PATTERNS OF INDUSTRIAL DEVELOPMENT IN INDIA
A CROSS - SECTIONAL STUDY

DISSERTATION SUBMITTED TO JAWAHARLAL NEHRU UNIVERSITY
IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE AWARD OF
MASTER OF PHILOSOPHY

SUPRIYA DHAWAN

CENTRE FOR THE STUDY OF REGIONAL DEVELOPMENT
SCHOOL OF SOCIAL SCIENCES
JAWAHARLAL NEHRU UNIVERSITY
NEW DELHI-110 067

1991

जवाहरलाल नेहरु विश्वविद्यालय
JAWAHARLAL NEHRU UNIVERSITY
NEW DELHI - 110067

Date: 18th July, 1991

CERTIFICATE

This is to certify that this dissertation entitled "PATTERNS OF INDUSTRIAL DEVELOPMENT IN INDIA: A CROSS-SECTIONAL STUDY" submitted by Miss Supriya Dhawan in partial fulfilment of the requirement for the award of the degree of MASTER OF PHILOSOPHY has not been previously submitted for any degree of this University or any other University. This is her own work.

We recommend this dissertation be placed before the examiners for evaluation.

SUPERVISOR
Dr. Ashok Mathur

CHAIRPERSON
Dr. K.S. Sivasami

19-7-1991

GRAM : JAYENU TEL. : 667676, 667557 TELEX : 031-73167 JNU IN

ACKNOWLEDGEMENT

With a deep sense of gratitude, I express my heartiest thanks to Prof. Ashok Mathur, without whose efficient guidance, patience, understanding and valuable time, my dissertation would not have taken this form.

I also profoundly thank Prof. G.K. Chadha for his kind support understanding and guidance throughout my duration at J.N.U.

I am highly indebted to my mother and father (Raj & Vasdev Dhawan) who consistently remain the backbone of my career, giving me all the opportunity and support needed.

I am extremely greatful to Mr. M.N. Katariya for his kind support and encouragement, which helped me in the successful completion of this dissertation.

My sincere thanks to Mr. Satyendra Kumar of J.N.U. who helped me at all times for the data processing.

I am highly obliged to Mr. V.K. Dutta and Mr. Sudhir Talwar who extended all possible help for computer services rendered and in the printing and final production of the dissertation.

SUPRIYA DHAWAN

INDEX

LIST OF TABLES

Contd...

Contd...

LIST OF ANNEXURES

CHAPTER - 1

INTRODUCTION

1.1 THE CONCEPT OF INDUSTRIALIZATION.

Industrialization has been broadly defined as, "a process in which changes of a series of strategical production functions are taking place. It involves those basic changes that accompany the mechanization of an enterprise, the building of a new industry, the opening of a new market and the exploitation of a new territory. This is a way of the process of deepening as well as widening of capital."(1) Thus, in a broad and more fundamental sense it involves the basic transformation of a society resulting in a series of interactions between the pre-existing agricultural society and compulsions of the industrialization process.

Industrialization is normally interpreted as a process whereby the share of industry in general and of manufacturing in particular is increased in the total economic activity. A large number of studies have indicated a clear tendency for industrialization to be associated with rising incomes. In other words, with the rise in per capita income, the share of manufacturing in National Income increases. The increase in the share of manufacturing in National Income has been conventionally taken as an important statistical measure of structural change at the macro economic level. Relatively stable relations in an economic and social system are generally described as its

---

1. Pei - Kang Chang (1949) Agriculture and Industrialization Cambridge, Massachusetts, Harvard University Press pp 69.

structure. Without a formal model of the underlying relations, any observed change in the composition of demand or in the composition of some other economic aggregate, can be defined as a structural change.

Economic development can be looked upon as a set of interrelated changes in the structure of an economy that are needed for its continued growth. They relate not only to the internal structure of the composition of employment, demand, and production but also to the external structure of trade and capital flows. Taken together these structural changes define the transformation of a traditional to a modern economic system. Successful development in most countries was characterized by an increase in the share of manufacturing in total output. This structural change is both a cause and effect of rising income. Industrialization results from the interplay of rising demand for manufactured goods, technological progress, changing factor proportions and trade policies. Despite the fact that some of these factors are quite similar among countries, others may differ as a consequence of resource endowments and the development strategy adopted.

It will be useful at this stage to examine the measures which can be used to define an industrialized economy. Sutcliffe[2] put forward three such measures, although he did realise the limitations of judging a qualitative change in economic structure by quantitative criteria alone. His measures were:

---

2. R.B. Sutcliffe (1971) Industry and Under Development. Addison Wesley, London.

- At least 25% of gross domestic product originating in the industrial sector.

- A minimum of 60% of industrial output should be in the form of manufactures.

- At least 10% of the population should be employed in the industrial sector.

Taken together, these critera tried to exclude those countries having a large industrial sector due to the importance of mining rather than manufacturing and those where only a relatively low proportion of the population were employed in the industrial sector. However these criteria are certainly by no means the only ones that can be used as a measure of industrialization. It is indeed interesting to see the number of countries that passed these tests of industrialization using data of the early 1980's[3] as compared to the mid - 1960's position.

In the mid - 1960's the only developing countries found by Sutcliffe to be industrialized in accordance with the above mentioned criteria were Argentina and Hongkong, while chile, Portugal and Yugoslavia were at the border line. Data relating to the early 1980's did not show a dramatically different picture. A large number of developing countries passed the first two tests but as found in his study of 1960's, in the early 1980's also, there were relatively only a small number which passed all three tests.

---

3. R. B. Sutcliffe (1984) "Industry and Under Development re-examined" Journal of Development Studies Vol. 21 No. 1 pp 121 - 33.

Sutcliffe argued that inspite of the structural change that had taken place in the early 1980's, much of the industrialization in developing countries is premature implying that the per capita value of manufacturing output was far below that in the developed economies. He also suggested that in some developing countries, the rising share of manufacturing in GDP may reflect the weakness of agricultural performance as much as the strength of industrialization. Besides, he has also pointed out the possibility of increased polarization to take place within the industrial sector in many developing countries.

1.1a CHARACTERISTICS OF MANUFACTURING INDUSTRIES:

The importance given to manufacturing industries is basically due to the inherent characterstics of these industries. For instance, the income elasticity of demand for manufactured goods is relatively high and these are highly tradeable goods. Unlike other major sectors such as agriculture and services, manufacturing is characterized by increasingly inter-related and specialized branches of activity. When its aggregate output increases, there is a greater scope for the division of labour and specialization within the sector itself, than is the case for other sectors. Manufacturing can create much greater intersectoral linkages than other activities, hence it has the potential for greater positive externalities of a pecuniary type. Furthermore, it is the manufacturing sector which produces the capital goods that are used in a range of sectors including agriculture, construction and public utilities. Expansion of manufacturing sector, thus has the potential for creating higher incomes both within the sector itself and in other sectors.

According to Kaldor[4], manufacturing acts as an engine of growth since its growth raises productivity not only in the sector itself, through an extension of division of labour, but also in other major sectors.

Further, a look at Table 1.1 would reveal that the manufacturing sector among all the Divisions of Industrial classification employs the maximum percentage of total (main) workers i.e. 33.76 percent according to the 1981 census. Thus from the employment perspective too, the manufacturing sector's contribution cannot be overlooked.

1.1b ADVANTAGES OF INDUSTRIALIZATION:

Earlier discussions for accelerated industrialization were based mainly on the assumed properties of technology in the manufacturing and related sectors. In the 1940's, scholars such as Rosenstein-Rodan and Mandelbaum stressed the importance of economies of scale and growth of productivity in manufacturing and the benefits that are cumulatively obtained in the form of external economies.

In the early 1950's Prebisch and Singer advocated industrialization to offset the disadvantages of specialization in primary production and associated deterioration in terms of trade. In the early period of 1960's Nurkse proposed a policy of balanced growth of the industrial and primary sector as he realised that there was a limited world demand for exports of

---

4. N.Kaldor (1967); Strategic factors in Economic Development, Cornell University Press, Ithaca, N.Y.

TABLE 1.1

PERCENTAGE OF MAIN WORKERS WITHIN EACH DIVISION OF INDUSTRIAL CLASSIFICATION

DIVISION	DESCRIPTION OF INDUSTRY	PERCENT TO TOTAL
0	Agriculture, Hunting, Forestry Fisheries	6.75
1	Mining & quarrying	1.72
2-3	Manufacturing & Repair	33.76
4	Electricity, Gas, Water	1.32
5	Construction	4.99
6	Wholesale Retail trade, Hotels and Restaurants.	16.47
7	Transport, Storage and Communications	8.23
8	Financial Insurance and Banking Services	2.42
9	Community Social & Personal Services	24.34
Total	ALL INDUSTRIES	100.00

Source of Data : Census of India (1981), General Economic Tables. Table B:12 Industrial Classification of main workers other than cultivators and agricultural labourers by Division and main group.

primary products and an increasing domestic demand for manufactured products.

Perceptions regarding the advantages of industrialization have experienced some changes over time. In the 1960's, Kuznets viewed the issues of industrial growth in a wider perspective, not only as a response to changing demand and supply conditions but also as a principal means of acquiring modern technology.

1.1c POLICY ALTERNATIVES FOR INDUSTRIALIZATION

Regarding Policy Alternatives open to developing countries, there are widely differing positions. John Weiss[5] has referred to three alternative schools of thought; the Structuralist, Radical and Neoclassical. The Structuralists, argue that the structure of an economy, and specifically the size of its structure is the most crucial determinant of long run growth and that it has been observed to have represented during the 1950's and 1960's the conventional wisdom of developing countries. From the policy perspective the Structuralist's were associated with the import substitution policies pursued in most developing countries during this period. However, this policy alternative was severely critisized as it lead to poor economic performances in several countries.

The Radicals approach industrialization from a wider political economy perspective. Authors of the Radical tradition, emphasize on the numerous obstacles to industrialization as a result of a combination of the external International environment

---

5. John Weiss (1988) Industry in Developing Countries, Theory, Policy and Evidence, Croom Helm, New York.

and the internal class and economic structures of developing countries themselves. Basically, the Radical school of thought can be described as that which is highly critical of capitalism, favours socialism and may employ Marxian analysis.

On the other hand, the Neoclassicals essentially represent the application of conventional economic theory to the various development issues. This approach to industrialization can be considered to be a part of a wider perspective which encompasses price and capital theory and the broad area of Macro Economic strategy. This school of thought essentially focusses on the market, that is, the exchange relations to ascertain fundamental issues which relate to the value of commodities and the distribution of income.

As the world economy experienced a sustained growth from the mid 1950's to the mid 1970's, it led to an optimistic view of the advantages of trade for the developing countries than had prevailed before. Manufactured exports from the developing countries grew at more than 10% per annum, which made the general belief of export markets being limited, much less tenable. Further impetus was given to the prevailing thought, by the comparative studies of the effects of import substitution which stated that, these policies become cumulatively less efficient if they were maintained for long periods.

Of late, there have been arguments for shifting from an inward-oriented to an outward-oriented strategy which has been greatly strengthened by the success of a small group of newly industrializing economies, particularly, Hongkong, Korea, Taiwan and Singapore. These four East Asian Economies have accelerated

their exports tremendously following a new pattern of industrialization characterized by rapid growth of manufacturing based on increased participation in the International Economy.

We now turn to the Trend Of Industrial Development as it has been observed in India since 1960's to the 1980's.

1.2 TREND OF INDUSTRIAL DEVELOPMENT IN INDIA

Trends in the growth of the manufacturing sector in India has been a highly debated issue for quite some time. Ahluwalia's[6] statistical study demonstrated that during the period between 1966-67 and 1979-80 as compared to the seven year period of 1959-60 to 1965-66 there was a relatively slower growth of the registered net value added. According to her infact, this relative stagnation continued to exist even in the early 1980's. However, K.N. Raj[7] did not agree with Ahluwalia's observations of the persistance of relative stagnation of a deceleration. On the basis of his time series graphical analysis of total manufacturing gross value added for the period 1952/53 to 1982/83, there has possibly been an increase in the rate of growth of industrial output since the mid 1970's, which is close to the levels achieved in the 1950's and 1960's. Alagh[8] arrived

---

6. I.J Ahluwalia (1985) Industrial Growth in India, Stagnation since the mid 60's. Oxford University Press. Delhi.

7. K. N. Raj (1984) "Some observations on Economic Growth in India over the period 1952-53 to 1982-83", Economic and Political weekly Oct. 13.

8. Y.K. Alagh, "Some aspects of planning policies in India" Govind Vallabh Pant Memorial Lecture, 1985.

at a similar conclusion "Even ignoring the unregistered manufacturing sector, industrial output in India grew at a rate of 7.6% per annum for the period 1976-77 onwards compared to 4.6% per annum in the period 1971-76".

Table 1.2 reveals the growth rate of the manufacturing sector as a whole, during the 1980's.

TABLE 1.2

ANNUAL GROWTH RATES IN THE MANUFACTURING SECTOR IN THE 1980's

(1980 - 81 = 100)

YEAR	MANUFACTURING
(WEIGHT)	(77.11)
1981-82	7.9
1982-83	1.4
1983-84	5.7
1984-85	8.0
1985-86	9.7
1986-87	9.3
1987-88	7.9
1988-89	8.9

Source: Economic Survey, 1989-90, Government of India.

The manufacturing sector has the highest weightage in the secondary sector; it stands at 77.11 percent. Mining has a weight of 11.46 percent and electricity 11.43 percent. It is quite interesting to see the trend of the growth rate during the 1980's. The period 1982-83 witnessed a major decline in the growth rate from 7.9 percent in 1981-82 to 1.4 percent in 1982-83. Since then the growth rate has been increasing steadily excepting for a slight decline from 9.3 in 1986-87 to 7.9 percent in 1987-88. The period of 1988-89 has again shown an improvement. Thus in the second half of the 1980's, the growth rate has become fairly consistent in contrast to the position in the early 1980's.

Table 1.3 indicates the rates of growth in value added in the registered manufacturing sector at three time periods, namely 1959-60 to 1965-66 (period I), 1966-67 to 1979-80 (period II) and 1980-81 to 1986-87 (period III). The growth rate achieved in period III at 10.4% per annum is higher than that realized in period I (at 7.6%) and period II (at 5.5%). As can be observed from the table at the disaggregated level, the growth rate in period III is higher than in period II for all the industry groups with the exception of textiles (23-26), wood and furniture (27) and basic metals (33). Similarly, a comparison of period I and period III indicates that certain industry groups which constituted about two-fifth's of the value added in 1986-87, experienced a higher rate of growth during period III as compared to period I. These industry groups included food products (20-21), leather products (29), rubber and petroleum (30), non-metallic mineral products (32), electrical machinery (36) and

TABLE : 1.3

GROWTH RATES IN VALUE ADDED IN REGISTERED MANUFACTURING OF DIFFERENT SUB-PERIODS AT DISAGGREGATED LEVEL

NO	INDUSTRY GROUP	PERIOD I	PERIOD II	PERIOD III
1	Food Products	0.7*	3.8	13.1
2	Beverages	9.3	7.3	9.9
3	Tobacco etc.	1.5*	1.3	-
4	Textiles	3.9	4.4	3.3
5	Foot wear etc.	15.3	14.5	16.6
6	Leather & fur products	0.5*	3.1	-
7	Wood and cork	1.1	5.4	6.1
8	Furniture and fixtures	11.7	6.3	-
9	Paper and paper prod.	11.4	7.3	9.5
10	Printing & publishing	6.8	1.7	-
11	Rubber products	4.6	4.2	12.3
12	Petroleum products	-5.9	6.2	-
13	Chemical and chemical products	10.7	9.1	11.1
14	Non-metallic mineral products	7.0	3.0	16.2
15	Basic metal	15.0	5.1	4.1
16	Metal products	12.0	2.5	6.8
17	Non-electrical machinery	17.9	7.5	10.3
18	Electrical machinery	14.7	9.8	20.6
19	Transport equipment	10.3	4.6	9.1
20	Miscellaneous	14.2	4.5	20.6
21	Repair services	-	-	13.3
	Total Gross/ Net value added	7.6	5.5	10.4

* Statistically not different from zero even at 90 percent significance.

Source : R. Nagraj, "Growth in manufacturing output since 1980 some preliminary findings". Economic and political weekly July 1, 1989.

miscellaneous group (38). These figures within bracket indicate the National Industrial Classification code.

Table 1.4 indicates the percentage contribution of major industry groups (at 2 digit level of NIC) to the total manufacturing sector. We have specifically seen the position as in 1974-75 and 1982-83 since these are the two points of time for our empirical study. The percentage contribution of cotton textiles industry has declined drastically from 16.16% in 1974-75 to 8.63% in 1982-83. Further, it is observed that in both the periods high contributions have been made by the basic metal and alloy industry, (16.20% and 12.08% in 1982-83 and 1974-75 respectively) and chemical & chemical products (14.45% and 17.77% in 1974-75). The percentage contribution of industry groups such as machine tools, electrical machinery, transport equipments and food products have been fairly high around 7% of the total manufacturing sector. These percentage contributions have increased in the period 1982-83. In addition, rubber, plastic, petroleum products and non-metallic mineral products have shown a higher percentage contribution to the total value added. However, the percentage contribution of industry groups of beverages; tobacco; jute, hemp, mesta, cotton textiles; paper & paper products; have shown a decline. Thus, it seems that the percentage contributions of consumer goods industries has more or less tended to decline, while that of the heavy basic capital goods industries has increased in 1982-83.

Having discussed the growth trends and percentage contribution of value added within the manufacturing sector, it

TABLE - 1.4

PERCENTAGE CONTRIBUTION OF VALUE ADDED BY MAJOR INDUSTRY GROUPS TO THE TOTAL MANUFACTURING SECTOR

(1974 - 75 AND 1982 - 83)

(NIC) CODE	DESCRIPTION OF INDUSTRY	1974-75 (%)	1982-83 (%)
20-21	MANUFACTURING OF FOOD PRODUCTS	6.94	7.85
22	BEVERAGES, TOBACCO ETC.	3.49	1.27
23	COTTON TEXTILES	16.16	8.63
24	WOOL, SILK SYNTHETICS	3.29	3.75
25	JUTE, HEMP, MESTA	3.08	1.73
26	TEXTILE PRODUCTS INCLUDING WEARING APPAREL	0.66	0.87
27	WOOD FURNITURE ETC.	0.48	0.32
28	PAPER, PAPER PROD. PRINTING	5.32	3.05
29	LEATHER & FUR PRODUCTS	0.58	0.49
30	RUBBER, PLASTIC & PETROLEUM PRODUCTS	4.43	6.72
31	CHEMICAL, CHEMICAL PRODUCTS	14.77	14.45
32	NON-METALIC MINERAL PRODUCTS	2.87	5.16
33	BASIC METAL AND ALLOY INDUSTRY	12.08	16.20
34	METAL PRODUCTS	2.54	2.08
35	MACHINERY, MACHINE TOOLS	7.37	7.94
36	ELECTRICAL MACHINERY	7.31	8.50
37	TRANSPORT EQUIPMENT	7.7	9.72
38	OTHERS	0.93	1.27
	TOTAL	100.00	100.00

Source: Annual Survey of Industries (Census Sector) (1974-75, 1982-83) Central Statistcal Organization.

would be worthwhile to see the percentage of work force in this sector at the disaggregated level.

Table 1.5 reveals the percentage of main workers to the total main workers in Division 2 and 3 within the manufacturing sector. We observe that high percentage of main workers are employed in industry groups of Cotton texiles; Textile products including wearing apparel; Food products; Beverages, Tobacco, and Non-metallic mineral products. While industry groups such as Jute, Hemp, Mesta Textiles, Wool, Synthetic fibres; Electrical Machinery; Leather & Fur industry, Rubber, Plastic, Petroleum products, employ a very small percentage of the total main workers. We can thus infer that those industries which are more concentrated in space, tend to have a smaller percentage of workers to the total, than those industries which have a spatial spread. Moreover, capital based industries would tend to have lesser workforce compared to the consumer goods. The intermediate goods industries tend to show slightly higher percentage compared to the capital based industries.

TABLE 1.5

PERCENTAGE OF MAIN WORKERS (HOUSE HOLD AND NON HOUSE HOLD)

WITHIN THE MANUFACTURING SECTOR.

(1981)

NIC DIVISION 2 & 3	PERCENTAGE TO TOTAL MAIN WORKERS IN DIVISION 2 & 3
20-21	8.99
22	7.25
23	14.96
24	1.82
25	1.68
26	11.09
27	9.52
28	2.51
29	1.94
30	1.31
31	3.01
32	7.28
33	2.61
34	4.55
35	3.28
36	1.76
37	2.06
38	4.66
39	9.68
DIV 2&3	100.00

Source of Data : Census of India (1981)
General Economic Tables.
B:13, Total main workers in manufacturing Processing, Servicing and Repairs.

The present study has dealt broadly with two perspectives: the spatial structure and sectoral structure of industries. In chapter 2, we discuss the extent of regional industrial disparities in India. We have also made a reference to the emphasis placed in the five year plans for reducing regional disparities.

In chapter 3, we have reviewed a series of studies that basically relate to economic growth and structural change, which were designed to provide an empirical basis for models of development. In general, a systematic correlation between industrialization and the growth of National Income has been observed. Therefore, economic growth has been identified with industrialization which implies the growing value of industrial output in absolute and relative terms in contrast with agriculture. Kuznets[9] study of 15 countries revealed a marked increase of manufacturing output with rising per capita income. Chenery and Taylor[10] also found that a statistically significant relationship exists between per capita income and the degree of industrialization. H.B. Chenery has made vast and valuable contribution to the literature on industrialization and growth. We have discussed in detail about Chenery's models of development in chapter-3. The latter part of the chapter throws light on the

---

9. S. Kuznets (1957), "Quantitative aspects of the Economic Growth of Nations, II Industrial distribution of National Products and labour force", Economic Development and cultural change July, pp 3-11.

10. H.B. Chenery and L. Taylor (1968), "Development patterns: Among countries and over time," Review of Economics and Statistics Nov. pp 391-416.

Indian scenerio of the contribution of primary, Secondary and Tertiary sector over time to National Income.

The fourth chapter is concerned with the basic empirical exercise undertaken in this dissertation, the major contours of which may now be delineated.

