.189.

63. Patra, Michael Debabrata, and Rajiv Ranjan, (1992), The Structure of India's Imports : 1970-71 to 1988-89, June, p.81.

64. Raghavachari, M.V., (1981), Trends in the Growth of Central Excise Duties : 1950-51 to 1981-82, December, p.141.

65. Rajan, K.V., (1991), Securitisation of LDC Debts, March, p.1.

66. Ramachandra Rao, K.S., (1984), Impact of Administered Prices on Wholesale Price Level (1970-71 to 1983-84), December, p.240.

67. Ramachandra Rao, K.S., (1985), An Analysis of Non-financial Non-departmental Enterprises in Public Sector (1961-62 to 1980-81), December, p.83.

68. Ramachandra Rao, K.S., (1989), Financing of Sectoral Investment during Plan Periods, December, p.363.

69. Ramachandra Rao, K.S., (1992), **Financial Projections for Indian Economy - Another Look at the Eighth Plan**, December, p.229.

70. Ramachandra Rao, K.S. and S.L.Narayana, (1983), **Financing of Capital Formation in State Governments**, December, p.184.

71. Rangarajan, C., and Anoop Singh, (1984), **Reserve Money : Concepts and Policy Implications for India**, June, p.1.

72. Rangarajan, C., Anupam Basu, and Narendra Jadhav, (1989), **Dynamics of Interaction between Government Deficit and Domestic Debt in India**, September, p.163.

73. Rao, D.C., (1980), **The Structure of Corporate Finance and some Related Policy Issues**, December, p.121.

74. Rao, D.C., T.R.Venkatachalam, and A.Vasudevan, (1981), **A Short-term Model to Forecast Monetary Aggregates - Interim Results**, December, p.113.

75. Rao, J.C., (1983), **Money and Prices - An Empirical Study of the Indian Experience — 1970-1982**, June, p.1.

76. Ray, A.K., (1981), **Agricultural Supply Response in India : 1961-62 to 1977-78**, December, p.188.

77. Ray, A.K., (1989), **Indian Plan Models : A Review**, December, p.315.

78. Ray, D., and L. Datta, (1987), **Forecasts of Aggregate Deposits and Bank Credit by Box-Jenkins and Bilinear Models**, September, p.89.

79. Ray, Partha, (1993), **Central Bank Independence and Effectiveness of Monetary Policy : A Survey**, December, p.267.

80. Ray, Partha, and K.Kanagasabapathy, (1992), **Industrial Inflation in India during the Eighties : An Explanation**, March, p.1.

81. Ray, Partha, and T.P.Madhusoodanan, (1992), **Predicting the Money Multiplier : The Indian Evidence Revisited**, September, p.121.

82. Roy, Mohua, (1989), **Price Trends during Five Year Plan Periods**, December, p.539.

83. Saggar, M.K., (1992), **Contemporary Issues in Indian Agriculture**, September, p.173.

84. Saggar, M.K., and V. Sunder Raghavan, (1989), **Planning for Agricultural Transformation**, December, p.401.

85. Saoji, S.H., and G.I. Hegde, (1985), **Some Aspects of Term Lending by Scheduled Commercial Banks (1972-1981)**, December, p.127.

86. Sarker, P.C.; (1988), **Performance of Infrastructure Industries and their Prospects in the Seventh Five Year Plan**, June, p.117.

87. Sarker, P.C., (1988), **Detection of Influential Observations and Outliers in Linear Regression Analysis**, December, p.357.

88. Sarker, P.C., (1989), **Measurement of Imbalances in Regional Development in India : Graphical Approach**, March, p.1.

89. Sarker, P.C., (1989), **Forecasting of Index Numbers of Industrial Production through Combination of Forecasts**, September, p.245.

90. Sarker, P.C., and T.G. Nayak, (1993), **Patterns of Credit Outstanding in Priority Sector - A Regional Analysis**, June, p.133.

91. Sarma, Y.S.R., (1982), **Government Deficit, Money Supply and Inflation in India**, June, p.56.

92. Sarma, Y.S.R.,(1991), **Money,Output and Prices**, September/December, p.209.

93. Sastry, D.V.S., (1982), **Impact of the rise in the prices of Petroleum Products on the General Price Level - 1970-71 to 1980-81**, June, p.68.

94. Sastry, D.V.S., (1990), **Expenditure on R & D and Imported Technology — A Cross-section Study**, December, p.287.

95. Sastry, D.V.S., and U.R.Kelkar, (1987), **Regional Disparities in Industrial Development**, December, p.265.

96. Seshan, A., (1983), **Demand for Commercial Bank Credit from Sugar Factories in Private and State Sectors (1973-1980)**, June, p.39.

97. Seshan, A., (1987), The Burden of Domestic Public Debt in India, June, p.45.

98. Shanker, Kripa, (1981), A Study of Capital-Output Ratios in the Indian Corporate Sector, 1961-62 to 1977-78, June, p.1.

99. Shanker, Kripa, (1988), Product Diversification, Growth and Profitability in the Private Corporate Sector in India, September, p.281.

100. Shanker, Kripa, and T.G. Nayak, (1983), Shifts in the Factor Income Shares - A Comparative Study of the Public and Private Indian Corporate Sector, 1960-61 to 1977-78, June, p.82.

101. Sharma, K.C., (1988), Impact of Fiscal Policy on the Private Corporate Sector - 1970-71 to 1987-88, September, p.157.

102. Sharma, K.C., (1991), Investments & Financial Behaviour of Public Limited Companies, June, p.59.

103. Shetty, S.L., (1989), The Evolution, Characteristics and Growth of Certificates of Deposits (CDs) in Selected Foreign Countries, June, p.73.

104. Shetty, S.L.,(1991), Need for Fresh Approach to Credit & Monetary Policy Formulation in India, September/December, p.227.

105. Singh, D., (1981), Inventory Behaviour in Government Companies in India : A Time-series Study, June, p.97.

106. Subba Rao, K.G.K., (1982), Size and Profitability with reference to Small Scale Industrial Units in the Assisted Sector, June, p.44.

107. Subba Rao, K.G.K., (1987), Tangible Wealth of Household Sector, June, p.1.

108. Subba Rao, K.G.K., (1988), Indicators of Banking Development : Statewise Analysis, March, p.1.

109. Subba Rao, K.G.K., (1989), Private Non-Profit Institutions Serving Households - A Profile, June, p.139.

110. Subba Rao, K.G.K., and A.K.Nag, (1990), On Disaggregation of Household Saving into Rural and Urban Components, June, p.153.

111. Subba Rao, K.G.K., and A.K.Tripathi,(1991), Inter-temporal Comparisons of Engel Elasticities based on Consumer Expenditure Data, March, p.23.

112. Sunder Raj, V.M., (1982), **Financing through Trade Credit : A Review of the Corporate Sector**, December, p.160.

113. Upadhyay, Ghanshyam, (1992), **Modelling Nonstationary Macroeconomic Time Series**, March, p.35.

114. Varma, Ravi, (1980), **Employment and Production in Small Scale Industries : Some Findings of the Reserve Bank Survey**, December, p.155.

115. Vasudevan, A.,(1980), **Monetary Impact of Time Deposits : The Indian Experience, 1950-51 to 1977-78**, June, p.33.

116. Vasudevan, A., (1983), **High Powered Money in India during the Seventies**, December, p.123.

117. Vasudevan, A., (1991), **Analytics of Monetary Management**, September/December, p.183.

118. Venkateswaran, S.,(1990), **Payments System in India - Clearing House Operations**, September, p.233.

NOTES AND COMMENTS

1. Angadi, V.B., (1983), **Measurement of Efficiency in Banking Industry**, June, p.110.

2. Bhoi, B.K.,(1993), **Analytics of the Recent Call Money Rate Behaviour in India**, December, p.319.

3. Gothaskar, S.P., (1980), **Measurement of Value Added by Insurance Services**, June, p.104.

4. Gupta, Deepak, (1993), **Industrial Employment in the Eighth Plan - Issues and Options**, September, p.239.

5. Kannan, R., (1984), **Growth Rates of Foodgrains Production in India (1950-51 to 1982-83)**, June, p.88.

6. Pitre, Vidya, (1982), **India's Export Statistics - An Attempt at Elaboration**, December, p.206.

7. Ray, D., (1980), **Forecasting of Total Deposits of All Scheduled Commercial Banks : Box-Jenkins Approach**, June, p.111.

8. Ray, D., and K.S. Namboodiri, (1980), **Generation of Random Numbers from a Normal Distribution with Zero Mean and Unit Variance**, December, p.218.

BOOK REVIEWS/REVIEW ARTICLES

1. Ahluwalia, Isher J., **Productivity and Growth in Indian Manufacturing.** By Rajiv Lochan, June 1992, p.111.

2. Aitchison, J., **Statistical Analysis of Compositional Data.** By A.K. Nag, March 1989, p.65.

3. Ananthapadmanabhan, G., **An Operational Planning Model for the Indian Economy : A Systems Approach.** By T.K. Chakrabarty, December 1990, p.337.

4. Asian Development Bank, **Foreign Trade Barriers and Export Growth.** By G. Chatterjee, March 1990, p.69.

5. Baily, Martin Neil, Gary Burtless, and Robert E. Litan, eds., **Growth with Equity : Economic Policymaking for the Next Century.** By Sunando Roy, December 1993, p.339.