1.3 SCOPE AND METHODOLOGY OF THE STUDY

In the present study an attempt has been made to see the influence exercised on the industrial structure by some of the basic demand and supply variables, namely per capita income and population, We have estimated linear logarithmic regression equations in which per capita value added depends upon per capita income and population. This is the equation used by H.B. Chenery" in his study of 1960, where:

$$\log Vi = \log \beta_{i0} + \beta_{i1} \log Y + \beta_{i2} \log N \quad \text{....(eqn 1.1)}$$

where Vi.....per capita net value added in industry i
Y.....Per Capita Income
N.....Population
i.....industries

Our entire empirical study is based on pooled regressions to increase the number of observations which are the states of India in this study (list of states selected are given in Annexure 1.3)

To obtain an overall perspective of the change in the percentage contribution of the primary, secondary and tertiary sector with a rise in per capita income, we have estimated the log linear pooled regression for 1981-82 and 1982-83 by keeping the population constant. Our results are consistent with the theory, that as per capita income increases the share of primary

sector decreases and that of secondary and tertiary sector increases in the National Income.

To obtain finer distinctions Pooled log linear regression equations (eqn 1.1) were estimated for 1981-82 and 1982-83 for industries at the two digit level of National Industrial classification. This exercise at the 2 digit level could not be estimated for the period 1974-75 and 1975-76 due to non availability of data. See annexure 1.1 for details of these industries .

To gain a greater insight into specific prominent cases we estimated a pooled log linear regressions at three digit level for the years 1974-75, 1975-76 on the basis of the equation 1.1. Similarly, pooled regression equations were estimated for 1981-82 and 1982-83 for industrial groups at the 3 digit level. In this study we have selected 14 manufacturing industries at the 3 digit level. For details of industries see annex 1.2.

The regressions were estimated using the ordinary least square method. The present study is based on data of 14 major states of India. (See annex 1.3 for list of states) Essentially the Eastern States and Union Territories have been excluded in the study mainly due to the absence of the selected manufacturing industries in these states and to avoid distortion of results. The selection of manufacturing industries was made, keeping in mind to a large extent, the spatial spread of the industries in the 14 selected states.

---

11. H.B. Chenery, (1960) "Patterns of Industrial Growth," American Economic Review Sept.

In the 2 studies of Chenery-Taylor (1968) and Taylor (1969), the classification of countries according to size in terms of population was found to be highly significant Chenery used population as a proxy for market size. Hence to study the size distinction, we have also divided our set of observations into two groups (i) States above the average population of the selected fourteen states and (ii) States below the average population. Regressions have been estimated separately for each group.

Another direction of investigation which has been persued is with respect to per capita income of the states. The set of observations have been divided into 2 groups: (i) States above the per capita National Income and (ii) States which are below the National Average figure. The regression results are summarized in chapter 4.

The Net Value Added data have been obtained from the Annual Survey of Industries[12] (census sector) for the years under study. The scope of the Annual Survey of Industries (ASI) is extended to the registered manufacturing establishments in the country. The ASI is carried out at two different levels; Units employing 50 or more workers and operating on power and those employing 100 or more workers, but operating without power which are covered on complete enumeration basis under what is called the 'census sector'. The Net Value Added as defined by ASI is the increment to the value of goods and services that is contributed by the

---

12. Annual Survey of Industries 1981-82, 1982-83, 1975-76 and summary results for census sector Vol. 1 and Vol. 2, Central statistical Organization, N. Delhi.

factory, i.e. the value created by the factory; and is obtained by deducting the value of total input and depreciation from the value of output.

Data relating to the per capita income and population have been obtained from the estimates of State Domestic Product[13] for the period under study & our study is essentially based on current prices as ASI data are available only at current prices. However, this cannot be considered to be a limitation, since it is a cross-sectional study. Finally in chapter-5, we summarize the main theme of the study and present the main conclusions.

---

13. Estimates of State Domestic Product, June 1988; Nov., 1985; Central Statistical Organization, N. Delhi.

ANNEXURE 1.1

MANUFACTURING INDUSTRIES AT 2 DIGIT LEVEL (NIC)

MAJOR GRP		DESCRIPTION OF MANUFACTURING INDUSTRY
20-21	-	FOOD PRODUCTS
22	-	BEVERAGES, TOBACCO ETC.
23	-	COTTON TEXTILES
24	-	WOOL, SILK AND SYNTHETIC FIBRES ETC.
25	-	JUTE, HEMP & MISTA TEXTILES
26	-	TEXTILE PRODUCTS INCLUDING WEARING APPAREL
27	-	WOOD, FURNITURE FIXTURES
28	-	PAPER, PRINTING & PUBLISHING
29	-	LEATHER & FUR PRODUCTS
30	-	RUBBER, PLASTIC, PETROLEUM, COAL PRODUCTS
31	-	CHEMICAL AND CHEMICAL PRODUCTS
32	-	NON-METALLIC MINERAL PRODUCTS
33	-	BASIC METAL AND ALLOY INDUSTRIES
34	-	METAL PRODUCTS & PARTS
35	-	MACHINERY & MACHINE TOOLS
36	-	ELECTRICAL MACHINERY & APPARATUS
37	-	TRANSPORT EQUIPMENT & PARTS
38	-	OTHER MANUFACTURING INDUSTRIES

ANNEXURE 1.2

SELECTED MANUFACTURING INDUSTRIES AT THE 3 DIGIT LEVEL (NIC)

NIC CODE		MANUFACTURING INDUSTRY
204	-	GRAIN MILL PRODUCTS
206	-	MANUFACTURING & REFINING OF SUGAR
210	-	MANUFACTURING OF HYDROGENATED OILS, VANASPATI GHEE ETC.
231	-	COTTON, SPINNING & WEAVING
247	-	SPINNING, WEAVING OF OTHER TEXTILES (SYNTHETIC)
264	-	TEXTILES INCLUDING WEARING APPARELS
276	-	WOODEN, FURNITURE AND FIXTURES
280	-	PULP, PAPER
311	-	FERTILIZERS AND PESTICIDES
324	-	CEMENT, LIME AND PLASTER
330	-	IRON & STEEL INDUSTRIES
350	-	AGRICULTURAL MACHINERY & EQUIPMENT
360	-	ELECTRICAL INDUSTRIAL MACHINERY
374	-	MOTOR VEHICLES AND PARTS

ANNEXURE 1.3

STATES INCLUDED IN THE PRESENT STUDY

1. ANDHRA PRADESH
2. BIHAR
3. GUJARAT
4. HARYANA
5. KARNATKA
6. KERALA
7. MADHYA PRADESH
8. MAHARASHTRA
9. ORISSA
10. PUNJAB
11. RAJASTAHAN
12. TAMIL NADU
13. UTTAR PRADESH
14. WEST BENGAL

CHAPTER - 2

REGIONAL INDUSTRIAL DISPARITIES IN INDIA

In this chapter we essentially look at the spatial structure of the manufacturing industries in India in the past few decades and examine the role played by the government in reducing regional disparities. At the onset, it would be useful however, to briefly review some theories of economic development with specific reference to the spatial pattern of industrialization.

2.1 A THEORETICAL PERSPECTIVE

Rostow[1] attempted to explain the process of industrialization in terms of the stages of growth. His stages of growth are:

(i) The traditional society. (ii) The transitional stage, which is a pre-condition for take off. (iii) Take off. (iv) Drive to maturity. (v) The final stage of high mass consumption.

In accordance with this model, it is during the take off stage, that a country achieves industrialization. According to Rostow, "Successful industrialization shows a tendency to be imbalanced. This imbalanced pattern of industrialization tends to create spatial inequalities in the initial stages. This results in a concentration of industries at a few places where the leading sector industry gets located. It is only after the stage of maturity is reached that the process of industrialization spreads out spatially".

---

1. W.W. Rostow (1957) Stages of Economic Growth., A Non-communist Manifesto, Cambridge University Press.

Mrydal[2] claims that interregional inequalities of growth are inevitable and once the process of development originates at a certain place, it is self perpetuating in character. Rapidly growing regions always accumulate more resources which perpetuate inequalities; hence according to Mrydal spatial inequalities are maintained.

Hirschman[3] also accepts that inter-regional inequalities of growth are inevitable during the process of development. However, he expects that in the long run the polarization effects would give way to the trickling down effects.

Kuznets[4] on the other hand, believes that in the initial stages, development emerges in those regions which have had sustained experience with older economic technology. Modern economic growth in the pioneer country continous to be concentrated till methods become available by which resources and knowledge can be transferred to other countries. These are the countries which have possession of resource endowments and institutions that permit them to follow the path of the pioneer. Kuznets thus implied that, the extent of the spatial spread will be limited by the conditions in the follower countries.

In general, industries may set up in an area depending upon the availability of localized raw materials, cheap labour,

---

2. G.M. Mrydal (1957) Economic Theory and Underdeveloped Regions, London.

3. A.O. Hirschman (1958) The Strategy of Economic Development, New Haven.

4. S.Kuznets (1966) Modern Economic Growth : Rate Structure and Spread, Vakils, Feffer and Simons Ltd., Bombay.

location, availability of markets, transportation networks, or the subjective preferences of enterpreneurs. Whatever may be the deciding factor of setting up an industry in a particular area, a set of mechanisms come into play, which encourage further clustering of industries. In the initial stages, concentration may emerge due to economies of scale enjoyed by the existing plants. At a later stage, other units may enter these areas to benefit from the various kinds of linkages with the existing plants. Agglomeration economies[5] and the multiplier effect may also result in further clustering of economic activity in space.

Besides the features of modern industry referred to in the above discussion, which lead to the concentration of industries, certain inherent characterstics of the industrial system may provide an indication of its spatial spread. These characteristics of the industrial system can be contrasted with those pertaining to the agricultural spread. Geographical and natural factors affect agricultural activity. By its very nature, industrial activity attempts to reduce the effect of geographical and earthbound factors. According to V.K. Seth[6]," It is the economic history as shaped by organised power of the state and science (including technology) that are crucial in shaping the course of industrial development".

Location theories have played an important role in determining factors which affect the spatial pattern of industrialization. Some of these theories have approached the

---

5. A. Weber (1929) The Theory of Location of Industry, Chicago University Press. N.Y.

6. V.K. Seth (1987) Industrialization in India : Spatial Perspective, Commonwealth Publishers, New Delhi.

problem from the demand side while others have focussed essentially on the supply side. For instance, Weber[7] looked at the problem from the supply side by focussing on the issue of minimizing transport costs when the market and source of input are separated by some distance. On the other hand, Fetter[8] and Hotelling[9] evolved a demand-oriented approach. Other important contributions in the realm of location theory were made by A.Losch, W.Isard and D.M. Smith to mention a few. Despite the fact that the location theories have made an important contribution in highlighting a number of factors which influence the choice of a location of an industry, they have some limitations too. These theories are not able to provide an explanation for observed changes in spatial pattern over time. For instance, economic development may bring about changes in the spatial pattern, however the location theories are unable to explain these temporal shifts.

2.2 EXTENT OF REGIONAL INDUSTRIAL DISPARITIES IN INDIA

Analysis of industrial growth in a spatial perspective can provide valuable insight into the dynamics of the industrial sector. Depending on inter-regional variation in factor endowment, factor price and factor efficiencies, each region

---

7. A. Weber (1929) opcit.
8. F. Fetter (1929),Economic Laws of Market Areas' Quarterly Journal of Economics, Vol 38 pp 520-529.
9. H. Hotelling,(1929) Stability in competition Economic Journal, Vol. 39 pp 41-57.

TABLE 2.1

STATE PER CAPITA INCOME IN REGISTERED MANUFACTURING : 1970-71, 1980-81 AND 1986-87 (AT 1970-71 PRICES)

STATES	1970-71		1980-81		1986-87	
	PCI	RANK	PCI	RANK	PCI	RANK
ANDHRA PRADESH	23.7	12	34.4	11	56.1	8
ASSAM	28.7	9	25.4	13	32.3	13
BIHAR	28.6	10	35.4	10	42.7	12
GUJARAT	98.5	2	133.2	2	191.9	2
HARYANA	57.8	5	103.0	3	136.2	3
HIMACHAL PRADESH	15.8	16	11.1	17	20.7	16
JAMMU & KASHMIR	4.4	17	12.5	16	18.0	17
KARNATKA	50.4	6	79.2	6	115.0	5
KERALA	32.7	8	50.6	8	50.2	9
MADHYA PRADESH	22.2	13	30.6	12	47.5	10
MAHARASHTRA	157.5	1	221.2	1	277.0	1
ORISSA	25.8	11	36.5	9	30.2	14
PUNJAB	41.6	7	75.2	7	95.4	6
RAJASTHAN	19.5	15	22.4	15	30.1	15
TAMIL NADU	63.9	4	96.1	4	118.3	4
UTTAR PRADESH	21.0	14	23.0	14	43.2	11
WEST BENGAL	91.6	3	89.0	5	81.5	7
ALL INDIA *	46.1	-	63.5	-	81.5	-
C.V. %	83.9	-	85.5	-	85.1	-

* Average for 17 States.
Abbrevitions: PCI - Per Capita Income.
C.V.- Coefficient of Variation.
Source : R.V. Dhadibhavi, (1991) opcit.

provides suitability to specific types of industries, which in turn give character to the development process of the region[10].

R.V. Dhadibhavi,[11] has examined the per capita incomes in the registered manufacturing sector of 17 major states in India for the years 1970-71, 1980-81 and 1986-87. For these years the states were ranked in accordance with their per capita industrial income. Table 2.1 reveals that there is very little change in the position over the years. Maharashtra, Gujarat, West Bengal, Tamil Nadu and Haryana were the five highest ranked states; only West Bengal lost its position in 1986-87. In 1970-71 Jammu & Kashmir, Himachal Pradesh, Rajasthan and Uttar Pradesh were amongst the poorest industrial states in 1970-71. The position of Orissa deteriorated in 1986-87 with its rank lowering from 9th in 1970-71 to 14th in 1986-87, while Uttar Pradesh improved its rank from 14 in 1980-81 to 11 in 1986-87. The coefficient of variation indicates that there was an increase in the industrial disparity from 1970-71 (at 83.93%) to 1980-81 (at 85.46%), and there has been practically no change in the disparity level from 1980-1981 to 1986-87.

Table 2.2 gives the estimated growth rates in industrial output of the states covered in Dadibhavi's[12] study for the period of 1970's, 1980's and for the entire 16 year period. It

---

10. B. Goldar and V.K. Seth(1989),'Spatial variations in the rate of industrial growth in India Economic and Political Weekly June 3.

11. R.V. Dadibhavi(1991),'Growth of industry and industrial infrastructure : An interstate analysis, Yojna, January 1-15, Vol. 34 No. 24.

12. R.V.Dhadibhavi (1991) ibid.

TABLE 2.2

(AT 1970-71 Prices)

Annual Growth rates of Real Net Value Added in Registered Manufacturing in different States.

States	Share of Registered Manufacturing output(%)		Growth rate of NVA in Registered Manufacturing (1970-71 prices) %.		
	1970-71	1986-87	1970-71to 1980-81	1980-81to 1987-88	1970-71 to 1987-88
Andhra Pradesh	3.61	4.93	7.17	10.77	8.25
Assam	1.46	1.08	2.55	5.78	3.75
Bihar	5.63	4.98	4.15	5.17	5.02
Gujarat	9.21	10.80	6.46	8.48	6.83
Haryana	2.03	3.30	8.25	7.75*	7.85
Himachal Pradesh	0.19	0.14	1.09	10.56*	4.59
Jammu & Kashmir	0.07	0.18	14.09	7.38	11.28
Karnataka	5.17	7.10	9.20	8.54	7.92
Kerala	2.44	2.08	4.78	1.44*	4.22
Madhya Pradesh	3.24	4.14	5.69	8.27	6.80
Maharashtra	27.80	28.79	6.89	6.38	6.07
Orissa	1.98	1.30	8.85	1.79	3.92
Punjab	1.97	2.63	9.16	5.86	7.70
Rajasthan	1.76	1.78	4.66	6.78	5.76
Tamil Nadu	9.20	9.25	7.86	5.60	5.97
Uttar Pradesh	6.50	7.96	5.07	14.67*	7.45
West Bengal	14.21	7.34	2.00	0.88	3.71
All India*	100·00	100·00	6.33	6.83	6.45

The totals are less than 100 as other states are not included *1980-81 to 1986-87.
Source: Same as Table 2.1

can be inferred that there are wide variations in the growth rates of State Domestic Product from the registered manufacturing sector among states. Jammu & Kashmir, Punjab, Karnataka, Orissa, Haryana, Tamil Nadu and Andhra Pradesh recorded the highest industrial growth during the 1970's, ranging between 7% and 14.09% per annum. Maharashtra and Gujarat recorded a 6 percent growth rate of industrial value added in this period, while a very low growth rate of manufacturing output of about 2% was experienced by West Bengal, Assam and Himachal Pradesh.

According to Dadibhavi's study, the 1980's show a very different regional profile from that of the 1970's. Uttar Pradesh had experienced the highest growth rate of 14.67%; besides, Andhra Pradesh, Himachal Pradesh, Gujarat, Karnataka and Madhya Pradesh also experienced high growth rates during the 1980's. However the position of West Bengal and Kerala had deteriorated. Orissa had faired very well in the seventies, however, in the eighties it recorded an extremely low rate of industrial growth of 1.79 per cent per annum.

M.B. Singh[13] attempted to measure the level of industrial development of various states in India for the year 1980. The indices of development he used were (i) Number of factories (ii) Manufacturing Employment (iii) Input (iv) Value added by manufacturing (v) Number of factories per 100 sq. kms. of area (vi) Percentage of manufacturing employment to total population and (vii) Per capita investment. He assumed the regional mean as

---

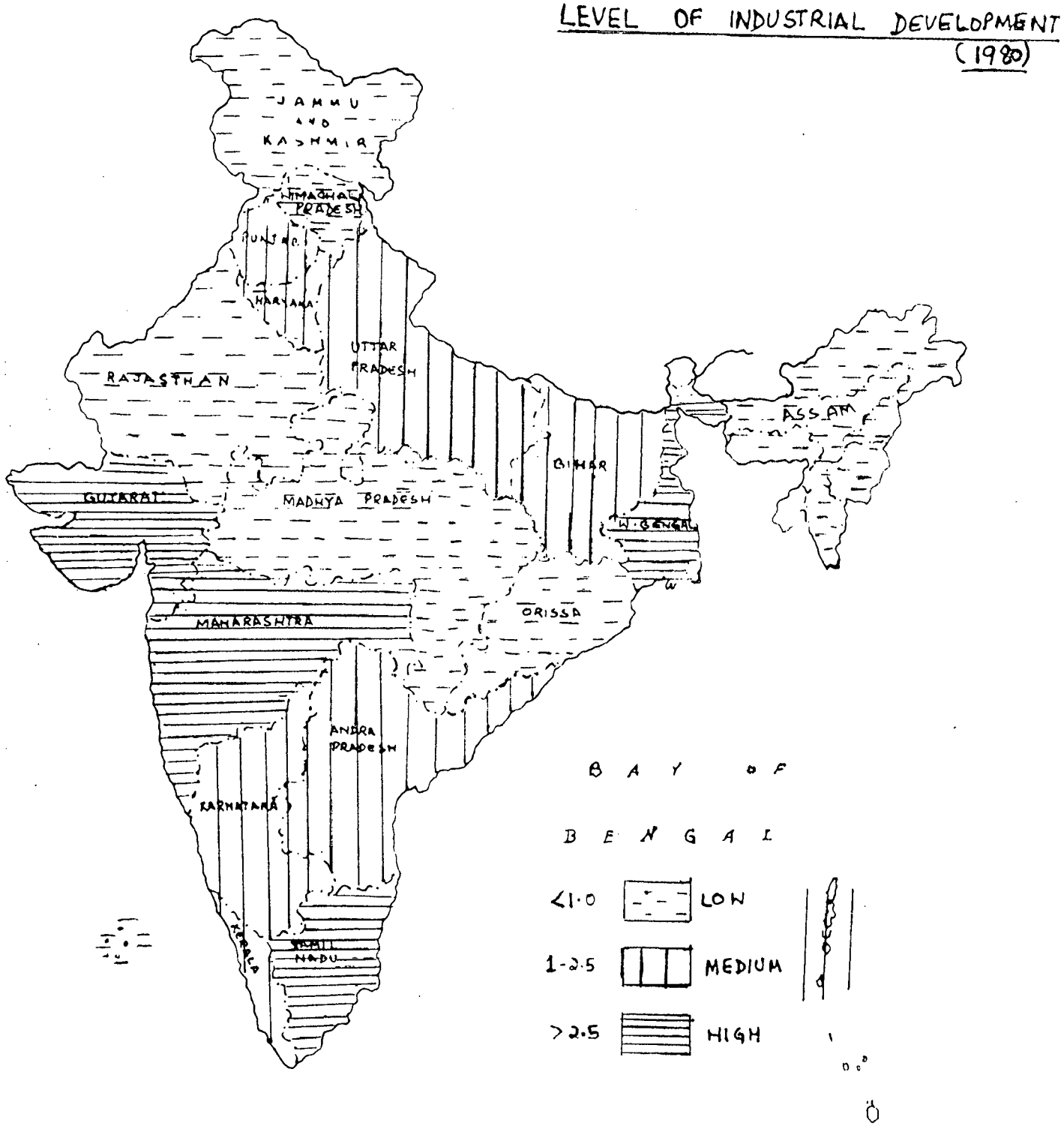
13. M.B. Singh (1989), " Spatial Analysis of manufacturing industries in India." New Dimensions in Industrial geography(ed). Lotus Publications, Varanasi.

one, and calculated the deviation indices (based on all the above seven indicators) for all the states and Union Territories. He then categorized the country into three distinct industrial zones.

(i) Highly industrialized	> 2.50
(ii) Medium industrialized	1.00-2.50
(iii) Low level of industrialization	< 1.00

(i) Highly Industrialized regions: In 1980, on the basis of the indicators of industrial development, as chosen by M.B.Singh, Chandigarh, Maharashtra, Delhi, Gujarat, Tamil Nadu and West Bengal belonged to this category. This region consisted approximately of 49% of factories in India and provided employment to about 52% of the entire manufacturing sector. It is observed that this region occupies an area of about 22% in India a population of about 30%. M.B.Singh has rightly pointed out that the industrial development in these state received impetus from the invention of steam power, discovery of coal and iron in the Chota nagpur plateau and availability of cheap labour. Among cash crops, Jute, Mesta and tea dominate in West Bengal. Regarding the Gujarat State, it ranks first in the country, in the production of cotton and groundnut and second in the production of Tobacco. These commodities have found good markets and provide a foundation for important industries such as textiles, oil and soap. Gujarat has a dominant electronics industry and some of the other existing and upcoming industries are chemical, petrochemicals, fertilizers, drugs and pharmaceuticals, dye-stuffs and engineering units of multiple types. The state is a major producer of inorganic chemicals and has the largest petrochemical complex in the country.

MAP 2.1


LEVEL OF INDUSTRIAL DEVELOPMENT
(1980)
JAMMU AND KASHMIR
HIMACHAL PRADESH
PUNJAB
HARYANA
RAJASTHAN
UTTAR PRADESH
BIHAR
ASSAM
GUJARAT
MADHYA PRADESH
W. BENGAL
ORISSA
MAHARASHTRA
ANDRA PRADESH
KARNATAKA
KERALA
TAMIL NADU
BAY OF BENGAL
<1·0 LOW
1-2·5 MEDIUM
>2·5 HIGH

Another state which belongs to highly industrialized zone is Maharashtra, which is the third largest state in both area and population. The major industries contributing to Maharashtra's industrial production are chemicals and chemical products, textiles, electrical and non-electrical machinery and petroleum and allied products. Other important industries are pharmaceuticals, engineering goods, machine tools, steel and iron castings and also leads in sophisticated electronics equipment. The development of offshore oil fields at Bombay high and Bassein North oil fields have contributed greatly towards the industrial development of the state.

The development of industries in Tamil Nadu is reinforced by availability of hydel power, local markets, raw cotton and cheap labour.

(ii) Medium Industrialized Regions : According to M.B.Singh's study, this region encompasses Punjab, Haryana, Kerala, Bihar, Uttar Pradesh, Andhra Pradesh, Karnataka, Pondichery, Goa, Daman and Diu, and Andaman Nicobar islands. The area had about 40 percent and 37 percent of factories and factory employment respectively and covered a higher population and area in comparison to the highly industrialized region.

The chief manufactures of Punjab are textiles, sewing machines, sugar, fertilizers, sports goods, electrical goods, and machine tools. While, the industries essentially located in Haryana are cement, sugar, paper, cotton textiles, handtools, vanaspati, ghee, and the Hindustan Machine Tools factory. In minerals, Bihar is the richest state and industries based on iron ore, coal etc. are spread around Jamshedpur and Bokaro which are

the major steel towns. The most populous state in India is Uttar Pradesh. The organized industrial sector of Uttar Pradesh has been basically confined to agro-based industries such as sugar, cotton textiles, edible oils and paper. Important Union government undertaking such as Hindustan Aeronautics, Indian Telephone Industries, Bharat Electronics are located in Karnataka.

(iii) Low Industrialized Region : This region covers only about 21 percent of the population but a vast area of about 45 percent of the country. The states which belong to this category according to M.B. Singh are Assam, Madhya Pradesh, Himachal Pradesh, Jammu & Kashmir, Rajasthan, Orissa, and some states in the eastern sector. The major industries in Madhya Pradesh are the steel plant in Bhilai, Bharat Heavy Electricals at Bhopal, Almunium plant at Korba. However the region as a whole requires a greater impetus.

Yet another study has indicated significant regional differentiation in the pattern and growth of industry. This is the study conducted by Ravindra H. Dholakia,[14] who examined the net value added in the registered manufacturing and the secondary sector of 17 major state economies for the years 1979-80 and 1984-85. From his study it was revealed that the coefficient of variation, weighted by population for the registered manufacturing sector decreased from 77.68 percent in 1979-80 to 72.38 percent in 1984-85. While in the secondary sector as a whole the coefficient showed a greater decline from 53.08 percent

---

14. R.H.Dholakia(1989), 'Regional aspects of Industrialization in India' Economic and Political Weekly, Nov, 18.

in 1979-80 to 46.74 percent in 1984-85. This implies that sub-sectors other than registered manufacturing sector such as unregistered manufacturing, construction, electricity, gas and water supply contributed significantly in reducing the regional industrial disparities. Further, as per his analysis, all the southern states grew at a rate lower than the national growth rate in net value added in industry. However with the exception of Punjab and Rajasthan, all the Northern states grew at a rate higher than the National growth rate, during this period. According to Dholakia, such a sharp differential regional pattern in the growth of industry, would largely be due to deliberate government policy.

He also looked into the capital per worker and capital productivity to find some explanation to the regional differentiation. Based on his study, a distinct regional pattern could be observed. The southern region, West bengal and Assam had an above average capital productivity but a less than national average of capital per worker. On the contrary, the northern region had a high capital per worker but less than the national average capital productivity with the exception of Maharashtra and Gujarat which recorded high capital productivity & Jammu & Kashmir which recorded a low figure for both the factors.

Dholakia (1989) also attempted to examine the hypothesis that regional spread of industry would prove growth promoting rather than growth hindering. He regressed the degree of regional concentration on the per annum growth rate of Net Value added for the period 1979-84. The result indicated that if the degree of regional concentration of industry is reduced by one percentage

point, it would increase the growth rate of industry on an average by 0.16 percentage points. This result throws light on the advantages of having regional spread of industries.

As mentioned earlier, due to the difference between the northern states and the southern states in terms of capital per worker and capital productivity, Dholakia (1989) tried to identify the regions which should have a more diversified or a move specialized industrial structure. For this purpose he defined an index of specialization to find the correlation between the index and capital per worker. His empirical evidence supported the hypthesis that if the industrial structure of a regional economy is diversified, it will reduce the requirement of capital per worker in manufacturing, and the contrary in the case of a specialized industrial structure. Dholakia thus goes a step further by suggesting certain measures for reducing regional disparities by diversification of the industrial base in the North and further specialization in the south, which would not only tend to equalize the factor proportions but also the productivity of capital in the industrial sector in the two regions.

As a part of this study, we have calculated the compound growth rates of value added in registered manufacturing in 14 states for the period 1961-71, 1971-81 and 1981-86. A look at table 2.3 will reveal that in accordance with R.V. Dadibhavi (1991)[15] findings, the fastest growth during the seventies was experienced by Punjab, Kerala, Karnataka, Orissa, Haryana, Tamil

---

15. R. V. Dadibhavi (1991) op cit.

Nadu and Andhra Pradesh. The 1970's as compared to the 1960's showed a slower growth rate, ranging from 6 percent to 21 percent in the 1960's, and in particular, Haryana and Orissa experienced very high growth rate (about 21 percent). In the seventies, very low growth rate was registered in West Bengal (1.82 percent) and Uttar Pradesh (3.22 per cent). In the period from 1981-86, high growth was observed in Andhra Pradesh, Haryana, Madhya Pradesh, Rajasthan and Uttar Pradesh. Very low growth rate was registered in Gujarat and West Bengal and infact, there was a negative growth rate in Kerala (-0.57 %) and Orissa, (-12.24 %). Orissa had performed rather inconsistently, recording the highest growth rate in the 1960's but experienced a high negative growth rate in 1980-86. West Bengal, it is observed, has faired very poorly in the 1970's and 1980's.

TABLE 2.3

STATE WISE COMPOUND GROWTH RATE (%) OF VALUE ADDED IN THE REGISTERED MANUFACTURING SECTOR (AT 1970-71 PRICES)

SR. NO.	STATES	1961-71	1971-81	1981-86
1	Andhra Pradesh	7.57	5.98	13.98
2	Bihar	8.90	4.42	5.30
3	Gujarat	10.10	5.62	1.32
4	Haryana	20.26	8.68	7.19
5	Karnataka	16.58	7.14	8.90
6	Kerala	10.14	6.31	-0.57
7	Madhya Pradesh	8.65	5.61	8.61
8	Maharashtra	11.65	5.76	5.21
9	Orissa	21.62	5.45	-12.24
10	Punjab	11.87	8.42	4.51
11	Rajasthan	16.80	3.03	16.54
12	Tamil Nadu	11.59	5.86	7.94
13	Uttar Pradesh	6.85	3.22	13.33
14	West Bengal	6.98	1.82	0.38

Source of data : Estimates of State Domestic Product Govt. of India, Nov.1985, June, 1988.

Having referred to the various studies which examined the extent of regional industrial disparities in India, it would be pertinent to note the factors which are to some extent responsible in determining a spatial pattern of industrialization.

2.3 DETERMINANTS OF SPATIAL PATTERN OF INDUSTRIALIZATION

V. K. Seth[16] in an attempt to examine the factors which would influence the spatial pattern of industrialization, analyzed certain variables to view the issue from the demand & Supply side. With respect to the demand side he considered the influence of the market and in the case of the supply side he considered the influence of labour cost & raw material cost. Seth's study revealed that labour cost was not an important determinant of the spatial pattern of industries due to the existence of certain conditions such as the existence of protected markets and market imperfections in developing countries. These factors allow the producers to pass on atleast part of the higher costs to the consumers through higher prices. V.K.Seth's empirical study did indicate however, that the wages per worker had a significant effect on the spatial distribution. But he pointed out, that differences in labour cost are related to the differences in the productivity and skill-mix over space and hence labour cost does not affect the spatial pattern of industries. Essentially for the same reason, the cost of material does not appear to be an important determinant. A. Weber[17] had

---

16. V. K. Seth (1987) op cit.

17. A. Weber (1929) op. cit.

suggested weight-loosing raw materials required by an industry will make the industry material oriented. To defend his argument, Seth also pointed out that, at an aggregative level Weber's suggestion need not hold true, because each industry uses multiple kinds of materials. Moreover in V.K.Seth's study, the influence of the availability of raw material did not exist, and this aspect is reinforced by the fact that Orissa, Bihar and Madhya Pradesh are resource rich states, but are not significant in terms of industrialization.

With respect to the influence of the market, Vijay Seth's study revealed that his hypothesis of the market influence as a determinant of location of an industry was significant. The classical location theories believed that the market was an important determinant since locating an industry close to the market would minimize the transport costs for supplying the product. Seth claimed that the decision of locating a firm depends not only upon the current demand, but also on future demand forecasts. To make a systematic analysis of the industry-wise forecasts of demand, the measurement of the market influence can be attempted with the help of the size of the market of a region, which according to many studies indicate that the size can be measured in terms of the population. However Seth insists that population per se is not an adequate measure; in addition it depends essentially upon the purchasing power differences which is reflected in the per capita income differences and the degree of urbanization.

Dhar and D.V. Sastry,18 referred to technological factors in influencing the spatial pattern of industries. The index of the measure of industrialization they had used was the consumption of electricity.

D.T. Lakdawala,[19] in his study brought out the importance of technological interdependance as a determinant of the spatial pattern. P.S.Florence,[20] also tried to establish a relationship between the size of a firm and its locational pattern. They believed that as the size of a plant increases it makes the plant less dependant on external economies. Moreover large firms do not depend on local markets. This enables them to have a wide locational choice. However, small scale firms, according to Florence, due to their dependence on external economies tend to concentrate in cluster form.

The studies of Dholakia,[21] Nair,[22] Dhar and Sastry (1968) and Lahiri,[23] to mention a few, have observed that there is inter-state convergence in the industrialization process in

---

18. P.N Dhar and D.V.Sastry, (1968), Inter-State variations in Industry, Economic and Political Weekly, March 22.

19. D.T.Lakdawala, et.al (1974) Regional Variations in Industrial Development, Popular Prakashan, Bombay.

20. P. Sargent Florence,(1948) Investment location and size of plant, NICSR, Economic and social studies, No. 7.

21. R.H.Dholakia, (1977),'An Inter-State analysis of capital and output in Registered manufacturing sector Indian Journal of Industrial Relations Vol 15(1) pp. 63-73.

22. K.R.G.Nair (1982) "Regional Experience in a developing economy. Wiley Eastern Ltd. New Delhi.

23. R,K,Lahiri(1969), 'Some aspects of Inter-State disparities in Industrial development in India' Sankhya series B vol. 31 (3,4).

India. This trend of inter-state convergence was also observed by V.K.Seth. (1987). According to him, this may not necessarily imply that there are less spatial inequalities in India, since there may be inequalities in the spatial pattern of industrialization within a state. Various studies have tried to identify the determinants of spatial pattern within the states.

For instance, it is argued that Gujarat experiences inter-district convergence due to certain conditions existing in the state. These conditions can be identified as, a well integration of the economy with market towns, existence of mineral resources, a fairly developed agriculture etc. This fact has been substantiated by A. Kundu and M. Raza[24] in their studies.

Similarly Punjab and Haryana may tend to experience inter-district convergence, due to well integration of villages with the markets towns & high level of agricultural productivity. Increasing farm income generates demand for industrial consumer goods, which attracts enterpreneurs to set up agro-based and related small and medium scale industries in these states.

However, Madhya Pradesh and Bihar are states with rich resource endowments but low level of integration of villages with the market areas, and poor agricultural development. Hence these states tend to have lower per capita income and possibly experience spatial concentration of Industries. Those industries which requires a strong market orientation do not get developed in these states.

---

24. A.Kundu and M.Raza(1982) Indian Economy-The Regional Dimension, Centre for the Study of Regional Development, Jawahar lal Nehru University, New Delhi.

Further those regions which were able to internalize modern industries due to some historical advantages tend to experience industrial agglomeration We can include Maharashtra and West Bengal in this category. The studies of Kundu and Raza[25] also indicated this agglomerated pattern of industrialization.

In Hill states, the observed spatial concentration in the inter-district spread of industialization is probably due to weak transport and communication linkages, existance of subsistance farming etc. These are basically constricting factors which prevent the spatial spread of industries.

We have discussed the probabilities of inter-district convergence and divergence in India, of a few states. This was mainly to get a broad idea, that different states have had different experiences and that the prerequisites of industrialization are not uniformly distributed among various districts. V.K. Seth (1987) identified some prerequisites such as a strong agricultural base, well organized and developed trading channels and favourable resource endowment. In addition, the governments role in reducing regional disparities cannot be ignored.

2.4 GOVERNMENT POLICIES AND REGIONAL DISPARITIES

In a vast country like India, with cultural and geophysical diversities a federal type of governmental structure and strong regional political institutions, it is quite natural to find

---

25 A. Kundu and M.Raza (1982) ibid.

reduction of regional disparities as an important objective in the Five Year Plans of the Indian Government.

(a) FIVE YEAR PLANS:

Though the First (1951-1955) and second Five Year Plan (1955-1960) documents, did state the objective of achieving balanced regional development, the planners believed that the degree to which the spatial pattern of industrialization in the country could be changed within a short time span was limited. The government believed that the creation of infrastructural facilities would have a favourable impact on the industrial location in the long run.

P.C. Mahalanobis[26] evolved a model to explain the basic industrial strategy during the Second Five Year Plan (1955-1960). According to him, to achieve the maximum possible growth rate and self reliance, the government should invest relatively large proportions of resources in heavy / basic or capital goods industries. However the objective of regional balances in the second Plan, was left to the small scale industries to achieve. For this purpose, an "Industrial estates programme was introduced to facilitate the small units with certain common services and with the provision of electricity, gas, water etc. Due to errorneous assumptions regarding the locational pattern of the small scale industries, this stragegy failed to achieve its objectives of reducing regional disparities. Modern small scale industries also require the infrastructural facilities similar to

---

26. For details see, P.C.Mahalanobis (1963): An approach to operational research to planning in India, Asia Publishing House.

the ones needed by the larger-scale sectors. It can be observed generally that the First and Second Five-Year Plans had no explicit policy of balanced regional development.

The Third Five Year Plan (1961-65): This plan devoted an entire chapter to the issue of regional imbalances. The Plan stated that, "development of regions and national economy as a whole have to be viewed as a part of a single process" and the ultimate objective "must be that over a reasonable period, all regions in the country should realise their potential for economic development and should attain level of living not for removed from those of the nation as a whole".[27] An attempt was also made to identify the backward regions and increase the overall awareness. In addition, the studies conducted on the economic trends and growth rate of different regions, were highly promoted. Moreover, the policy of charging a uniform price of steel at all the big cities in India was introduced.

The Fourth Five Year Plan (1969-1974) placed great emphasis on infrastructural facilities in an attempt to achieve a more balanced spatial pattern of industrialization. It was believed that as there existed intrinsic linkages of infrastructural facilities and growth and diversification of economic activities, there was a need to expand the infrastructural facilities to move towards the goal of reducing regional disparities. The Fourth plan in addition, recognized an increasingly greater role to be played in this regard by the individual state governments.

---

27. Planning Commission,(1961) Third Five Year Plan, Government of India, New Delhi.

Up to this period, there was a general belief that an attempt to reduce the regional disparities would have a diminutive effect onthe overall growth of the economy. However, it was during the Fifth Five Year Plan (1974-79) that it began to be increasingly recognized that there need not be a trade-off and that both the objectives can be achieved simultaneously. One of the objectives of this Plan was to improve the standard of living of those below the poverty line. Hence greater emphasis was placed on developing the backward areas.

The Sixth Five Year Plan (1978-1983) devoted an entire chapter to the patterns of regional development. This plan introduced a scheme of a District Industries Centre to achieve industrial dispersal through small-scale industries. Under this scheme, it was suggested that entrepreneurs should be provided with various facilities to set up small industries in villages. The planning commission also set up a National Committee on 30th November, 1978, to develop the backward areas under the chairmanship of B.Sivaraman.

The Sixth Plan however was revised (1980-1985) due to a change in the political power at the centre. The revised plan did not contain a separate chapter on regional development. In contrast to the earlier plans, this plan laid more emphasis on the state governments for tackling the problems of a short term nature. This implied that greater stress would be placed on the problems associated with the issues concerning demand management and elimination of bottlenecks arising from the supply side, such as, transportation and power.

One of the objectives of the Seventh Five Year Plan (1985-90) was to lay stress on increases in agricultural productivity and it also envisaged a programme in human resource development. These are critical determinants of a regions economic status and the reduction in interregional disparities in these elements would help in the task of reducing regional imbalances. In addition, this plan continued certain policy measures taken up in the previous plans, which were to attack the problem of regional inbalances more directly. With a view to accelerate the pace of industrial delopment, the Government of India declared the entire North-Eastern region as belonging to 'A' category i.e. it entitled the industrially backward areas to central investment subsidy at a maximum permissible rate. Transport subsidy (to the extent of 75%) for raw material and end products was also available. In the Sixth Plan a formula was worked out for allocating certain amounts to the states whose per capita Income was below the national average; a similar treatment had been accorded to these states in the seventh plan. Moreover, special concessions and subsidies were also to be given to programmes such as the Hill Area Development Programme and Desert Development Programme.

Taking an overall analysis of the development strategy pursued in the various Five Year Plans, V.K Seth pointed out that the planners concentrated their attention more on the intersectoral balances than on regional imbalances. This was so, despite the fact that several adhoc groups and committees were appointed such as the Pandey Committee and the Wanchoo Group set up in 1968.

The strategy to influence the spatial pattern of industrialization which has been generally followed by the Indian Government consists of such policy instruments as : (a) use of licensing policy to influence the location of private sector investment (b) the location of public sector units and (c) use of input subsidies and other financial incentives to increasingly attract industrial investment in the backward areas. Several evaluations of the policy instruments used by the government, have highlighted certain fallicies. The granting or the rejection of the issue of industrial licenses was practically not based on any predetermined fixed criteria. It has also been pointed out that the techno-economic studies of proposed investments conducted by the DGTD was rather poor. Under such circumstances, the licensing authorities were practically left without any direction with respect to the spatial distribution of licenses, and hence the objectives of influencing the spatial pattern of private investment could not be achieved.

It has also been pointed out by several studies that upto 1970, public sector investment favoured the materials rich industrially backward states. However after 1970, public sector investment assumed a wider spatial spread probably due to a shift in the composition of investment favouring market oriented industries and the pressures put by various regions. This resulted in investments favour of the more industrialized states.

(b) FINANCIAL DEVOLUTION :

An important way by which the State policy can influence the level of regional development is through public expenditure. In the Indian set up, public expenditure essentially comprises of

(i) expenditure incurred by the central government and (ii) expenditure incurred by the state governments. The transfer of financial resources from the centre to the states basically takes place through 2 channels, one channel includes is the statutory transfer of resources, whereby the proceeds of taxes are shared between the Centre and the States; and the grants-in-aid of revenue of the States. The second channel through which centre-state resource transfers, take place include the assistance of state plans by the planning commission; discretionary grants for special purposes and investment in centrally sponsored projects.

However there is a general feeling that transfer of resources from the centre to the states has not been equitable. One of the reason may be attributed to the discretionary element available to the centre which can be used in a non-equitable way.

Several studies point out, that despite substantial element of progressivity in Finance commission devolution and a slightly lower order of progressivity in central assistance for State Plans, the actual State plans do not reveal a progressive pattern in relation to their per capita state domestic product.

Ashok Mathur[28] has rightly pointed out a few factors that ought to be taken into account in analyzing the impact of devolution of financial resources from the centre to the States as an explanatory factor in regional growth. Firstly, growth not only depends upon the outlays of State Governments but also on

---

28. Ashok K.Mathur(1989), "Some Thoughts on Regional Development and the State Policy in India", Paper Presented at National Seminar on Development, modernization and social justice, Nov.

investment of resources by the private sector. One of the important determinants of the latter is the deployment of resources by the public sector financial institutions. It has been observed that basically investments of these institutions have been located in well established areas. Thus the regional pattern of the flow of resources from these institutions can be drawn upon as an additional factor explaining the tendency towards divergent regional growth. Another factor to be kept in mind is that the impact of the pattern of devolution (of central finances to the states) on rates of growth would also depend on the pattern of expenditure in the states. Furthermore, in judging the impact of financial devolution on regional economic dispatities, Ashok Mathur[29] mentioned that the behaviour of regional disparities may not be uniform across all sectors. Hence this would call for different types of policy measures to invigourate the lagging regions depending upon the sectors causing acute problems in them.

The weighted coefficients of variation of SDP per capita within the primary, secondary and tertiary sectors (at 1970-71 prices) were estimated by A.K. Mathur, results of which are presented in Table 2.4. Primary sector disparities reveal sharp increase and the secondary sector disparities reveal a decline, through less sharp than the increase in case of primary sector. The tertiary sector follows the pattern of the agricultural sector but in a more mild form. He points out that in the area of industry the need is for strengthening the trend towards declining regional disparities through greater support to

---

29. Ashok K.Mathur (1989) ibid.

infrastructural development in the industrially backward areas. Further, Vijay K. Seth (1987) drew attention to the fact that public sector industrial investment which was regionally allocated in a progressive manner till 1970, tended to get diverted more to the developed regions in the subsequent period. This trend needs to be arrested.