6. Banuri, Tarique, ed., **Economic Liberalization : No Panacea.** By D. Anjaneyulu, September 1993, p.253.

7. Bapna, S.L., **Aggregate Supply Response of Crops in Developing Region.** By A. Seshan, December 1981, p.242.

8. Barnett, Vic, and Toby Lewis , **Outliers in Statistical Data.** By D.V.S. Sastry, December 1987, p.285.

9. Bhatt, Atul, **Santalpur Block after Seven Years.** By C.L. Dadhich, March 1992, p.51.

10. Bird, Graham, ed., **Third World Debt : The Search for Solution.** By A. Prasad, September 1990, p.281.

11. Buckley, Peter J., and Jeremy Clegg, eds., **Multinational Enterprises in Less Developed Countries.** By D. Singh, September 1992, p.215.

12. Chakravarty, Sukhamoy, **Development Planning - The Indian Experience.** By A. Vasudevan, December 1989, p.563.

13. Chatterjee, Samprit, and Ali S.Hadi, **Sensitivity Analysis in Linear Regression.** By A.B. Chakraborty, June 1988, p.145.

14. Chatterjee, A.K., **Management Techniques of Bank Lending.** By M.L. Inasu, December 1982, p.230.

15. Chawla, O.P., K.V. Patel, and N.B. Shete, **Impact of Differential Rate of Interest Scheme.** By N.J. Bhatia, December 1983, p.214.

16. Cho, Chin-Kuei, **Quality Programming - Developing and Testing Software with Statistical Quality Control.** By S.K. Sharma, December 1988, p.413.

17. Debroy, Bibek, **Foreign Trade Policy Changes and Devaluation : Current Perspective.** By N. Nagarajan, September 1992, p.223.

18. Dobson, Wendy, **Economic Policy Co-ordination : Requiem or Prologue.** By R.Kannan, June 1991, p.147.

19. Doornbos, Martin, and K.N. Nair, **Resources, Institutions and Strategies: Operation Flood and Indian Dairying.** By Karthykeyan, June 1990, p.173.

20. Dutta, Bhaskar, Shubhashis Gangopadhyay, Dilip Mookherjee, and Debraj Ray, eds., **Theoretical Issues in Development Economics.** By T. K. Chakrabarty, September 1993, p.259.

21. Economic Commission for Latin America and the Caribbean, **Protectionism : Regional Negotiation and Defence Strategies.** By Y. Kalyanaraman, June 1990, p.181.

22. Feldstein, Martin, **Inflation, Tax Rules and Capital Formation.** By D.V.S. Sastry, December 1983, p.217.

23. Friedman, B.M., ed., **The Changing Role of Debt and Equity in Financing U.S. Capital Formation.** By T.K. Velayudham, December 1984, p.291.

37. Mishra, N., **Accounting for Price Level Changes.** By Rama Rao, June 1982, p.94.

38. Morgan, Mary S., **The History of Econometric Ideas.** By Ajay Prakash, June 1991, p.143.

39. Morley, Mohan Lal, G., **Poverty Alleviation - The Indian Experience.** By P.S. Karode, March 1989, p.68.

40. Panchamukhi, V.R., K.M. Raipuria, and Rameshwar Tandon, eds., **Money and Finance in World Economic Order.** By Vidya Pitre, June 1988, p.151.

41. Papola, T.S., **Rural Industrialisation - Approaches and Potential.** By P.U. Narayan, December 1983, p.224.

42. Pickens, T.Boone, Jr., **Boone.** By J.K. Sinha, September 1989, p.273.

43. Purohit, Mahesh C., **Principles and Practices of Value Added Tax - Lessons for Developing Countries.** By M.S. Pillai, March 1993, p.75.

44. Purohit, Mahesh C., C. Sai Kumar, Gopinath Pradhan and O.P. Bohra, **Fiscal Policy for the National Capital Region.** By M.S.Pillai, December 1992, p.297.

45. Research and Information System for the Non-Aligned and Other Developing Countries, **The World Economy in the Mid-Eighties.** By G.S. Bhati, June 1986, p.198.

46. Rousseeuw, J. Peter, and Annick M. Leroy, **Robust Regression and Outlier Detection.** By Praggya Kissan, March 1990, p.77.

47. Sarma, N.A., **International Environment and India's Economic Development.** By K.A. Menon, December 1986, p.265.

48. Sarma, N.A., and V.K. Bhalla, **World Monetary and Financial System — Issues for Reform.** By C.B. Tripathi, September 1987, p.181.

49. Scott, Maurice, and Deepak Lal, eds., **Public Policy and Economic Development.** By B.K. Bhoi, March 1991, p.43.

50. Sen, Amartya, **On Ethics and Economics.** By D.U. Shirali, September 1989, p.265.