TABLE 2.4

INTERTEMPORAL TREND OF SECTORAL COEFFICIENTS OF VARIATION OF PER CAPITA SDP

YEAR	PRIMARY SECTOR	SECONDARY SECTOR	TERTIARY SECTOR
1961	17.23	57.05	38.70
1966	19.07	52.90	38.93
1971	25.55	52.80	38.58
1976	24.64	53.17	40.01
1981	29.20	53.36	41.63
1986	35.77	48.74	40.34

Source : A.K. Mathur "Some thoughts on Regional Development and State Policy in India", paper presented at National seminar on development, modernization and social justice Nov.,1989.

Thus, despite the fact that a large number of measures have been taken to reduce the inter-state disparities, a lot of scope still exists to narrow down the gap between the relatively more developed and the lesser developed regions, subsequent to this discussion of the spatial pattern of Industries in India, it also would be interesting to see the sectoral pattern of industrilization, which has been dealt with in Chapter 3 and 4.

CHAPTER 3

ECONOMIC GROWTH AND STRUCTURAL CHANGE :A REVIEW

Over the past 30 years the field of development economics has undergone tremendous transformation as a consequence of a rapid increase in empirical knowledge. The various theories put forward in the 1950's have been tested, analyzed and reformulated with the help of statistical analysis of their hypothesis. From this process has emerged a more comprehensive approach to development: a set of interrelated changes in the structure of an economy.

The relation between industrialization and economic growth has been a subject of continuous controversy. Among the best documented generalizations of development is that, as per capita income increases, the share of manufacturing in output and employment increases, while that of agriculture decreases. However there are certain pertinent issues which are in dispute such as the ways in which the changes in the structure of production would affect the rate of growth and the distribution of its benefits; and the type of effect that policies will have, which are designed to accelerate this shift or to change its composition.

This chapter essentially has 2 major parts. The first part presents the main conclusion of a series of studies of development patterns that were designed to provide an empirical basis for models of development. In the second part of the

chapter we refer to a few studies which throw light on the pattern of development in India.

3.1 A THEORETICAL PERSPECTIVE

In this section we review the vast contributions made by various scholars to the literature on development patterns. We have discussed these contributions in a chronological order, starting from the 1950's to the more recent contributions which look at the relationship of economic growth & structure of the economy in a wider perspective.

In the discussion of this part, we have essentially followed Sutcliffe's[1] approach of examining the various studies on development patterns.

(a) SIMON KUZNETS[2] :

Kuznets, in his study of 1957, initially on the basis of a cross-section, attempted to examine the average share of the major sectors in the National Product by combining the countries into different groups according to their per capita National Income. This revealed that there was a consistant decline in the share of the agricultural sector in national product as national income increases. The industrial sector which Kuznets terms the M + sector, on the other hand, increases consistently with rising levels of income. However for the Services Sector, he did not

---

1. R.B.Sutcliffe (1971) Industry and underdevelopment, Addison. Wesley, London.

2. S. Kuznets,(1957) Quantitative Aspects of Economic Growth of Nations, II Economic Development and cultural change, vol V (Supplement) No.4 July.

find a distinct pattern of change between countries according to their different levels of per capita Gross Domestic Product.

On a similar basis Kuznets also attempted to examine cross-sectionally, the average share of major sectors in the labour force, by grouping countries in accordance with their per capita income level. His study revealed that the same trends existed in the share of the labour force in the three sectors according to the level of per capita national income, except that in this case there emerged a clear pattern for the share of the labour force in the service sector. Thus countries with a higher national income, had a higher average share of the total labour force in the service sector than any group with a lower national income per head.

In addition, Kuznets examined the relationship of economic development and the share of labour force in the major sectors using a time series analysis for twenty-eight countries. He observed that the broad trends which emerged in the cross-sectional study was confirmed by the time-series study, though there were some exceptions. However it has been pointed by Scholars that, Kuznets' time-series study did not include many under developed countries. Many such countries experience economic stagnation combined with over population, which can sometimes considerably affect the sectoral structure of output and the labour force. This aspect was not considered by Kuznets, hence in certain cases, his results did not conform to his hypothesis.

The empirical study by Kuznets on the changing structure of national product and the labour force was followed by attempts of

other scholars to examine the possibility of the existance of a standard pattern of industrial growth.

(b) WALTER HOFFMAN: In his book "The Growth of Industrial economies", Hoffman claimed that irrespective of the relative amounts of the factors of production, state of technology, or location factors, the structure of the manufacturing sector would always follow a uniform pattern. According to him, among the first few industries to develop were the consumer goods industries which would be followed by the capital good industries. These capital goods industries would gradually begin to assume dominance over the consumer goods sector in term of output. He viewed this process to go through a number of stages: In stage I, the ratio of consumer goods output to capital goods output is 5($\pm$) to 1. Stage II would have a ratio of 2.5 ($\pm$ 1) to 1. And stage III a ratio of 1 ($\pm$ 0.5) to 1. Finally in stage IV, Hoffman claimed that the capital goods output would be higher than the output from the consumer goods sector.

Hoffman calculated net output ratio's of consumer goods to capital goods for a number of countries at different dates. He observed that there were differences in the speed with which countries moved from one stage of industrialization to the next. In terms of the ratio's he identified three groups of countries: (i) those which revealed a rather sharp decrease such as Japan & Germany, (ii) those with a medium rate of decline such as Britain, France, Australia and S. Africa, (iii) and countries with a low rate of decline, for instance USA, Argentina, Canada and Denmark.

A few weaknesses of Hoffman's study have been pointed out by Sutcliffe.[3] He claims that the choice of industries which were included in the two industrial sectors could be misleading. For instance the chemical industry produces chemical goods as well as capital goods. Thus the precise value of the net output ratio's would depend largely on the category in which specific industries are placed.

Hoffman tried to show that all 'free' economies pass through the stages of industrialization mentioned above. However there is no necessity for newly industrializing countries to follow the pattern which Hoffman has identified. These countries may adopt a 'planned' approach for industrial development and there may be an increased presence of government enterprises in the economies. In such cases, there may emerge a very different pattern to that determined by Hoffman, for the free industrialized economies. Hoffman however does acknowledge this fact, that the rate of decline in the net output ratio will be faster in newly industrializing countries compared to the economies which industrialized in the last century. He believes that one of the possible explanations may be the existance of a fund of technical knowledge in the industrialized countries, which could result in differential rate of net output ratio's. Hoffman identified a few more explanations for this phenomena, such as the possibility of the existance & influence of immigrants as well as of capital, pressure from foreign competition and the availability of raw materials.

---

3. R. B. Sutcliffe (1971) op. cit.

Several scholars pointed out that Hoffman's classification of industries based on only two sectors i.e. the capital goods and consumer goods, cannot be reliably used to describe a country as highly or less industrialized. By using this classification, it is quite possible that a country which has a high proportion of its industrial sector producing capital goods, would be classified in the third stage of industrialization though the total industrial output may be small.

Several other studies have tried to overcome these restrictions. We take up this discussion briefly below.

(c) Hollis B. Chenery[4] Chenery has made vast and important contributions to the literature on the Patterns of Industrial Growth. Chenery like his predecessors agreed that an increase in the per capita income of a country is normally accompanied by a rise in the share of industrial output. In search of an explanation to the consequent rise of industry, he stressed, on examining the various demand and supply factors. For the sake of convenience we shall analyze Chenery's contribution to the literature over the years in this section in several parts.

In discussing the determinants of sector growth, Chenery has made use of variables such per capita income, factor supplies such as labour, physical capital, human skills, natural resources and population. He expects some degree of uniformity in the patterns of growth of various countries, due to certain similarities in the demand & supply conditions which he terms as

---

4. H. B. Chenery,(1960) "Patterns of Industrial Growth", American Economic Review, September.

"Universal Factors". These factors include: "(i) Common technical knowledge (ii) Similar human wants (iii) access to the same markets for imports and exports; (iv) the accumulation of capital as the level of income increases (v) The increase of skills, (broadly defined) as income increases".[5]

Chenery outlined 4 major determinants of sector output which includes, Final use of each commodity, Intermediate demand for a commodity, Imports and Exports, and the production level. In his study of 1960, he attempted to statiscally estimate the sector growth functions based on about 50 countries for the years between 1950 and 1956.

Chenery estimated a linear logarithmic regression equation in which per capita value added depended on per capita income and population.

$$\log Vi = \log \beta_{i0} + \beta_{i1} \log Y + \beta_{i2} \log N. \quad (.....\text{eqn. } 3.1)$$

He assumed a similar function for imports

$$\log Mi = \log \gamma_{i0} + \gamma_{i1} \log Y + \gamma_{i2} \log N. \quad (.....\text{eqn } 3.2)$$

Where Vi is the per capita value added in industry or sector.

β_{i1} is the growth elasticity (dVi/Vi) -- (dY/Y)

β_{i2} is the size elasticity (dVi/Vi) -- (dN/N)

Y is the per capita national income

N is population.

According to Chenery, the process of industrialization involves a number of changes in the economic structure such as, a rise in the relative importance of the manufacturing industry, a change in the composition of Industrial output, shifts in the

---

5. H. B. Chenery (1960) op cit.

production techniques and sources of supply for individual commodities. In line with this argument, according to Chenery's results, the growth elasticity for manufacturing was 1.44 and for all industry it was 1.66. Again, the regression for per capita value added in the manufacturing sector and in the whole of the industrial sector have high adjusted coefficients of determination ($\bar{R}^2$).

Chenery estimated the changing shares of the major sectors in the national income which he interpreted as the contemporary pattern of growth. The principal factors of this pattern were the rise in the share of industrial output from 17 percent (of which 12% from case of manufacturing alone) at an income level of $100 to 38% (of which 33% from manufacturing sector) at an income level of $1000. On the other hand the primary production decreased from 45% to 15%. Though the share of services in national product did not vary significantly with the level of per capita income which also confirmed Kuznets conclusion, the share of transportation and communication doubled over the range of incomes.

Further, he used the regression equations to determine the normal output levels for three groups of industries, classified in accordance with the nature of the demand for their products as (i) Investment and related products (ii) Intermediate goods and (ii) Consumer goods. At an income level of $100, 68 per cent of manufacturing consisted of consumer goods and only 12 percent of investment goods. However, at an income level of $600 the share of investment products increased to 35 percent of all manufacturing, while the consumer goods sector fell to 43

percent. The intermediate goods sector maintained a fairly constant share of the total.

The regression of value added on income and population gave a reasonably good fit for all the sectors. A similar result was found for the import regressions. In his study, Chenery also tried to analyze the factors which cause the industrial sector to grow more rapidly than the other sectors of the economy. He indicated 3 possible causes; (i) the substitution of domestic production for imports i.e. import substitution (ii) growth in final use of industrial output & (iii) growth in intermediate demand due to demand stemming from (i) and (ii). His study indicated the relative importance of import substitution as a cause of high growth rate which infact accounted for 70 percent of the total deviation in the case of Investment and Intermediate goods sector. These results thus contradicted the usual assumption that changes in the composition of demand were the main cause of industrial growth. According to Chenery, changes in supply conditions, which result from a change in relative factor costs with an increase in income, cause a substitution of domestic production for imports. These supply changes are thus more important in explaining the growth of industry than are the changes in demand condition.

Further, Chenery's study of 1960, indicated that differences in income level explained 70 percent of the variation in the levels of the total industrial output among the various countries, and about 50 percent of the variation was explained in the case of the average sector of the industry. For the factors responsible for the unexplained variation, Chenery referred to

the effects of market size and income distribution; factor proportions; and regional distributions.

Chenery has made several extensions and modifications to his 1960 study, which we shall discuss briefly at a later stage.

(d) The United Nations Study[6] of 1963, was in many respects similar to Chenery's study of 1960, which we have discussed earlier. This study made use of multiple correlation techniques to compare the level of industrialization with variables such as per capita income and population. The UN study used the following regression equation :

$$\log V_o = \alpha_i + \beta_i \log Y/P + \gamma_i \log P + \delta_i \log d \quad (...\text{eqn } 3.3).$$

Where V_o = value added in sector

P = Population in millions

Y = Total income

d = the degree of industrialization

This model is therefore much the same as that of Chenery's (1960) with one exception, i.e. in the eqn 3.3, there is an additional variable which was used in the case of individual sectors, i.e. the ratio between the actual value added and the calculated value added in the manufacturing sector as a whole. Some of the results of the analysis of Chenery as well as Hoffman were confirmed by the U.N. Study. In both the studies, the highest elasticities amongst others were found for paper and paper products, metal products, basic metal industries, machinery and transport equipment. The U N study observed that countries

---

6. United Nations Department of Economic and Social affairs (1963), A study of Industrial growth, New York.

differed from the normal pattern of industrialization in accordance with their income level. Low income countries with a per capita income of less than $100 have much greater average deviations from the normal pattern compared to countries with per caapita incomes more than $150. In explaining deviations from the normal growth, the U N study among other reasons refers to differing government policies, and resource endowments.

(e) Peter Temin[7]: Practically all the evidence for patterns of industrial growth which was presented till the mid sixties, was based on cross-section data. Besides the obvious reason for examining whether the time series and cross-section coefficients were the same, he thought it was pertinent to know if a time series relationship would hold at all periods within the time horizon of most policy makers. Temin performed a regression analysis similar to that of Chenery's (1960) and the U N Study's (1963) on the Time Series data at 20 year intervals from 1870 to 1950 for nine developed countries (Australia, Canada, France, Germany, Italy, Sweden, UK, Japan, USA). The basic model that he tested though indirectly with the help of other models was:

$$\log (A_{it}) = a_t + b \log (Y_{it}) + u_{it} \quad \text{... eqn 3.4}$$

$$\log (M_{it}) = c_t + d \log (Y_{it}) + v_{it} \quad \text{... eqn 3.5}$$

Where A and M are the percentage shares of national income originating in Agriculture and industry, respectively and Y is the per capita income at constant prices. The subscript i indicates the country being observed and the subscript "t"

---

7. Peter Temin(1967), "A Time Series Test of Patterns of Industrial growth", Economic Development and cultural change, January.

indicates the period. Temin's results confirmed that of Chenery's for the rise in the share of the industrial sector in national income as per capita income increased. The magnitude of the elasticity of the share of the M sector with respect to income was very close to that found by Chenery for the industrial sector (0.36) and found by the United Nations Study for the manufacturing sector of high income countries (0.30). Temin also observed that there was no evidence of a time trend in the shape of the M sector independent of changes in the income level.

Despite the fact that his results revealed a significant relation, three-fourths of the variance of the changes in the M sector remained unexplained. On the other hand the results with respect to the share of the A sector showed no evidence of being related to per capita income which is contrary to what was discovered by the cross-section analysis which referred to the relation as a "Growth Pattern". One of the explanations to this might be that the countries selected by Temin for his analysis were developed countries and in a few of them major changes in the agricultural share had taken place even before 1870. Further, Temin observed that though the share of the agricultural sector and level of income is not infact operational, the share of agriculture represents a significant down-ward trend. He claimed that this decline was not related to changes within any one country and it was quite likely that this phenomenon was observed due to the "possible effects of agricultural price movements which cross national boundaries..".[8]

---

8. P. Temin (1976) ibid.

A time series analysis was also conducted by Chenery and Taylor in 1968.[9] Chenery has made vast contributions to the literature on Industrialization and economic growth. Infact his recent contributions are highly broad-based with a more comprehensive approach to the issue. We shall briefly discuss Chenery's contribution over the years

(f) Chenery's Studies:- Further extensions

Chenery and Taylor in their study of 1968 designed a statistical procedure to test for several types of uniformity in development patters. These were the similarities between the production relations estimated from time series and cross-section data, and the systematic shift in these relations over a period of time. They also attempted to bring about an improvement in the estimates by grouping countries in a accordance with size and trade orientation.

Chenery and Taylor could obtain a better enplanation of the share of industry in national product by using some more variables than was previously in his 1960 study before to (eqn 3.1)

$$\ln xi = \alpha + \beta_1 \ln Y + \beta_2 (\ln Y)^2 + \gamma \ln N + \delta \ln k + \epsilon \ln ep + \epsilon \ln em \quad \ldots.(\text{eqn } 3.6)$$

Where Y = per capita G N P (in 1960 dollars)
N = Population in millions
k = Share of gross fixed capital formation in GNP (I/Y)
ep = Share of primatry imports in GNP (Ep/Y)
em = Share of manufactured exports in GNP (Em/Y)

---

9. H.B. Chenery and L. Talyor,(1968) "Development Patterns: Among countries and overtime "Review of Economics and Statistics, November Vol L, .

A sample of 606 observations on 48 counties was used to estimate equation 3.6. These regression results revealed that it was a much better explanation of the variation in the shares of industry and primary production than the regression based on Chenery's 1960 study.

To examine whether small countries have different growth patterns from large ones, Chenery and Taylor divided their sample into two groups: those with population below and those above 15 million. For the large countries the regression results indicated that the industrial share increased at a rapid rate during the early phases of growth, but reached a peak at a per capital income of $ 1200. On the contrary, the results for the small country showed a lower income elasticity in the early phases, however there was no tendency for decline at higher levels.

In addition, Chenery and Taylor attempted to examine the effects of trade patterns in the small country and large country groups. The small countries were divided into 2 groups, one oriented towards primary exports the other group oriented towards the manufactured exports. Three development patterns emerged from this analysis. In the case of the large counties, apart from income and size, investment share (k) emerged to be an important variable. The large country pattern showed industry rising rapidly from 16 % of GNP at an income of $100 to 32 % at $400. After this the increase is much slower and the highest i.e. 37% is reached at $1200.

For the small industry oriented countries, the variation of production shares, with income was found to be very similar to

the large country pattern. But the share of investment(K) in the case of these countries had a much lesser effect since capital goods were to a large extent imported.

The small primary-oriented countries depicted a development pattern which was very different from the previous 2 cases discussed. Primary production declined very slowly and exceeded industry upto an income level of about $800.

Chenery and Taylor also examined the similarity of intertemporal and intercountry patterns for the post war period by comparing the time series estimates of income elasticites to the corresponding cross-section estimates. The time series elasticites, were computed for each country by fitting a log linear regression to the data for 1950-1963. There was some tendency for primary production to decline more rapidly than the cross-section would suggest. Regarding intertemporal variations, a majority of countries, tended to move parallel to the cross-country pattern.

In the case of the changes in Industrial Structure, the differences among the 3 development patterns became more distinct, when the industrial sector was disaggregated into its component industries. They computed separate regressions for each of the 12 industry groups and each type of country. In case of large country patterns the development pattern was primarily determined by the growth of domestic demand because resource and trade differences were relatively insignificant. Chenery and Taylor grouped industries in terms of 'early', 'middle' and 'late' industries.

The early industries are those which supply essential demands of the poorest countries and which could be carried out with simple technology. These industries practically did not increase their share in GNP above income levels, of about $200. The industries which belonged to this category were food, leather goods, and textiles which had an income elasticity of domestic demand of 1.0 or less. These industries together maintained a more or less. constant share of GNP: but with increase in per capita income from $100 to $1000, its share decreased from 50 % to 23 % of manufacturing.

The 'middle' industries included non-metallic minerals, rubber products, wood products, chemical, and petroleum refining. In contrast to the early industries, the middle industries doubled their share of GNP in the lower income levels but depicted only a marginal increase above income levels of $400-$500.

The 'late' industries continue to increase faster than the GNP upto the highest income levels. Moreover they double their share of GNP in the later stages of industrialization i.e. above $300. This group includes industries such as clothing, printing, basic metals, paper and metal products.

Chenery and Taylor in their study of 1968, also attempted to determine the effect of scale and resources on growth patterns by comparing the regression results for the 2 groups of small countries to those for the large countries.

"A given level of demand will be reached at a higher level of per capita income in a small country than in a large one,

which postpones the time at which the cost of domestic production falls to the cost of imports".[10] The most distinct scale effect were indicated by the chemicals, basic metals, rubber products, textiles, non-metallic minerals and printing.

The resource effect is largely felt in industry groups of basic metals, rubber, textiles, chemicals, wood products, paper and metal products. The two effects if combined, indicate that in the small industry-oriented countries, scale and resource effect work in opposite directions. On the other hand in the small primary oriented countries, these effects work in the same direction.

Thus, Chenery and Taylor's Time-Series Study of growth paths supported the underlying hypothesis that universal factors which affect all countries are reflected in the intercountry patterns. Despite the fact that individual country differences resulted in significant variations in all cases, central tendencies of the time series estimates were close to the corresponding cross-section estimates.

Chenery and Syrquin[11] in their study of 1975, attempted a comprehensive statistical analysis of the essential features of development which could serve as a basis for economic theory and policy. They studied the experience of about a 100 countries between 1950 and 1970 and tried to indentify universal patterns of changes, besides they also made an attempt to identify

---

10 H.B. Chenery and Taylor (1968) ibid.

11. Hollis Chenery and Moses Syrquin (1975) "Patterns of Development, 1950 - 1970, London, Oxford University Press.

alternative ways to achieve development. Chenery and Syrquin attempted the comparison and reconciliation of time series and cross-section analysis of the same phenomenon for providing an integrated treatment of the basic processes of accumulation, allocation and distribution. In describing the process of development, they used the concept of a transition from one state of development to another. The transition was defined by a set of structural changes which generally accompany the growth of per capita income. This is indicated by the following quadratic equation.

$$X = \alpha + \beta_1 \ln Y + \beta_2 (\ln Y)^2 + \gamma_1 \text{Ln } N + \gamma_2 (\ln N)^2 + \sum \delta_i T_j + F \quad \text{(eqn 3.7).}$$

Where
- Y = Per Capita GNP
- N = Population
- F = Net resource inflow as a share of GDP
- Tj = Time period
- X = Dependant variable, which broadly includes the Accumulation process, Resource allocation process, Demographic and Distributional processes.

This equation was fitted for the 1950-70 period data for 101 countries each with a population of over one million in 1960. The measures of accumulation referred to by Chenery and Syrquin were saving, investment, government revenues; school enrollment; educational expenditure etc. The accumulation process unlike most of the other developmental processes considered, indicated a significant international time trend in almost all its measures. For the fifteen years interval between 1950-54 and 1965-69, there was an upward shift in the values of the savings, investment, government revenue; school enrollment and mean educational expenditure. The exogeneous variables such as country size and capital inflow also indicated a significant relationship to most of the accumulation processes. Capital inflow decreased with an

increase in the size of country, mainly due to the smaller share of trade in large countries. The capital inflow (F) partially offsetted changes in saving and government revenue. This resulted in negative coefficients for F. Certain other factors specific to each country are associated with the variation in capital inflow. To this extent, the cross-country pattern may not be able to predict accurately changes in individual countries over time. When these factors are excluded, the results of time series analysis indicated a much larger proportion of an increase in external resources going into capital formation. Further, even when allowance was made for differences in external resources, accumulation rates, were higher in large countries in all respects, except for school enrollments.

As per Chenery and Syrquin's study, half of the actual increase in saving, investment and school enrolment takes place at an income of $200 and 90 % of it at $700 . The rapid rise at lower levels of income and subsequent tapering off, according to them was due to the positive coefficients for (lnY) and large negative coefficients for $(lnY)^2$. This interpretation is consistent with the more or less constant rate of investment and school enrollment found in more advanced countries, where these aspects of transition were completed.

On the other hand the increase in taxation and government revenue and expenditure was a comparatively late process which did not reach its half way mark until about $400 per capita. However, when transfer payments were separated from other uses of government revenues, the timing became more normal.

One of the largest sources of variation in the accumulation process at low levels of income was the inflow of capital. Despite the fact, that there was a weak relation of capital inflow to income level, there was a strong negative correlation with size.

In the Resource Allocation processes, Chenery and Syrquin included, the private, government and food consumptions, utilities and service; the share of primary sector, and the structure of trade. The transition, on the whole indicated that per capita food consumption increased only half as much as the increase in per capita income. Thus a drop in the share of food consumption from 41 % to below 20 % of G N P brings about a doubling of the share of investment and a 70 % rise in the non-food consumption. These shifts imply a doubling of the share of industrial goods in the total demand.

Regarding the change in the composition of exports, it is the reverse in composition to Domestic demand though it occurs generally later in the transition. These shifts are to a great extent affected by government. It was observed that there was a decline of primary exports from 13% to 6% of GNP, while primary imports imprts increased from 4 % to 6% over the transition. For the manufacutured exports, there was an increase from about 1 % to 13 % over the transition. It was further observed that the change in the composition of demand was one of the most uniform of the processes, while the composition of trade was found to be the least uniform. Further the effect of population on the import and export levels, was quite distinctive.

Chenery12 in his study of 1979, developed an inter industry model of the process of industrialization based on trade and development theory. The basic objective of the model was to explain the interrelation among changes in domestic demand, capital flows, the structure of production and international trade. To examine the change in composition of industry, Chenery looked at the manufacturing sector at a disaggregated level i.e. at 2 digit level of industrial classification. This indicated sectoral differences in demand, trade and production. The model was estimated from intercountry data and explained the average variation in the pattern of production, with a rise in income. Different patterns of trade and capital inflows were included to examine the effects of the alternative development strategies.

Although he observed general similarity in the rise of industry in the pattern identified, there were also significant differences among them in time and sectoral composition. The methodology developed by Chenery for this purpose was based on a algebraic decomposition of the growth of each sector into 4 factors such as (i) domestic demand (ii) export expansion effect (iii) effects of technological change and (iv) import substitution effects.

The allocation of resources was thus believed to be influenced simultaneously be internal and external forces. The Internal Structure focussed on the problem of allocating labour, capital, and foreign exchange within constraints of given demand functions and technology. Chenery used the term External

---

12. Hollis Chenery (1979) Structural change and Development Policy, New York, Oxford University Press.

Stucture to characterize those aspects of resource allocation that arise from supply and demand for foreign exchange. These are the external constraints on resource allocation.

Chenery also tried to analyze the mechanism by which the economic structure adjusted to changes in factor proportions under realistic assumptions about the possibilities of substitution among commodities and factors.

He also formulated in his study of 1979, a partial equilibrium model to indicate the quantitative significance of economies of scale in determining related investment decisions in the mining, steel, and metal working sectors. According to Chenery, dynamic external economies can affect the optimal pattern of development throughout the transitional phase from a primary oriented economy to one with well developed overhead facilities and diversified industry. Chenery also pointed out that the government may have to intervene to serve the benefits of coordination. He referred to 3 types of coordination (i) direct control of investment, (ii) indirect coordination through administered prices and (iii) integration under private control.

The allocation and coordination of investment is a central feature of development policy. According to Chenery, under realistic assumptions about the nature of horizontal and vertical interdependance, the timing of investment in scale economy sectors would have a siginificant effect on investment timing in others and thus on the entire investment pattern. In Chenery's model, primary production performed this function; it is expanded whenever required to secure imports of manufactured

good but these imports are periodcally replaced with domestic production at a lower cost.

Chenery also gave a dynamic analysis of the relation between changes in flows of external capital and the corresponding changes needed in the structure of domestic production and external trade. Thus Chenery made a comprehensive analysis of the relation between economic development and structural change. His initial study of 1960, did not consider in detail the causes for economic growth i.e. rise in income. In his subsequent studies, he broadened this concept to encompass the influences of internal and external structure.

Chenery[13] has indeed made vast contribution to the literature on the relation between industrialization and Economic growth. In his recent study of 1986, his main objective was to explore the interrelations between the growth of developing countries and the changing structure of their economies. Two of the well known structural relations that affect the ways in which economies grow and which distinguish the developing from the developed countries are:

(i) Engel's law of declining share of food in consumption.

(ii) Lewis's hypothesis of the elastic supply of labour in most developing economies.

Chenery pointed out to other relations of comparable importance: (i) Balassa's stages of comparative advantage derived

---

13. H. Chenery S. Robinson and M. Syrquin, (1986), Industrialization and growth: A Comparative Study, A World Bank Research Publication, Oxford University Press.

from the Hecksher-Ohlin model (ii) Kuznets findings of systematic differences in the level and growth of labour productivity by sector. (iii) The demographic transition; a set of factors which first produce an increase and then a decrease in population as per capital income increases.

Combined together, these income related structural changes indicate that the growth processes of developing economies may differ substantially from those of advanced countries. Chenery explored into this hypothesis by initially extending the techniques of growth accounting. He applied the Solow (1957) methodology to a large sample of developing and developed countries. This revealed some characteristic differences between the two groups in their sources of growth. These sources were then disaggregated to examine the interaction between changes in the composition of demand and trade on the one hand and factor supplies and productivity growth on the other.

Chenery[14] argued that the growth process of a developing country be best understood as a part of the overall transformation of its economic structure. According to him, the interdependence works in both directions: income growth causes changes in the composition of domestic demand and production and at the same time the rise in the investment rates and reallocation of labour tend to increase the aggregate growth. Since transformation is influenced by resource endowments, initial structure of the economy and by the choice of development policies, the transformation is not uniform across countries.

---

14. M. Chenery. S Robinson, M Syrquin (1986), ibid.

Chenery, Robinson and Syrquin in their study of 1986, presented a multi-sectoral model estimated from cross country data which was designed to simulate the effects of changing demand and trade on the structure of production. This helped to identify some of the common features of the transformation, which could be used as benchmarks in comparing the experience of various countries. This static model was solved for exgoneous increases in per capita income and resulted in numerical relationships between the rise in manufacturing and the factors which bring about these changes: domestic demand expansion, export expansion, import substitution and changing input-output coefficients.

3.2 EMPIRICAL STUDIES IN THE INDIAN CONTEXT

Kanhaya L-Gupta[15] used cross-section data for 1950,1955 and 1960 and fitted the following regression equation (using 15 states)

$$\ln X_i = \alpha_i + \beta_i \ln Y + \gamma_i \ln Z \qquad i = 1...6 \quad ...(\text{eqn } 3.6)$$

where Y is the real per capita income, Z population in million; X_1 = share of agriculture in net domestic product; X_2 = share of mining, manufacturing and construction. X_3 = share of trade X_4 = share of transport, storage and communication X_5 = other services; $X_6 = (X_3 + X_4 + X_5)$.

The above equation is the same as that used by Chenery in his study of 1960. K L Gupta grouped the states with per capita incomes less than & greater than the national average per

---

15. Kanhaya L. Gupta,(1971) "Development patterns : An inter regional study", quarterly Journal of Economics, vol 85.

capita income and separately regressed the equations. This was done, as he observed that the equation 3.8 did not allow for variation in income elasticity with changing per capita income.

The results proved to be better than the pooled regression results were and along the same lines as Chenery's result of his 1960 study. A further analysis was made by Gupta: he grouped the states into large and small categories in terms of population to get an idea of the scale effect. Results of grouped regression were better than the pooled regression. His analysis revealed that the performance of the larger states was better than the performance of the smaller states. This, was possibly because the larger states enjoyed ecomomies of scale not available to the small states. However, there is no direct evidence to support this argument. K L Gupta in his study identified "growth patterns" among the different regions in India using the same analytical framework as applied to the study of "growth patterns" using international cross-section data. These interreginal growth patterns display the same qualitative characteristics as international "growth patterns".

During the post independance period, the Indian industrial scene has undergone a vast transformation. There has been a structural transformation, with the primary sector receding in its importance in the total income generation, and the secondary sector improving its share, although at a slow pace. R.M. Sundaram[16] calculated the sectoral contributions to the increase in GDP for each of the three decades between 1951-52 and 1981-82.

---

16. R.M. Sundaram (1987), Growth and income distribution in India - Policy and performance since independance.

In the decade 1961-1962 to 1971-72, there was an increase in GDP of Rs 10,000 crores and the contribution of agriculture to this increase was 30%, of industry, 29.7% and of services 40.3%.

In the decade 1971-72 to 1981-82, out of GDP increase of Rs 15742 crores, the contribution of agriculture was only 23.7%, of industry 24.4% but of services 51.9%.

Dr. V.C. Sinha[17] has also tried to evaluate the industrial growth in India. His Study reveals that there is a transformation of the economy from a predominantly agrarian one, to a partially industrialized society. In this process a structural change in the composition of national income is inevitable. This structural change is taking place, though at a slow pace. He claims that the main reason for the slow rate of structural change in domestic output is the slow rate of growth of the manufacturing output. During the 1960's, the basic and capital goods industries grew at a fast rate, relative to consumers goods industries which grew at a slower pace. This pattern was in consonance with the growth strategy adopted during the 2nd & 3rd five year plans. He also indicated the change in the share in net value added of the major groups. The consumer goods industries declined from 57.3% in 1951-53 to 36.4% in 1973-75, while the share of investment goods in net value added increased from 31.1% in 1951-53 to 44.8% in 1973-75 and share of in termediate goods also increased from 11.6% to 18.8% between 1951-53 and 1973-75.

---

17. Dr. V.C. Sinha (1984), "Indusrtial Growth in India; An Evaluation " Southern Economist, December 1st.

The share of food and textiles in industrial production declined from 63% in 1966 to below 30% in 1980, whereas the share of mining, manufacturing and construction sector of the economy increased from 14.9% in 1950-51 to 22.5% in 1980. The share of electricity, gas, water supply, transport, storage and communication sectors increased from 3.9% to 7.4% during the same period.

R.V. Dadibhavi[18] in his study on the Industrial Structure of India, has made certain observations regarding the sectoral shares of Net Domestic Product for various years which are summarized in Table 3.1.

We can comprehend from the data given in the table that there has been a significant change in the structure of the Indian economy over the period 1950-51 to 1980-81. The share of primary sector in the NDP has fallen while those of the secondary and tertiary sectors have increased. It is observed from data given in the Table 3.1 that the occupational change between 1951 and 1961 is in the same direction as the sectoral shares in the NDP in case of all the three sectors, though the change is not of the same magnitude. When the occupational change in the share of the three sectors between 1961 and 1971 is considered, it is in the opposite direction to the sectoral NDP shares. However between 1971 and 1981, the correspondence seemed to have reestablished between occupational and sectoral distribution. With the fall in the share of agriculture in the NDP from 50% in

---

18. R.V. Dhadibhavi(1987), "Industrial Structure and Pattern of Development in India". Indian Journal of Industrial Relations, Vol 22, No.3. January.

1970-71 to 45.8% in 1980-81, a decrease in the share of the total number of workers from 70.4% in 1970-71 to 66.2% in 1980-81 is observed. The rise in the share of secondary and tertiary sectors in the NDP between 1971 and 1981 is accompanied by the rise in the share of the total number of workers. Thus one may view that the structural change that has taken place along with economic progress in India is similar to what has taken place in the structure of the economies of the developed countries.

TABLE 3.1

INDUSTRIAL STRUCTURE OF INDIA

	Sector	Sectoral Share in NDP(%) 1970-71 prices				Sectoral distribution of male workers(%)			
		1951	1961	1971	1981	1951	1961	1971	1981
1	Primary sector	61.3	56.7	50.0	45.8	69.1	68.0	70.4	66.2
2.	Secondary sector	14.3	16.5	10.9	21.4	12.6	12.7	11.3	13.9
3.	Tertiary sector	24.4	26.8	31.1	32.8	18.3	19.3	18.3	19.9
	TOTAL	100	100	100	100	100	100	100	100

Source : R.V. Dadibhavi(1987) ibid. pg. 293.

Dadibhavi has also observed in his study that there is a general tendency for the primary sector to be much more prominent in low per capita income states than in high per capita income states. The shares of secondary and tertiary sectors in SDP are found to be comparatively high in high income states. Further, his results reveal that in India the group of poor states have a higher share of SDP and work force in primary sector and lower share of SDP and workforce in secondary and tertiary sectors compared to the developed states in the year 1970-71 and 1980-81.

However, there are some exceptions in the central idea of the sectoral hypothesis. Punjab & Haryana are the highest per capita income states in India, but the shares of the primary sector in these states are not found to be the least and the shares of the secondary and tertiary sectors is not the highest as compared to other states. Tamil Nadu has a low share of primary sector and high share in secondary and tertiary sectors in total output as compared to other states but it is not the highest income state in India. Bihar is a low per capita income state despite the fact that its share of output from the secondary sector is relatively large as compared to some of the high income states. Thus, the results broadly indicate that the regional development is accompanied by changes in industrial structure more or less on the same basis as advanced by Colin-Clark (1940) and Kuznets (1957,1958).

CHAPTER 4

STRUCTURAL PATTERN OF INDUSTRIALIZATION IN INDIA

In the previous chapter we attempted to highlight the main theme of the various models of development pattern. Evidence of several studies brings out the close relationship between levels of income and industrial output. To seek explanations for this association one ought to look at supply side factors as well as demand side influences. These factors, among other factors generally include demand for final use of a commodity, intermediate demand of a commodity and the substitution of domestic production for imports which may be partly responsible for causing the industries to grow more rapidly than the rest of the economy.

Besides per capita income which affects the output of the industrial sector, factors such as size of the market, effects of international trade and capital formation to mention a few are important factors which can influence the structural pattern of the economy.

In this chapter we deal with the scenerio of the pattern of industrial structure in India. We have attempted to see the responsiveness of per capita value added of the major sectors as well as certain selected industries with respect to changes in per capita income and population. These are the two independent variables selected in this study. We have not included other variables such as international trade, capital formation etc. It is due to the difficulty in obtaining accurate data regarding statewise imports, exports and constraints of time, that only these two variables have been considered in the empirical study.

H.B.Chenery1 had carried out a similar study in 1960 to examine the effect of changes in per capita income and population on value added of the major sectors in Gross National Product of about 50 countries. Details of chenery's model have been already discussed in chapter 3. We have estimated the same linear logarithmic regression equation as that used by Chenery in his study.:

$$\log Vi = \log \beta_{i0} + \beta_{i1} \log Y + \beta_{i2} \log N \qquad (...eqn\ 4.1)$$

We have Vi.....per capita net value added
Y.....per capita income
N.....population
β_{i1}.....growth elasticity
β_{i2}.....size elasticity
β_{i0}.....Intercept term
i.....stands for industries

The units of observations are the states selected in the study (the selected states are given in Annexure 1.3). Thus the per capita income and population of the corresponding states are used to estimate the regression equation for the various industries. Our cross-sectional study is basically conducted at 2 different points of time, 1974-75 pooled with 1975-76 and 1981-82 pooled with 1982-83. The data were pooled essentially to increase the number of observations. The regressions for 1981-82, 1982-83 have been estimated at the 2 and 3 digit levels. (List of selected industries are given in annexure 1.1 and 1.2 respectively) However for 1974-75 & 1975-76, the regressions have been estimated only at the 3 digit level due to difficulty in obtaining statewise data at 2-digit level.

---

1. H. B. Chenery (1960) op. cit.

We present the results of the empirical study in four parts. The first part deals with the regression results at the sectoral level of classification i.e. the responsiveness of the per capita net value added in the Primary, Secondary and Tertiary sector to changes in Income and Population. We have also attempted to estimate on the basis of the pooled regression equations, the percentage contributions of these sectors in the total income for 1981-82, 1982-83 at two selected levels of per capita income i.e. at Rs. 500 and at Rs. 1500. In the second part we discuss the responsiveness of per capita net value added of industries at the 2 digit and 3 digit level of classification with respect to the changes in the independant variables. The analysis is undertaken at the disaggregated level to bring out finer distinctions which would give a greater insight into the structural pattern. In the third part, we discuss an alternative formulation in which the same regression equations are fitted at a further disaggregated level. We have divided the states into 2 groups, one group comprises those states with a per capita income which is above the per Capita Net National Product and the other group comprises those states with a per capita income which is less than the National average (for details of states see annex 4.2 and 4.3). Chenery[2], in his study of 1968 had also subdivided the total sample into large countries, small primary-oriented, and small industry-oriented countries. This revealed that the 3 groups followed different development patterns. In our study, we have attempted to examine the differences in development patterns of the comparatively more developed and the less developed states at

---

2. H. B. Chenery, (1968) op cit.

the 2 and 3-digit levels. In addition to disaggregation on the basis of Per Capita Income, We had divided the states on the basis of the average population of the 14 states selected.

Thus one group comprises those states which have a population above the average population and the other group of states are those which have a population below the average (for details of states see annex 4.4). Chenery in his studies, had considered population as a proxy for market size. Essentially in the absence of free interregional trade which may be due to transportation bottlenecks or discriminatory government policies, or due to certain cost elements, the size of a region's market may play an important role in determining where a plant of a certain size consistent with the exploitation of economies of scale will be located. In view of the above argument, we have estimated regression equations separately for the 2 groups of states at the 2 & 3 digit level to get an insight into the differences in the development pattern of each group, the results of which are discussed in the fourth part.

4.1 SECTORAL CLASSIFICATION:

We have tried to capture initially a broad picture of the responsiveness of the value added of major sectors of the economy: Primary, secondary and Tertiary sectors and some of their sub groups with respect to changes in variables, such as per capita income and population. The pooled regression equation was estimated for 1981-82, 1982-83 for the 14 states under study. The regression results are summarized in Table 4.1. It indicates that the growth elasticity in the case of agriculture and primary sector as a whole is less than one. This implies that per capita

value added, i.e., the dependent variable of these sectors, will increase at a less than proportionate rate as the per capita income increases. On the contrary we can observe that the income elasticities in the case of the secondary and tertiary sectors including their subgroups (i.e. manufacturing, construction, transport and communication) are greater than unity. Hence we can infer that with an increase in per capita income, there will be a more than proportionate increase in the per capita value added of the secondary & tertiary sectors.

For all the sectors, the responsiveness of the dependent variable with respect to per capita income is highly significant.

We can also observe that the growth coefficients are positive for all the sectors, but in the case of the size coefficient, it is found to be negative in the primary sector. This implies that with an increase in the size, the per capita Net Value Added in the primary sector declines. This is similar to Chenery's result. In the case of size elasticity again, for all the sectors, the elasticity is less than unity. The adjusted coefficient of determination, R for the sectors is approximately above 0.50. In the case of the tertiary sector it is about 0.86. Furthermore, the significance of the regression is found to be quite high.

If we compare these results (Table 4.1) with those obtained by Chenery (1960), there is a similarity. The growth elasticities for both the studies is less than unity in the case of the Primary sector, while it is greater than unity in the case of the secondary & Tertiary sector. Again, in the case of size elasticity, both the studies indicate an elasticity of less than

TABLE - 4.1

SECTOR WISE REGRESSION RESULTS

(1981-82 & 1982-83)

(No. of Observations = 28)

SR. NO.	SECTOR	INTERCEPT β_{i0}	GROWTH COEFFICIENT β_{i1}	SIZE COEFFICIENT β_{i2}	$\bar{R}^2$	STANDARD ERROR	F
1	AGRICULTURE	5.85	0.61 (3.57)[a]	-0.24 (-2.30)[b]	0.61	0.24	22.53[a]
2	PRIMARY	6.26	0.54 (3.23)[a]	-0.23 (-2.23)[b]	0.58	0.23	19.77[a]
3	MANUFACTURING (TOTAL)	-12.79	1.72 (7.13)[a]	0.35 (2.41)[b]	0.67	0.34	28.44[a]
4	MANUFACTURING (REGISTERED)	-13.06	1.76 (4.87)[a]	0.32 (1.46)	0.48	0.51	13.70[a]
5	MANUFACTURING (UNREGISTERED)	-11.25	1.47 (5.73)[a]	0.29 (1.91)[b]	0.56	0.36	18.45[a]
6	CONSTRUCTION	-7.63	1.01 (5.27)[a]	0.25 (2.19)[b]	0.50	0.27	14.73[a]
7	SECONDARY	-10.85	1.53 (8.14)[a]	0.33 (2.92)[a]	0.72	0.26	36.48[a]
8	TRANSPORT & COMMUNICATION	-9.69	1.31 (8.34)[a]	0.27 (2.83)[a]	0.73	0.22	38.94[a]
9	TERTIARY	-4.35	1.27 (10.9)[a]	0.08 (1.18)	0.86	0.16	85.0[a]

Figures in bracket indicate T.values.

(a) At 1 percent level of significance
(b) At 5 percent level of significance

one. However Chenery's study indicates a relatively higher $\bar{R}^2$, which is quite justified as he looks at a much wider perspective, using 'countries' as the unit of observation.

On the basis of the regression results given in Table 4.1, we have estimated the change in percentage contribution of the various major sectors to the total income (i.e. of 14 states considered in our study) at 2 different levels of per capita income: at Rs.500 and at Rs.1500. For this purpose we have kept the population constant at 40 million which is approximately the average population of the states selected. Using these values we have solved the regression equation, (for the pooled period 1981-82 and 1982-83) the results of which are summarized in Table 4.2. The results are consistent with theory that as per capita income increases the percentage contribution of the primary sector declines while that of the secondary & tertiary sector increases. The primary sector at a per capita income of Rs. 500 contributed 53.52% to the total income, however at the higher income level assumed in our study at Rs.1500, the percentage contribution of the primary sector declines to 32.26% Similarly the contribution of manufactured registered sector increases from 6.48 % at an income of Rs.500 to 14.93 percent at an income of Rs.1500. The secondary sector on a whole also indicates an increased contribution from 15.91% at Rs. 500 to 28.16% when income increases to Rs.1500. The percentage contribution of the Tertiary sector was estimated to be 26.34% at an income level of Rs.500, which increased to 35.04% with an increase in income to Rs.1500. These changes in the percentage contribution of the various sectors in the Income have also been depicted graphically (graph 4.1).

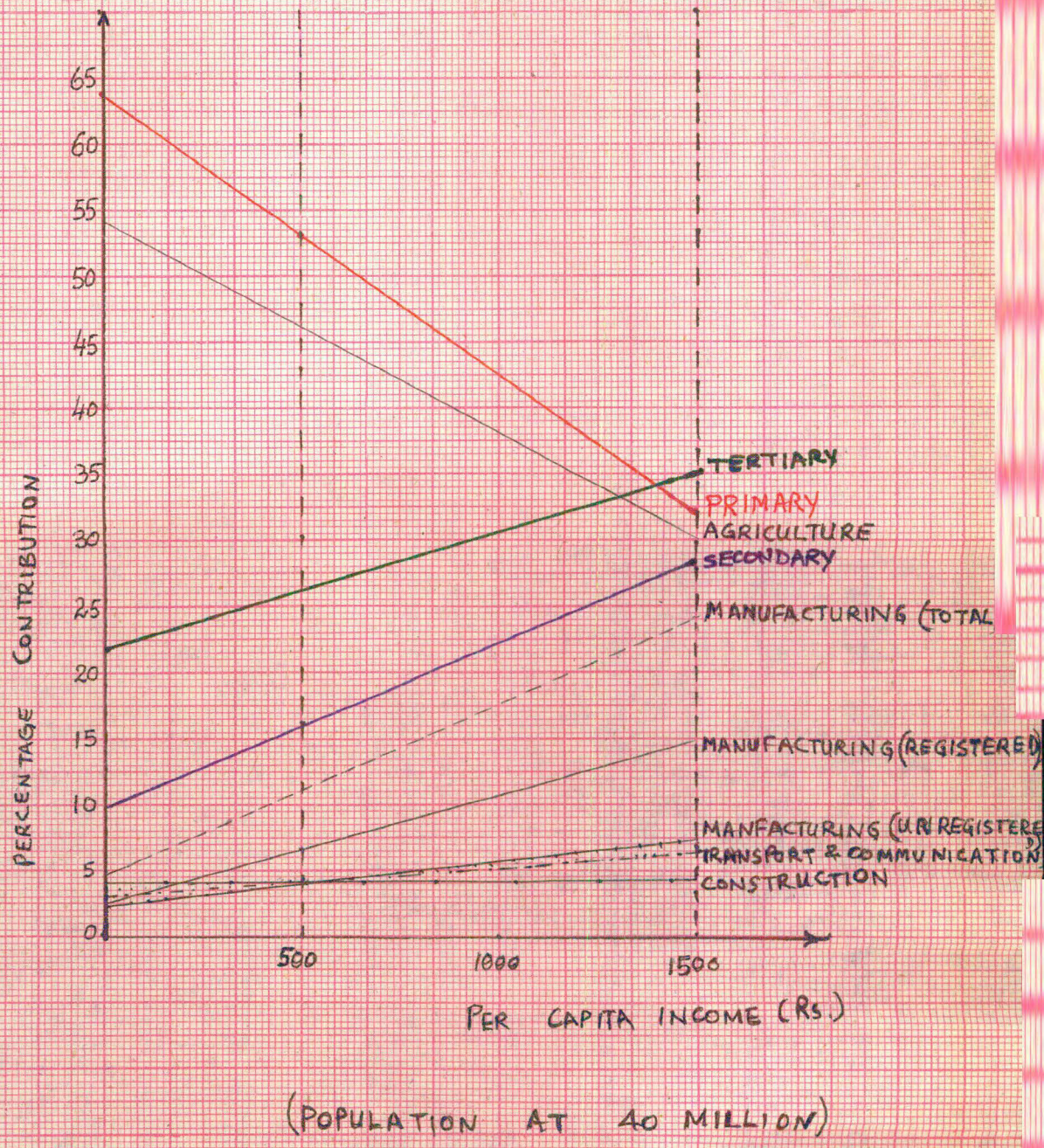
TABLE :4.2
PERCENTAGE CONTRIBUTION OF VARIOUS SECTORS
TO INCOME OF 14 STATES - 1981-82 & 1982-83
(Population at 40 million)

No. of Observations = 28

SR.NO.	SECTORS	AT PER CAPITA INCOME Rs.500	AT PER CAPITA INCOME Rs.1500
1	AGRICULTURE	46.42	30.28
2	PRIMARY	53.52	32.26
3	MANUFACTURING (TOTAL)	10.88	23.89
4	MANUFACTURING (REGISTERED)	6.48	14.93
5	MANUFACTURING (UNREGISTERED)	4.29	7.19
6	CONSTRUCTION	4.17	4.21
7	SECONDARY	15.91	28.16
8	TRANSPORT & COMMUNICATION	4.83	6.8
9.	TERTIARY	26.34	35.04

GRAPH 4.1

PERCENTAGE CONTRIBUTION OF VARIOUS SECTORS TO INCOME (1981-82, 1982-83)



(POPULATION AT 40 MILLION)

4.2 INDUSTRIAL CLASSIFICATION.

4.2a TWO DIGIT LEVEL CLASSIFICATION

We have estimated the pooled regression equation at the 2-digit level of industrial classification for 1981-82, 1982-83, results of which are summarized in table 4.3. We observe that in the case of food products; Beverages, Tobacco; Rubber, Plastic, Petroleum coal; and electrical machinery, both the income and size coefficients are significant. Further it is apparent that the growth elasticities are greater than unity and are higher than size elasticities which implies that per capita value added would respond to a greater extent with respect to per capita income than to population. In addition, the income coefficients are also significant in industry groups such as cotton textiles, wool & silk industry, chemical products, metal products, machine tools and transport equipment. We can also observe from table 4.3 that the income coefficients of all the capital goods industries are highly significant. Thus the industries which tend to show no correlation are basically the consumer goods industries such as Jute, Hemp, wood furniture, paper products, leather products and non-metallic mineral products. These industries generally have a smaller capital base. The percentage of variation explained by the independent variable in the industry groups of food products and metal products is about 60 percent. It is lower in the case of other industies. Furthermore, all the results which are significant show a positive relationship between the dependent and independent variables.

As per Chenery's study, the growth elasticities were high in the industry groups of paper, petroleum, metals, machinery and transport equipment. However the results of our empiricial study

TABLE : 4.3

REGRESSION RESULTS OF 2 DIGIT INDUSTRIAL CLASSIFICATION - 1981-82, 1982-83

(No. of observation = 28)

SR.	INDUSTRY	IND. CODE (NIC)	INTER-CEPT β_{i0}	GROWTH COEFF-ICIENT β_{i1}	SIZE COEFF-ICIENT β_{i2}	$\bar{R}^2$	STANDARD ERROR	F
1	Manufacture of food products	20-21	-34.15	2.98 (6.82)[a]	0.79 (3.33)[a]	0.62	0.59	23.33[a]
2	Manufacture of Beverages, Tobacco	22	-29.87	2.17 (3.03)[a]	0.79 (2.04)[b]	0.21	0.92	4.66[a]
3	Cotton Textiles	23	-33.25	3.48 (4.35)[a]	0.54 (1.22)	0.40	1.08	10.33[a]
4	Wool, silk, synthetic fibre textiles	24	-37.66	4.44 (3.69)[a]	0.33 (0.49)	0.48	1.31	11.01[a]
5	Jute, Hemp & Mesta textiles	25	-53.31	3.15 (1.26)	1.72 (1.59)	0.07	1.82	1.38
6	Textile products (incl.wearing apparel)	26	-24.29	3.44 (3.48)[a]	-0.09 (-0.18)	0.43	1.19	10.66[a]
7	Wood, Furniture & Fixtures	27	16.95	-0.56 (-0.47)	-0.81 (-1.10)	-0.03	1.39	0.62
8	Paper, Paper Products, printing.	28	-3.51	0.07 (0.06)	0.24 (0.39)	0.07	1.53	0.09
9	Leather and Fur Products	29	-1.83	-0.36 (-0.24)	0.21 (0.24)	-0.09	1.49	0.20
10	Rubber, Plastic, petroleum & coal.	30	-43.82	3.29 (2.59)[a]	1.18 (1.71)[b]	0.15	1.68	3.42
11	Chemical and chemical products	31	-26.38	2.74 (4.19)[a]	0.49 (1.51)	0.40	0.78	9.16
12	Non-metallic mineral products	32	10.57	-0.88 (-1.09)	-0.12 (-0.27)	0.02	1.09	0.20
13	Basic metal & Alloy industries	33	5.35	-0.43 (-0.62)	0.04 (0.10)	0.05	0.94	0.33
14	Metal Products & parts	34	-37.13	4.08 (6.06)[a]	0.41 (1.12)	0.60	0.91	21.6
15	Machinery & machine tools	35	-23.36	2.94 (4.68)[a]	0.21 (0.59)	0.48	0.85	13.57
16	Electrical machinery	36	-32.71	2.48 (4.06)[a]	0.93 (2.79)[a]	0.35	0.82	8.52
17	Transport equipment	37	-25.89	2.61 (2.23)[b]	0.48 (0.76)	0.11	1.51	2.7
18	Other Manufacturing industries	38	-14.12	2.12 (2.04)[b]	-0.09 (-0.18)	0.19	1.13	3.65

Figures in brackets indicate T.Values.

(a) Significant at 1 percent level
(b) Significant at 5 percent level

indicate that the income coefficient is not significant in case of the paper products industry, but it is significant and the growth elasticity is fairly high for other industries in accordance with Chenery's result. A possible reason for the coefficient to be not significant in the paper industry in our study is that the production of paper is basically spatially concentrated. A few states would contribute a very large percent of the total All-India Production of paper. Another striking similarity which can be observed is that the size coefficient in the case of the Petroleum products is more than unity in both the studies. This is the only industry at the 2 digit level of industrial classification for which the size coefficient is above unity and this can be observed in case of both studies. Another feature which can be observed in the case of Chenery's regression results is that the adjusted coefficient of determination is higher than that obtained in our study. The main reason for this difference is that in Chenery's study, the unit of observation are 'countries', while in our empirical exercise, the state is the unit of observation. This may impose some limitations on the scope of our study, since some features, may get revealed only at the national level.

4.2b THREE DIGIT LEVEL CLASSIFICATION

We have estimated the regressions at the 3 digit level of industrial classification, in addition to our analysis at the 2-digit level. This is to enable us to see some prominent, specific cases, which would give a greater insight into our purpose of study. Table 4.4 summarizes the pooled regression results (of 1981-82, 1982-83) at the 3 digit level. We can observe that the industry groups in which both the coefficients are significant

TABLE : 4.4

REGRESSION RESULTS OF 3 DIGIT INDUSTRIAL CLASSIFICATION - 1981-82, 1982-83

(No. of observation = 28)

SR.	INDUSTRY	IND. CODE (NIC)	INTER-CEPT β_{10}	GROWTH COEFF-ICIENT β_{11}	SIZE COEFF-ICIENT β_{12}	$\bar{R}^2$	STANDARD ERROR	F
1	Grain Mill products	204	-23.26	2.71 (3.80)[a]	0.13 (0.32)	0.39	0.96	9.34[a]
2	Manufacture & Refining of sugar	206	-52.64	3.28 (4.44)[a]	1.66 (4.02)[a]	0.47	0.88	11.01[a]
3	Manufacture of hydrogenated oils, vanaspati, ghee	210	-14.51	2.07 (3.08)[a]	-0.06 (-0.16)	0.46	0.63	8.46[a]
4	Cotton, Spinning, weaving	231	-36.46	3.40 (1.62)	0.75 (4.04)[a]	0.35	1.14	8.39[a]
5	Spinning,weaving of other textiles. (synthetics)	247	-5.97	1.40 (1.43)	-0.16 (-0.34)	0.16	0.93	2.67
6	All types of textile garments including wearing apparel.	264	-56.05	4.72 (4.80)[a]	1.09 (2.37)[b]	0.51	1.02	11.52[a]
7	Wooden Furniture and Fixtures	276	16.55	-2.09 (-1.79)[b]	-0.17 (-0.25)	0.11	0.94	1.61
8	Manufacture of pulp, paper	280	9.27	-0.25 (-0.28)	-0.36 (-0.79)	-0.06	1.11	0.32
9	Manufacture of fertilizers, pesticides	311	-5.55	2.06 (2.34)[b]	-0.46 (-1.03)	0.32	1.05	6.36[a]
10	Cement, lime, plaster	324	22.05	-0.24 (-2.73)[a]	-1.08 (-0.32)	0.22	0.89	4.25[b]
11	Iron & Steel Industry	330	9.28	-0.78 (-0.68)	-0.09 (-0.15)	-0.05	1.53	0.27
12	Agricultural machinery equipment	350	11.27	1.82 (1.43)	-1.45 (2.03)	0.35	1.62	7.46[a]
13	Electrical industrial machinery	360	-52.78	3.26 (3.09)[a]	1.68 (2.91)[a]	0.26	1.42	5.87[a]
14	Motor vehicles & parts	374	-5.61	1.16 (0.89)	-0.11 (-0.15)	-0.02	1.57	0.81

(a) Significant at 1 percent level.
(b) Significant at 5 percent level.

Figure is brackets indicate the T - Values.

are the manufacture and refining of sugar, textile garments and electrical machinary. In addition, the income coefficient is highly significant for the grain mill products, & hydrogenated oils, Vanaspati. The size coefficient is highly significant in the cotton spinning and weaving industry, but the elasticity is less than unity; this implies that, as the size of the market increases the net value added of the industry increases but at a less than a proportionate rate. Among the significant coefficients, the growth elasticities are above unity in all cases except for the industry groups of wooden Furniture, and cement, lime industry; which infact indicates a negative sign. A closer look at table 4.4 will reveal that basically for the consumer goods industries and electrical industry, the growth elasticity is fairly high. The adjusted coefficient of determination ($\bar{R}^2$) is about 0.50 in the case of consumer goods industry (in the industries for which the coefficients are significant).

In many of the industries, the regression results at the 2-digit level are in conformity with the results at the 3-digit level. In both cases, the growth coefficients are significant for the industry groups of food products, textile garments (incl. wearing apparel), Chemical industry (& fertilizer) and electrical machinery. The size coefficient is significant in the case of cotton, spinning and weaving industry at the 3-digit level, however, it is not significant for the cotton textiles at 2 digit level. The regression estimates at the 3 digit level for the years 1974-75, 1975-76 are summarized in Table 4.5. The growth elasticities are fairly high in the industry groups of Grain mill products; manufacture of sugar; hydrogenated oils, vanaspati;

TABLE : 4.5

REGRESSION RESULTS OF 3 DIGIT INDUSTRIAL CLASSIFICATION - 1974-75, 1975-76

(No. of observations= 28)

SR.	INDUSTRY	IND. CODE (NIC)	INTER-CEPT β_{i0}	GROWTH COEFF-ICIENT β_{i1}	SIZE COEFF-ICIENT β_{i2}	$\bar{R}^2$	STANDARD ERROR	F
1	Grain Mill products	204	-22.64	2.40 (3.47)[a]	0.25 (0.72)	0.31	0.79	6.77[a]
2	Manufacture & Refining of sugar	206	-30.93	2.25 (2.58)[a]	0.91 (2.24)[b]	0.18	0.81	3.50[a]
3	Manufacture of hydrogenated oils, vanaspati, ghee	210	-23.94	2.53 (4.09)[a]	0.31 (1.01)	0.54	0.49	10.41[a]
4	Cotton, Spinning, weaving	231	-37.85	3.85 (3.48)[a]	0.75 (1.43)	0.28	1.28	6.25[a]
5	Spinning weaving of other textiles. (synthetics)	247	-8.77	0.59 (0.50)	0.33 (0.56)	-0.13	0.96	0.21
6	All types of textile garments including wearing apparel.	264	-74.94	1.28 (1.55)	3.68 (5.76)[a]	0.85	0.43	22.05[a]
7	Wooden Furniture and Fixtures	276	-18.49	2.11 (1.41)	0.03 (0.03)	-0.07	1.47	0.99
8	Manufacture of pulp, paper	280	12.15	1.09 (1.30)	-1.07 (-3.05)[a]	0.40	0.83	8.38[a]
9	Manufacture of fertilizers pesticides	311	-48.69	4.42 (2.50)[a]	1.09 (1.21)	0.19	1.86	3.16[a]
10	Cement, lime, plaster	324	33.25	-2.02 (-2.03)[b]	-1.10 (-1.43)	0.17	0.81	2.55
11	Iron & Steel Industry	330	17.39	-1.16 (-0.56)	-0.52 (-0.60)	-0.06	2.22	0.22
12	Agricultural machinery equipment	350	19.66	0.72 (0.38)	-1.51 (-1.73)	0.23	1.76	3.88
13	Electrical industrial machinery	360	-41.84	3.175 (1.76)[b]	1.17 (1.42)	0.047	1.76	1.59
14	Motor vehicles & parts	374	-1.58	1.19 (0.68)	-0.35 (-0.42)	0.01	1.57	1.33

(a) Significant at 1 percent level.
(b) Significant at 5 percent level.

Figure is brackets indicate the T - Values.

cotton spinning weaving, fertilizers pesticides; and the electrical machinery. For all these industry groups, the elasticity is above 2, implying, a strong direct relation of the development of the economy (is the form of increase in income) and in the value added of these industries.

The size elasticity is observed to be high in the case of Textile Garments industry and infact 85 percent of variation in value added is explained by changes in the size. The size elasticity in the case of the manufacture of sugar, is less than unity, while a negative elasiticity is observed in case of paper products. This may be due the fact that the paper industry is more spatially concentrated.

If we compare table 4.4 and 4.5, we can notice many similarities and few differences in the structural pattern. At both the points of time i.e. in 1974-75, 1975-76 and 1981-82, 1982-83 the growth elasticities are high in case of the consumer goods industries such as manufacture of Grain mill products, Sugar, hydrogenated oils, vanaspati, intermediate goods like fertilizer, and capital based industry, essentially, the electrical industry.

Regarding differences in the 2 time periods at 3-digit classification, we observe that the size elasticity is below unity in case of manufacture and refining of Sugar in 1974-75, 1975-76. But in 1981-82, 1982-83, the size elasticity of this industry is above unity. This may be due to the fact that scale economies would have possibly emerged in the 8 years gap between the two time periods. Again in the case of the cotton spinning, weaving industry, in 1974-75, 1975-76, the income coefficient and

not the size coefficient is signifiant, but in 1981-82, 1982-83, it is the size coefficient which a higly significant. Furthermore, the size elasticity of textile garments industry is higher in 1974-75, 1975-76 than in 1981-82, 1982-83. In the latter point of time it is the growth elasticity which assume a high value in the textiles garments industry. Thus, there is a shift from an influence of size to an influence of income in the case of textile garments industry at the 3 digit level. Comparing tables 4.3, 4.4 and 4.5 we can find some distinct similarities. The consumer good industry in all cases shows a high growth elasticity, besides the electrical, Chemical and fertilizer industry, also indicate a significant growth elasticity. It implies that for these industries, there seems to be a more direct relation with changes in per Capita income.

4.3 EXTENSION OF EMPIRICAL STUDY ON PER CAPITA INCOME BASIS

It will be interesting to see if, by estimating separate regression equations, for the states with per capita income above and for those states below the per capita Net National Product, reveal any results different from what was obtained at the aggregate level. This exercise has been attempted at the 2 digit and 3 digit level of industrial classification for both the points of time. Below, we briefly discuss the outcome of such an exercise.

(a) The regression results of those states with per capita income above the per capita Net National Product at the 2 digit level in 1981-82, 1982-83 are summarized in Table 4.6 (Annex 4.1). The growth and size coefficients are both highly significant in the case of Food products as it is in

the case of the aggregative level (see table 4.3). For the industries such as the (i) Paper products (ii) Rubber, Plastic, Petroleum. (iii) Cotton textile industry, the growth coefficients are negative, which are not observed at the aggregate level. In the case of (i) and (ii) we can ignore this finding as the regression itself is not significant. In the case of the cotton textile industry, the negative growth coefficient could be due to the obsolete technology of this industry in developed states like Maharashtra and Gujarat; hence, value added of the cotton textiles industry may not move in the same direction as per capita income.

Another distinction which can be observed is that the size coefficient of the industry group of the textile products (incl. wearing apparel) and chemical products is highly significant in the case of the more developed states. These states probably provide more scope for scale economies for this industry. The percentage of variation explained is 90 per cent for Textile products, 87 percent in the case of Food products and 76% for Chemical industries, which are much higher than explained in the aggregate category.

Again, in the case of more developed states, for the leather industry the growth coefficient is highly elastic which was not observed at the aggregate level. This would be due to the possibility that as income increases, the demand pattern in the developed states shift towards increased consumption of leather goods among other products, which would stimulate greater production of leather goods. Furthermore, the

capital based industries of the developed states are not affected by per capita income changes, while in the case of the aggregate level, the growth coefficients, were highly significant.

Table 4.7 (ANNEX 4.1) gives an insight into the responsiveness of value added of industries to changes in per capita income and population in the less developed states at the 2 digit level. We observe that the results are very similar to that obtained at the aggregative level (see table 4.3) This may be due to the fact that the number of observations are very high in the case of less developed states, hence the results of the aggregate level, get reflected in the regression results of these states. The income coefficients are highly significant in the case of most of the consumer goods industries and capital goods industries. This conforms with the results obtained at the aggregate i.e. the less and relatively high developed states taken together. The size coefficients are fairly significant, in the industry groups of Food Products, Beverages, Wooden Furniture, and Electrical machinery. In all cases the size elasticities are positive except for Wooden Furniture industry which is negative. In this case, it is more likely that there are no scale economies, hence with an increase in the size of the market, the net value added of this industry declines.

(b) The regression results at the 3 digit level (for 1981-82 and 1982-83) for states with higher than the national average per capita Income are summarized in Table 4.8 (Annex 4.1)

The growth elasticities are very high for the industry groups of Grain mill products and hydrogenated oils, Vanaspati. We observe a negative size elasticity in the case of cement lime industry. This implies that with an increase in population, the per capital value added declines at a rate which is more than the increase in size of the market. Compared to the results obtained at the aggregate (Table 4.4), we can identify some differences. For instance, the growth and size coefficients are significant for the electrical industry, at the aggregate level, but for the group of developed states, the coefficients are not significant. This may be because in the developed states there may not be a direct immediate effect on the value added of changes in per capita income and size of the market. It can also be observed that the growth coefficients are not significant for any of the intermediate industry groups.

For the states which have a per Capita Income below the National average, the regression results of 3 digit level (1981-82 and 1982-83) are indicated in Table 4.9 (Annex 4.1) We observe that majority of the states selected come into this category, with the consequence that the results are quite similar to the aggregative picture (See Table 4.4). In the case of consumer goods industry, the growth elasticities are high in the case of manufacture; refining of sugar; cotton spinning weaving, textile garments, and electrical industry, which is in conformity with the results of the aggregate. Similarly, the size elasticities of the manufacture of sugar, textile garments, and electrical

industry are high. It is quite likely that in such cases, scale economies may induce increased production in these industries. However, we notice that spinning, weaving of other textiles (Synthetics) has a negative size coefficient. This is probably because, this industry may be spatially concentrated and that only certain states may be producing a bulk of it and catering to other parts of the country. However The $\bar{R}^2$ in the case of this industry is found to be 0.83, which is a high explanation to the variation. It is indeed interesting to note that, generally the regression results of the more developed states and less developed ones, show diametrically opposite results in the sense that, for the industries for which the coefficients are significant in one group of states, it is not found significant in the other group of states.

(c) We will now look into the earlier point of time i.e. 1974-75, 1975-76 at the 3 digit level. The regression results for the more developed states are indicated in Table 4.10 (Annex 4.1) The only growth coefficients that are found to be significant are the industry groups of Hydrogenated oils, Wooden Furniture, and motor vehicles and parts. However, none of the size coefficients are significant at 5 % and 1 % level of significance.

We can compare these results with that obtained in 1981-82, 1982-83 (See table 4.8) for the developed states, to examine any structural changes. While in 1974-75, 1975-76, the growth coefficient for grain mill products was not significant, it was found to be highly significant in 1981-

82, 1982-83. Again while growth coefficients for wooden furniture, fixtures and motor vehicle and parts was significant in 1974-76, but it was not significant in 1981-83. On the other hand, we find that the growth coefficents in the case of hydrogenated oils, vanaspati, for both points of time are significant and highly elastic. Regarding the size coefficient, at both points of time, it is not generally found significant in case of the developed states.

Moving on to the less developed states at the 3 digit level in 1974-76 (See Annex. 4.1 Table 4.11), we find that growth elasticities are very high in the cases of cotton spinning weaving, Wooden Furniture, Fixtures, and Electrical industries. The size elasticity is high in the industry groups of manufacture of sugar, and Electrical industrial machinery, which implies that there is scope for scale economies in these industries. However, we find that the size coefficient is highly significant, in the manufacture of pulp paper, but it has a negative sign. It is not significant in the case of developed states. However at the aggregate level, this phenomenon was observed.

In 1974-76, for both the developed and less developed cases, the growth elasticities are high for the Wooden Furniture and Fixture industry. However, for the developed group of states, the growth cofficients are not significant in the cotton spinning weaving and Electrical industry. This is probably because the developed states have already reached a fairly high level of development in these areas, hence with a further change in income, it has no impact on the value

added of these industries. While the developing states still have a scope for development in these areas, hence, their reponsiveness to changes in income are much more.

The size elasticities for the aggregate level and for the less developed states, are high for industry groups: cotton spinning weaving, and electrical machinery, however, for the fertilizer industry the income coefficient is significant at the aggregate level but not in the case of less developed states. In both cases, the size coefficients are significant in the manufacture and refining of sugar and electrical machinery industry.

In the foregoing discussion, we examined the regression results of the extended version on per capita income basis of our empirical study. In the Subsequent part we extend the analysis using population as the basis.

4.4 EXTENSION OF EMPIRICAL STUDY ON POPULATION BASIS

Chenery in his study of 1968, had grouped the countries in his sample in 3 categories: large countries, small primary-oriented, and small Industry-oriented countries and observed different patterns of development in each category. Similarly K.L. Gupta's study of 1971, tried to examine the development pattern in India on the basis of Chenery's initial regression equation. In his study, Gupta grouped the states into large and small on the basis of the population and observed the results to have generally improved compared to the pooled regression results. Population has been used as a proxy for market size, which would give an insight into the possibilities of scale economies.

In this section we shall be examining the regression results of two broad groups. One group comprises of those states in which population is above the average population of the 14 states selected in the study and the other group comprises of those states in which the population is below the average population. Further, we have analyzed these groups in terms of 2 digit and 3 digit level of industrial classification at 2 points of time, 1974-75, 1975-76, (pooled) and 1981-82, 1982-83 (pooled).

(a) The regression results of the group of states, with population above the average at 2 digit level for 1981-82, 1982-83 are summarized in Table 4.12 (Annex 4.1). We can observe that the growth coefficients are highly significant with the elasticities above unity in the case of most of the consumer goods, capital goods industry, and Chemical products among the intermediate industry. The size coefficient is found significant & positive only in the industry group of textile products, with an elasticity above unity. One explanation for this is that scale economies for this industry exist. However, the size coefficient for industry groups of wood, Furniture, Fixtures, Paper, Paper Products and non-Metallic mineral products are significant but negative. The percentage of variation explained in the case of most consumer goods, capital goods and chemical products is about 60 per cent.

If we compare these result, with the regression estimates for the group as a whole, (see Table 4.3) there is a high degree of conformity of values in case of income coefficient with the exception of Rubber Plastic Petroleum industry &

transport equipment, which are significant at the aggregete level but not in case of the group of states with below average population. Furthermore, we observe that though the grouped data revealed that the income coefficients are significant for industry groups, Wood, Furniture, Fixture, and Paper and Paper Products, it is not reflected at the aggregate level. The size coefficients for industry groups of food products; Beverages, Tobacco, Rubber Plastic Petroleum and Electrical machinery are significant at the aggregate level; however, it is not reflected in the states with large population.

Table 4.13 (Annex 4.1) indicates the regression results of the groups of states with less than average population, at the 2-digit level for 1981-83. We observe that the income coefficients are significant and highly elastic in the industry groups of food products, cotton Textiles, Wooden Furniture, Fixture, Leather Products, Chemical products, Metal parts and Machinery, Machine tools. Out of these, the income coefficients for wood furniture etc., show a negative sign. This implies that at higher incomes, the demand for wood Furniture, declines and therefore production decreases. However size coefficient is significant only for the Cotton textiles industry. This implies that generally speaking, the size of the market is not an important influence on the value added of industries in the case of lesser populated states. We further observe, that the percentage of explanation of the variation in the manufacture of leather and Fur Products were 94%, which is quite high. On the whole it can be inferred that for most of the 2-digit industry

groups, the coefficients are not siginificant for the less populated states.

(b) In this section we discuss the regression results of the States with Population more than the average population at the 3 digit level in 1981-83, (See Table 4.14, Annex 4.1). We can observe that the growth coefficients are generally significant and positive in the case of the consumer goods and the electrical machinery industries. The size coefficient is found to be significant, generally in the consumer goods industry. It is positive in the case of manufacture of sugar and hydrogenated oils however it is negative in many cases such as spinning weaving (synthetics), wood furniture and fixtures, Pulp, Paper, cement lime and Plaster, which could imply that these industires do not offer scale economies hence due to non-reduction in the cost of production the value added declines.

If we compare the aggregate level figures we find that the size coefficients is the case of higher populated group of states, show a positive relation for all the significant coefficents. The adjusted coefficient of determination, in case of consumer goods industry ranges from 42 percent to 74 percent.

The regression results of states with population less than the average for 1981-83 at the 3 digit level is summarized in Table 4.15 (Annex 4.1). We observe that basically for the consumer goods industries, the growth and size elasticities

are high. In addition, the growth elasticity is high in case of the fertilizer industry. The income coefficients all indicate a positive relation. In the case of the size coefficients, the agricutural machinery industry, Grain mill Products, manufacture of Vanaspati, ghee; indicate negative coefficients while textiles industry, cotton spinning weaving, indicate a positive coefficients.

Comparing the more populated and less populated group of states, we observe that in both cases, growth coefficients for consumer goods is generally significant with a positive sign, and in case of size coefficients for states with larger population, spinning weaving of synthetics, is significant but negative. In case of the smaller populated group, it is a positive relation. While the size coefficient is positive in case of hydrogenated oils in the larger populated group, the smaller population group indicates a negative relation.

The variation explained (for smaller populated group) in case of cousumer goods industries ranges from 56 percent to 78 percent.

(c) Having seen the position of the responsiveness of net value added of 3 and 2 digit level of industries in each group to the changes in per capita income and population (of smaller and largely populated groups of states) in 1981-82, 1982-83, we now turn to examine similar regression equation for 1974-75, 1975-76. Table 4.16 (Annex. 4.1) summarizes the results obtained for the larger populated states. We note that the

growth elasticities are very high in the case of manufacture of consumer goods products, intermediates and electrical machinery. In all cases it is a positive relation except for cement lime plaster. The size elasticities are high in the cases of hydrogenated oil, Vanaspati etc; spinning, weaving of synthetics; pulp, paper and cement lime plastic. Of these, a negative relation is noticed in case of pulp paper and cement lime industry. It is quite likely that some of these industries are concentrated in certain areas of the country from where these manufactured products are supplied to various regions. In such cases, the effect of a change in market size may not be felt or may not bring about a positive impact on the value added of these industries, since the concerned state may receive a large percentage of the industrial product from other states.

The percentage of variation explained in various industries in the consumer goods sector ranges from 25 percent to 68 percen. In the case of fertilizer; and cement, lime the percentage of variation explained is 73 percent.

Comparing these results with those obtained for the large populated states in 1981-83 (Table 4.14), would reflect existence of any structural changes in the development pattern. We observe that in 1981-83, for industry groups of spinning, weaving of synthetics, and wooden Furniture, Fixture, the growth coefficient was highly elastic. However in 1974-76, the growth coefficient was not significant, for these 2 industries. Further, we note that in 1974-76 growth elasticities are high in the pulp, paper manufactures;

fertilizer pesticides and cement lime, plaster industries. In 1982-83, the growth coefficients were not significant for these industry groups. However, at both points of time, the growth elasticities for grain mill products manufacture, refining of sugar, hydrogenated oils, cotton spinning weaving and electrical industry are high. In case of the size coefficients at both points of time, the hydrogenated oils, etc., spinning, weaving of synthetics, manufacture of pulp, paper, and cement lime industries show a high elasticity. The size coefficient of spinning, weaving of synthetics was positive in 1974-76, but in 1981-83 this coefficent has a negative sign. This would probably imply that these industries, do not offer scale economies in 1981-83, as was possibly present in 1974-76.

The regression results of the group of states with lesser population, in 1974-76 is summarized in Table 4.17 (Annex. 4.1) A cursory glance at the table indicates that there are few industries for which the coefficients are significant. For instance, the growth coefficient is significant in the cotton spinning, weaving industry, and manufacture of pulp, paper. However, in the case of the latter it is a negative relation, which has been generally observed in some of the earlier cases too. In the case of the size coefficient, it has been found to be highly significant in the industry groups of cotton spinning , weaving; pulp, paper, and agricultural machinery. However in the latter 2 industry groups, the coefficient was negative. The percentage of variation explained in these industries, ranges between 34% to 49%.

A Comparision of these results with the regression results in 1981-83 for the lesser populated groups at the 3 digit level (Table 4.15) would indicate the pattern of structural changes over the 8 years period. At both time periods, the only industry for which the growth elasticity is high is the cotton spinning weaving industry. In addition, in 1981-83, the other industries for which growth elasticties, were high were grain mill products, manufacture and refining of sugar, textile garments, and fertilizers. However, in 1971-73, the growth coefficient was not significant for any of these industries. Apart from these, though the growth coefficient for the paper industry was significant but had a negative sign.

The size coefficients in 1981-83, were found to be highly significant for the grain mill products, hydrogenated oils, Vanaspati, and Textile garments. For these industries, the size coefficient in 1974-76 was not significant. However, at both the points of time, the cotton, spinning weaving and agricutural machinery industires were found significant. Thus we observe that the two points of time indicate many differences and few similarities, which could imply that there have been few shifts in the structural pattern over the 8 year period.

However, we should bear one aspect in mind while examining the regression results, that in our study the units of observation are the states, This may lead to some limitation, since states are not water-tight compartments. Not only is there a lot of interregional trade within the country, but also that

certain states would be producing for the international sector. To this extent, it would be difficult to see the impact of size of the market.

Despite certain limitations our regression results are quite revealing for the broad sectors of the economy, the 2 digit and 3 digit level of industrial classification, at the two points of time. Our attempt to see more specific changes by extending the analyses on the basis of per capita income and population has also indicated certain revealing facts.

ANNEXURE 4.1 : TABLES 4.6 - 4.17

TABLE : 4.6

REGRESSION RESULTS OF STATES WITH PER CAPITA INCOME GREATER THAN PER CAPITA NET NATIONAL PRODUCT-2 DIGIT LEVEL
(1981-82, 1982-83)

SR.	INDUSTRY	IND. CODE (NIC)	INTER-CEPT β_{i0}	GROWTH COEFF-ICIENT β_{i1}	SIZE COEFF-ICIENT β_{i2}	$\bar{R}^2$	STANDARD ERROR	F	No.OF OBSR.
1	Manufacture of food products	20-21	-47.48	4.462 (6.159)[a]	0.888 (6.627)[a]	0.87	0.19	26.11[a]	8
2	Manufacture of Beverages, Tobacco	22	-37.53	3.655 (0.883)	0.551 (0.72)	0.14	1.09	0.42	8
3	Cotton Textiles	23	-37.60	-5.04 (-3.036)[b]	0.328 (1.068)	0.73	0.43	10.48[b]	8
4	Wool, silk, synthetic fibre textiles	24	-20.384	1.37 (0.801)	0.73 (2.309)[b]	0.34	0.45	2.87	8
5	Jute, Hemp & Mesta textiles	25	--	--	--	--	-	--	
6	Textile products (incl.wearing apparel)	26	-42.45	4.339 (8.19)[a]	0.536 (5.478)[a]	0.90	0.14	33.99[a]	8
7	Wood, Furniture & Fixtures	27	-44.75	1.941 (0.93)	1.586 (3.243)[b]	0.73	0.42	8.08	6
8	Paper, Paper Products, printing.	28	135.72	-15.99 (-2.609)[b]	-0.469 (-0.4133)	0.48	1.62	4.27	8
9	Leather and Fur Products	29	-26.28	3.657 (4.841)[a]	0.243 (-2.009)	0.96	0.11	65.48[a]	6
10	Rubber,Plastic, petroleum & coal.	30	48.21	-5.687 (-2.109)[b]	-0.045 (-0.091)	0.38	0.71	3.15	8
11	Chemical and chemical products	31	-8.38	-0.71 (-0.483)	1.043 (3.834)[a]	0.76	0.39	12.70[b]	8
12	Non-metallic mineral products	32	128.53	-14.26 (-3.045)[b]	-0.831 (-0.96)	0.53	1.24	5.09	8
13	Basic metal & Alloy industries	33	-8.63	0.878 (0.47)	0.263 (0.762)	-0.25	0.49	0.29	8
14	Metal Products & parts	34	13.85	-1.726 (-0.513)	0.112 (0.18)	-0.25	0.89	0.29	8
15	Machinery & machine tools	35	30.27	-2.969 (-1.087)	-0.202 (-0.40)	-0.12	0.72	0.63	8
16	Electrical machinery	36	6.68	-1.30 (-0.449)	0.365 (0.683)	-0.07	0.76	0.76	8
17	Transport equipment	37	-35.37	3.67 (0.835)	0.53 (0.657)	-0.21	1.16	0.37	8
18	Other Manufacturing industries	38	-12.93	0.711 (0.424)	0.475 (1.533)	.08	0.44	1.33	8

Figures within brackets indicate T-Values.
Regression was not estimated due to very few observations.

(a) At one percent level of significance.
(b) At five per cent level of significance.

OBSR. : OBSERVATION.

TABLE : 4.7

REGRESSION RESULTS OF STATES WITH PER CAPITA INCOME LESS THAN PER CAPITA NET NATIONAL PRODUCT-2 DIGIT LEVEL
(1981-82 & 1982-83)

SR.	INDUSTRY	IND. CODE (NIC)	INTER-CEPT β_{i0}	GROWTH COEFF-ICIENT β_{i1}	SIZE COEFF-ICIENT β_{i2}	$\bar{R}^2$	STANDARD ERROR	F	No.OF OBSR.
1	Manufacture of food products	20-21	-40.24	3.881 (3.66)[a]	0.774 (2.124)[b]	0.41	0.68	7.77[a]	20
2	Manufacture of Beverages, Tobacco	22	-45.48	3.659 (2.575)[a]	1.069 (2.114)[b]	0.27	0.88	4.43[b]	20
3	Cotton Textiles	23	-45.75	6.539 (4.365)[a]	-0.014 (-0.028)	0.48	0.96	9.89[a]	20
4	Wool, silk, synthetic fibre textiles	24	-20.23	4.957 (1.725)	-0.864 (-0.689)	0.21	1.54	2.78	14
5	Jute, Hemp & Mesta textiles	25	-60.25	7.191 (3.068)[a]	0.472 (0.518)	0.45	1.34	4.75[a]	10
6	Textile product (incl.wearing apparel)	26	-26.55	5.369 (2.332)[b]	-0.758 (-0.889)	0.28	1.36	4.40[b]	18
7	Wood, Furniture & Fixtures	27	6.88	3.381 (1.761)[b]	-1.857 (-2.54)[b]	0.45	1.12	7.67[a]	17
8	Paper, Paper Products, printing.	28	-10.97	2.565 (1.521)	-0.368 (-0.635)	0.05	1.08	1.59	20
9	Leather and Fur Products	29	-49.74	2.17 (0.723)	1.857 (1.19)	-0.04	1.63	0.72	14
10	Rubber, Plastic, petroleum & coal.	30	-58.10	4.373 (1.459)	1.543 (1.478)	0.08	1.92	1.79	20
11	Chemical and chemical products	31	-16.05	3.210 (1.981)	-0.287 (0.691)	0.13	0.72	2.29	20
12	Non-metallic mineral products	32	2.80	1.181 (1.369)	-0.534 (-1.802)	0.18	0.56	3.13	20
13	Basic metal & Alloy industries	33	23.38	-3.016 (-1.931)	0.082 (0.153)	0.09	1.01	2.0	20
14	Metal Products & parts	34	-47.77	6.146 (4.757)[a]	0.164 (0.371)	0.52	0.83	11.45[a]	20
15	Machinery & machine tools	35	-34.23	4.822 (3.848)[a]	0.045 (0.105)	0.40	0.81	7.59[a]	20
16	Electrical machinery	36	-56.82	5.706 (5.352)[a]	0.972 (2.655)[a]	0.60	68.50	15.73[a]	20
17	Transport equipment	37	-36.90	4.21 (1.542)	0.446 (0.461)	0.02	1.70	1.19	19
18	Other Manufacturing industries	38	-39.80	7.35 (2.967)[a]	-0.813 (-1.211)	0.45	1.06	6.87[b]	15

Figures within brackets indicate T-Values.

(a) At one percent level of significance.
(b) At five per cent level of significance.

TABLE : 4.8

REGRESSION RESULTS OF STATES WITH PER CAPITA INCOME GREATER THAN PER CAPITA NET NATIONAL PRODUCT - 3 DIGIT LEVEL
(1981-82, 1982-83)

SR.	INDUSTRY	IND. CODE (NIC)	INTER-CEPT β_{i0}	GROWTH COEFF-ICIENT β_{i1}	SIZE COEFF-ICIENT β_{i2}	$\bar{R}^2$	STANDARD ERROR	F	No.OF OBSR.
1	Grain Mill products	204	-69.38	9.114 (4.687)[a]	-0.146 (-0.407)	0.83	0.51	18.10[a]	8
2	Manufacture & Refining of sugar	206	-12.82	-0.25 (-0.086)	0.965 (1.795)	0.30	0.77	2.54	8
3	Manufacture of hydrogenated oils, vanaspati, ghee	210	-67.32	7.572 (6.594)[a]	0.476 (1.755)	0.93	0.23	34.63[a]	6
4	Cotton, Spinning,weaving	231	22.12	-4.099 (-1.629)	0.781 (1.678)	0.60	0.66	6.40	8
5	Spinning weaving of other textiles (synthetics)	247	-7.12	-0.463 (-0.212)	0.772 (1.907)	0.37	0.57	3.08	8
6	All types of textile garments including wearing apparel.	264	23.83	-4.077 (-1.377)	0.468 (1.623)	0.59	0.39	4.60	6
7	Wooden Furniture and Fixture	276*	--	--	--	--	--	--	
8	Manufacture of pulp, paper	280	71.38	-7.387 (-0.854)	-0.71 (-0.618)	-0.26	1.58	0.37	8
9	Manufacture of fertilizers pesticides	311	4.43	0.822 (0.326)	-0.481 (-1.031)	0.04	0.67	1.16	8
10	Cement, lime, plaster	324	-2.91	3.561 (0.885)	-1.387 (-3.54)[b]	0.80	0.54	11.15[b]	6
11	Iron & Steel Industry	330	-11.80	1.83 (0.956)	-0.045 (-0.127)	-0.06	0.51	0.79	8
12	Agricultural machinery equipment	350	-19.18	6.536 (0.912)	-1.846 (-1.393)	0.38	1.89	3.15	8
13	Electrical industrial machinery	360	35.96	-5.722 (-1.483)	0.63 (0.883)	0.40	1.02	3.33	8
14	Motor vehicles & parts	374	-28.59	3.649 (0.795)	0.09 (0.107)	-0.20	1.21	0.41	8

(a) Significant at 1 percent level.
(b) Significant at 5 percent level.

Figure is brackets indicate the T - Values.

* Regression could not be estimated due to very few observations.

TABLE : 4.9

REGRESSION RESULTS OF STATES WITH PER CAPITA INCOME LESS THAN PER CAPITA NET NATIONAL PRODUCT - 3 DIGIT LEVEL
(1981-82, 1982-83)

SR.	INDUSTRY	IND. CODE (NIC)	INTER-CEPT β_{i0}	GROWTH COEFF-ICIENT β_{i1}	SIZE COEFF-ICIENT β_{i2}	$\bar{R}^2$	STANDARD ERROR	F	No.OF OBSR.
1	Grain Mill products	204	-35.54	2.873 (1.983)	0.755 (1.525)	0.15	0.92	2.69	20
2	Manufacture & Refining of sugar	206	-72.49	4.753 (2.752)[a]	2.178 (3.366)[a]	0.46	0.93	7.13[a]	15
3	Manufacture of hydrogenated oils, vanaspati, ghee	210	-7.93	0.338 (0.205)	0.284 (0.537)	-0.18	0.61	0.14	12
4	Cotton,Spinning, weaving	231	-47.28	6.54 (4.222)[a]	0.064 (0.12)	0.46	0.99	9.14[a]	20
5	Spinning weaving of other textiles. (synthetics)	247	47.96	-0.92 (-0.84)	-2.237 (-6.8)[a]	0.83	0.38	23.84[a]	12
6	All types of textile garments including wearing apparel.	264	-69.62	5.988 (2.666)[a]	1.34 (1.826)[b]	0.30	1.16	4.13[b]	15
7	Wooden Furniture and Fixtures	276	60.63	-5.772 (-0.852)	-1.141 (-0.731)	0.34	0.84	2.57	7
8	Manufacture of pulp, paper	280	5.51	0.648 (0.393)	0.523 (-0.966)	-0.058	0.96	0.58	19
9	Manufacture of fertilizers pesticides	311	-24.18	4.902 (1.506)	-0.588 (-0.807)	0.08	1.23	1.68	20
10	Cement, lime, plaster	324	1.93	1.845 (1.276)	-0.806 (-1.441)	0.12	0.92	2.26	18
11	Iron & Steel Industry	330	32.90	-4.882 (-1.879)	0.261 (0.292)	0.09	1.67	1.97	20
12	Agricultural machinery equipment	350	16.63	-1.239 (-0.494)	-0.504 (-0.576)	-0.11	1.42	0.23	16
13	Electrical industrial machinery	360	-77.64	6.464 (2.89)[a]	1.762 (2.291)[b]	0.33	1.44	5.76[b]	20
14	Motor vehicles & parts	374	0.99	0.229 (0.072)	-0.09 (-0.08)	-0.13	1.8	0.00818	

(a) Significant at 1 percent level.
(b) Significant at 5 percent level.

Figure is brackets indicate the T - Values.

TABLE : 4.10

REGRESSION RESULTS OF STATES WITH PER CAPITA INCOME GREATER THAN PER CAPITA NET NATIONAL PRODUCT - 3 DIGIT LEVEL

(1974-75, 1975-76)

SR.	INDUSTRY	IND. CODE (NIC)	INTER-CEPT β_{i0}	GROWTH COEFF-ICIENT β_{i1}	SIZE COEFF-ICIENT β_{i2}	$\bar{R}^2$	STANDARD ERROR	F	No.OF OBSR.
1	Grain Mill products	204	-17.897	1.834 (1.332)	0.209 (0.496)	-0.016	0.64	0.926	10
2	Manufacture & Refining of sugar	206	-26.10	2.288 (1.254)	0.611 (1.222)	0.009	0.828	1.039	9
3	Manufacture of hydrogenated oils, vanaspati, ghee	210	-4.622	1.275 (2.045)[b]	-0.281 (-1.197)	0.656	0.265	7.689[b]	10
4	Cotton, Spinning, weaving	231	-17.68	0.893 (0.336)	0.802 (1.087)	-0.075	1.254	0.65	11
5	Spinning weaving of other textiles. (synthetics)	247	-8.24	0.039 (0.012)	0.525 (0.63)	-0.268	1.17	0.258	8
6	All types of textile garments including wearing apparel.	264*	--	--	--	--	--	--	
7	Wooden Furniture & Fixture	276	-50.50	4.473 (2.43)[b]	0.859 (1.35)	0.448	0.534	3.03	6
8	Manufacture of pulp, paper	280	1.233	0.958 (0.597)	-0.384 (-1.148)	0.060	0.565	1.257	9
9	Manufacture of fertilizers pesticides	311	0.204	0.792 (0.954)	-0.237 (-0.777)	0.21	0.345	1.8	9
10	Cement, lime, plaster	324	42.674	-2.338 (-0.698)	-1.576 (-0.963)	0.169	0.861	1.407	5
11	Iron & Steel Industry	330	-16.53	2.007 (0.467)	0.155 (0.130)	-0.212	2.029	0.122	11
12	Agricultural machinery equipment	350	11.589	2.598 (0.435)	-1.831 (-1.247)	0.155	2.40	1.737	9
13	Electrical industrial machinery	360	-3.052	-1.624 (-0.809)	0.906 (1.624)	0.337	0.948	3.547	11
14	Motor vehicles & parts	374	-39.42	4.444 (2.209)[b]	0.499 (0.893)	0.235	0.95	2.53	11

* Regression is not estimated due to very few observations.

(a) Significant at 1 percent level.
(b) Significant at 5 percent level.

Figure is brackets indicate the T - Values.

TABLE : 4.11

REGRESSION RESULTS OF STATES WITH PER CAPITA INCOME LESS THAN PER CAPITA NET NATIONAL PRODUCT - 3 DIGIT LEVEL
(1974-75, 1975-76)

SR.	INDUSTRY	IND. CODE (NIC)	INTER-CEPT β_{i0}	GROWTH COEFF-ICIENT β_{i1}	SIZE COEFF-ICIENT β_{i2}	$\bar{R}^2$	STANDARD ERROR	F	No.OF OBSR.
1	Grain Mill products	204	-20.717	2.235 (1.029)	0.198 (0.335)	-0.063	0.94	0.55	16
2	Manufacture & Refining of sugar	206	-68.062	5.037 (1.632)	1.959 (2.133)[b]	0.165	0.84	2.286	14
3	Manufacture of hydrogenated oils, vanaspati, ghee	210	-28.43	2.19 (0.549)	0.691 (0.757)	-0.209	0.610	0.308	10
4	Cotton, Spinning, weaving.	231	-69.81	8.679 (3.218)[a]	0.725 (0.987)	0.359	1.17	5.487[b]	17
5	Spinning weaving of other textiles. (synthetics)	247	12.593	0.813 (0.048)	-0.987 (-0.322)	-0.23	0.857	0.438	7
6	All types of textile garments including wearing apparel.	264	265.841	-19.263 (-1.037)	-7.836 (-0.821)	0.108	0.545	1.183	4
7	Wooden Furniture and Fixture	276	-91.022	12.261 (3.223)[a]	0.279 (0.199)	0.482	1.309	5.197[b]	10
8	Manufacture of pulp, paper	280	10.866	2.929 (1.404)	-1.691 (-3.219)[a]	0.582	0.825	10.05[a]	15
9	Manufacture of fertilizers pesticides	311	-108.44	10.98 (1.688)	1.99 (1.384)	0.116	2.263	1.724	15
10	Cement, lime, plaster	324	-77.529	5.72 (1.68)	2.248 (1.412)	0.076	0.715	1.412	11
11	Iron & Steel Industry	330	103.76	-11.092 (-2.127)[b]	-1.656 (-1.171)	0.146	2.22	2.28	17
12	Agricultural machinery equipment	350	-5.163	1.47 (0.292)	-0.386 (-0.264)	-0.143	1.322	0.373	11
13	Electrical industrial machinery	360	-201.526	19.636 (3.249)[a]	3.962 (2.299)[b]	0.404	1.67	5.415[b]	14
14	Motor vehicles & parts	374	143.365	-9.316 (-1.346)	-4.546 (-1.84)	0.122	1.82	1.70	11

(a) Significant at 1 percent level.
(b) Significant at 5 percent level.

Figure is brackets indicate the T - Values.

TABLE : 4.12

REGRESSION RESULTS OF STATES WITH POPULATION MORE THAN AVERAGE* POPULATION - 2 DIGIT LEVEL

(1981-82-83)

SR.	INDUSTRY	IND. CODE (NIC)	INTER-CEPT β_{i0}	GROWTH COEFF-ICIENT β_{i1}	SIZE COEFF-ICIENT β_{i2}	$\bar{R}^2$	STANDARD ERROR	F	No.OF OBSR.
1	Manufacture of food products	20-21	-38.74	3.00 (4.83)[a]	1.04 (1.78)	0.62	0.56	11.81[a]	14
2	Manufacture of Beverages, Tobacco	22	-32.54	2.59 (2.93)[a]	0.78 (0.94)	0.33	0.79	4.31[b]	14
3	Cotton Textiles	23	-13.29	4.54 (3.54)[a]	-1.01 (-0.84)	0.51	1.15	7.86[a]	14
4	Wool, silk, synthetic fibre textiles	24	-27.56	5.54 (4.15)[a]	-0.69 (-0.54)	0.61	1.19	9.87[a]	12
5	Jute, Hemp & Mesta textiles	25	18.33	4.39 (2.15)[b]	-2.74 (-1.99)	0.66	1.01	8.08[b]	8
6	Textile product (incl.wearing apparel)	26	-78.40	5.68 (5.14)[a]	1.98 (1.90)[b]	0.65	0.99	13.39[a]	14
7	Wood, Furniture & Fixtures	27	11.17	2.50 (2.62)[b]	-1.74 (-1.94)[b]	0.48	0.86	7.05[b]	14
8	Paper, Paper Products, printing.	28	10.19	2.74 (2.98)[a]	-1.60 (-1.86)[b]	0.52	0.82	8.11[a]	14
9	Leather and Fur Products	29	22.47	-1.23 (-0.73)	-0.77 (-0.49)	-0.11	1.51	0.32	14
10	Rubber,Plastic, petroleum & coal.	30	-67.18	3.27 (1.64)	2.48 (1.33)	0.10	1.79	1.78	14
11	Chemical and chemical products	31	-22.35	3.86 (4.67)[a]	-0.19 (-0.32)	0.65	0.59	11.67[a]	14
12	Non-metallic mineral products	32	30.58	0.45 (1.00)	-1.78 (-4.18)[a]	0.60	0.41	11.02[a]	14
13	Basic metal & Alloy industries	33	37.56	-1.22 (-0.98)	-1.42 (-1.20)	-0.005	1.12	0.96	14
14	Metal Products & parts	34	-29.32	5.29 (5.03)[a]	-0.52 (-0.52)	0.67	0.94	14.37[a]	14
15	Machinery & machine tools	35	1.83	3.62 (3.81)[a]	-1.47 (-1.64)	0.60	0.85	10.91[a]	14
16	Electrical machinery	36	-21.54	3.09 (4.76)[a]	0.06 (0.10)	0.62	0.58	11.96[a]	14
17	Transport equipment	37	23.14	2.58 (1.48)	-2.22 (-1.35)	0.20	1.57	2.69	14
18	Other Manufacturing industries	38	-24.73	4.84 (4.34)[a]	-0.63 (-0.72)	0.69	0.77	12.53[a]	11

* Average population of 14 states
Figures within brackets indicate T-Values.

(a) At one percent level of significance.
(b) At five per cent level of significance.

TABLE : 4.13

REGRESSION RESULTS OF STATES WITH POPULATION LESS THAN AVERAGE* POPULATION - 2 DIGIT LEVEL
(1981-82, 1982-83)

SR.	INDUSTRY	IND. CODE (NIC)	INTER-CEPT β_{i0}	GROWTH COEFF-ICIENT β_{i1}	SIZE COEFF-ICIENT β_{i2}	$\bar{R}^2$	STANDARD ERROR	F	No.OF OBSR.
1	Manufacture of food products	20-21	-34.15	2.97 (4.04)[a]	0.80 (1.25)	0.56	0.69	9.42[a]	14
2	Manufacture of Beverages, Tobacco	22	28.14	0.04 (0.03)	-1.67 (-1.59)	0.16	1.10	2.23	14
3	Cotton Textiles	23	-56.78	3.45 (4.12)[a]	1.94 (2.67)[b]	0.53	0.78	8.51[a]	14
4	Wool, silk, synthetic fibre textiles	24	-38.48	3.27 (1.34)	0.91 (0.56)	0.03	1.42	1.18	10
5	Jute, Hemp & Mesta textiles	25	**	-	-	-	-	-	-
6	Textile product (incl.wearing apparel)	26	12.96	0.58 (0.44)	-0.98 (-0.98)	0.10	1.0	1.65	12
7	Wood, Furniture & Fixtures	27	64.12	-4.67 (-2.48)[b]	-1.73 (-0.95)	0.36	1.31	3.35	9
8	Paper, Paper Products, printing.	28	45.45	-2.58 (-1.43)	-1.46 (-0.93)	0.003	1.7	1.02	4
9	Leather and Fur Products	29	-33.49	3.54 (3.16)[b]	0.25 (0.32)	0.94	0.26	34.13[a]	6
10	Rubber,Plastic, petroleum & coal.	30	-30.14	3.01 (1.59)	0.51 (0.31)	0.08	1.75	1.57	14
11	Chemical and chemical products	31	-37.02	2.63 (2.57)[b]	1.17 (1.40)	0.28	0.88	3.37	14
12	Non-metallic mineral products	32	14.44	-1.73 (-1.16)	0.02 (0.02)	0.01	1.39	1.12	14
13	Basic metal & Alloy industries	33	19.77	-0.35 (-0.65)	-8.85 (-1.79)	0.10	0.52	1.77	14
14	Metal Products & parts	34	-25.04	3.12 (3.59)[a]	0.13 (0.17)	0.57	0.82	9.85[a]	14
15	Machinery & machine tools	35	-17.68	2.42 (3.13)[a]	0.09 (0.15)	0.49	0.72	7.48[a]	14
16	Electrical machinery	36	-26.29	1.98 (1.81)	0.77 (0.82)	0.09	1.03	1.71	14
17	Transport equipment	37	-12.62	2.33 (1.53)	-0.19 (-0.15)	0.17	1.32	2.25	13
18	Other Manufacturing industries	38	0.63	0.43 (0.27)	-0.20 (-0.16)	-0.18	1.19	0.15	12

** Regression could not be estimated due to very few observations.
* Average population is the average of the 14 states.
Figures within brackets indicate T-Values.

(a) At one percent level of significance.
(b) At five per cent level of significance.

TABLE : 4.14

REGRESSION RESULTS OF STATES WITH A POPULATION MORE THAN AVERAGE* POPULATION. - 3 DIGIT LEVEL
(1981-82 & 1982-83)

SR.	INDUSTRY	IND. CODE (NIC)	INTER-CEPT β_{i0}	GROWTH COEFF-ICIENT β_{i1}	SIZE COEFF-ICIENT β_{i2}	R^2	STANDARD ERROR	F	No.OF OBSR.
1	Grain Mill products	204	-6.427	1.85 (4.30)[a]	-0.44 (-1.09)	0.62	0.38	11.825[a]	14
2	Manufacture & Refining of sugar	206	-56.28	3.39 (3.91)[a]	1.83 (2.23)[b]	0.58	0.76	8.60[a]	12
3	Manufacture of hydrogenated oils, vanaspati, ghee	210	-36.19	1.98 (2.69)[b]	1.18 (2.13)[b]	0.42	0.52	4.99[b]	12
4	Cotton, Spinning. weaving.	231	-13.40	4.48 (3.42)[a]	-0.98 (-0.79)	0.49	1.17	7.35[a]	14
5	Spinning weaving of other textiles. (synthetics)	247	0.71	2.89 (4.14)[a]	-1.17 (-2.17)[b]	0.72	0.50	13.15[a]	10
6	All types of textile garments including wearing apparel.	264	-35.731	3.73 (3.35)[a]	0.37 (0.38)	0.49	0.85	5.95[b]	11
7	Wooden Furniture & Fixture	276	319.06	12.86 (3.85)[b]	-23.48 (-4.03)[b]	0.74	0.47	8.13	6
8	Manufacture of pulp, paper	280	36.92	0.719 (1.21)	-2.29 (-4.36)[a]	0.64	0.49	12.02[a]	14
9	Manufacture of fertilizers pesticides	311	-21.75	2.53 (1.27)	0.23 (0.15)	-0.04	1.42	0.81	14
10	Cement, lime, plaster	324	55.11	-1.12 (-1.09)	-2.56 (-2.67)[b]	0.29	0.91	3.66	14
11	Iron & Steel Industry	330	63.07	-2.69 (-1.50)	-2.28 (-1.35)	0.08	1.60	1.63	14
12	Agricultural machinery equipment	350	37.02	0.53 (0.29)	-2.33 (-1.36)	0.02	1.61	1.12	12
13	Electrical industrial machinery	360	-20.956	3.51 (2.93)[a]	-0.18 (-0.16)	0.36	1.07	4.73[b]	14
14	Motor vehicles & parts	374	52.56	0.35 (0.18)	-2.98 (-1.68)	0.08	1.69	1.62	14

* Average of 14 states

(a) Significant at 1 percent level.
(b) Significant at 5 percent level.

Figure is brackets indicate the T - Values.

FH-3994

TABLE : 4.15

REGRESSION RESULTS OF STATES WITH A POPULATION LESS THAN AVERAGE POPULATION.-3 DIGIT LEVEL
(1981-82,1982-83)

SR.	INDUSTRY	IND. CODE (NIC)	INTER-CEPT β_{i0}	GROWTH COEFF-ICIENT β_{i1}	SIZE COEFF-ICIENT β_{i2}	$\bar{R}^2$	STANDARD ERROR	F	No.OF OBSR.
1	Grain Mill products	204	18.37	2.248 (2.09)[b]	-2.131 (-2.21)[b]	0.64	1.00	11.81[a]	14
2	Manufacture & Refining of sugar	206	-33.2	2.706 (1.88)[b]	0.777 (0.72)	0.18	1.07	2.11	11
3	Manufacture of hydrogenated oils, vanaspati, ghee	210	36.40	0.258 (0.28)	-2.207 (-2.59)[b]	0.78	0.44	10.05[b]	6
4	Cotton, Spinning, weaving	231	-67.29	3.523 (4.23)[a]	2.507 (3.47)[a]	0.56	0.78	9.55	14
5	Spinning weaving of other textiles. (synthetics)	247	-35.20	0.946 (1.47)	1.784 (4.23)[a]	0.74	0.36	11.19[a]	10
6	All types of textile garments including wearing apparel.	264	-107.89	6.991 (4.41)[a]	3.132 (3.06)[a]	0.66	1.02	9.91[a]	10
7	Wooden Furniture and Fixtures	276	40.197	-3.607 (-3.38)	0.884 (-0.70)	0.84	0.48	9.05	4
8	Manufacture of pulp, paper	280	40.415	-1.528 (-0.94)	-1.644 (-1.18	-0.5	1.38	0.77	13
9	Manufacture of fertilizers pesticides	311	-7.825	1.918 (1.98)[b]	-0.264 (-0.33)	0.34	0.83	4.18	14
10	Cement, lime, plaster	324	4.223	0.924 (0.86)	-0.567 (-0.74)	0.07	0.80	1.36	10
11	Iron & Steel Industry	330	27.352	-0.183 (-0.15)	-1.437 (-1.32)	0.03	1.17	1.23	14
12	Agricultural machinery equipment	350	62.502	1.489 (1.19)	-4.339 (-4.24)[a]	0.79	1.06	22.59[a]	12
13	Electrical industrial machinery	360	-38.317	2.75 (1.49)	1.043 (0.65)	0.02	1.72	1.18	14
14	Motor vehicles & parts	374	-1.805	1.873 (1.19)	-0.67 (-0.56)	0.21	1.18	2.51	12

* Average of 14 states

(a) Significant at 1 percent level.
(b) Significant at 5 percent level.

Figure is brackets indicate the T - Values.

TABLE : 4.16

REGRESSION RESULTS OF STATES WITH A POPULATION MORE THAN AVERAGE* POPULATION.-3 DIGIT LEVEL
(1974-75,1975-76)

SR.	INDUSTRY	IND. CODE (NIC)	INTER-CEPT β_{i0}	GROWTH COEFF-ICIENT β_{i1}	SIZE COEFF-ICIENT β_{i2}	$\bar{R}^2$	STANDARD ERROR	F	No.OF OBSR.
1	Grain Mill products	204	-2.92	2.481 (3.292)[a]	-0.88 (-1.275)	0.54	0.607	8.84[a]	14
2	Manufacture & Refining of sugar	206	-41.19	2.477 (2.251)[b]	1.407 (1.458)	0.25	0.84	2.856	12
3	Manufacture of hydrogenated oils, vanaspati, ghee	210	-36.42	2.482 (4.122)[a]	1.026 (2.122)[b]	0.62	0.38	8.55[b]	11
4	Cotton, Spinning, weaving.	231	-27.51	5.034 (2.806)[a]	-0.293 (-0.179)	0.36	1.44	4.73[b]	14
5	Spinning weaving of other textiles. (synthetics)	247	-293.93	-3.893 (-1.647)	18.182 (2.821)[b]	0.68	0.48	8.67[b]	8
6	All types of textile garments including wearing apparel.	264**							
7	Wooden Furniture & Fixture	276	247.56	7.342 (0.985)	-17.063 (-0.839)	-0.15	1.52	0.52	8
8	Manufacture of pulp, paper	280	18.36	2.535 (2.269)[b]	-1.964 (-2.054)[b]	0.50	0.84	7.02	14
9	Manufacture of fertilizers pesticides	311	2.41	1.314 (3.222)[a]	-0.572 (-1.806)	0.73	0.25	10.78[a]	12
10	Cement, lime, plaster	324	102.59	-2.403 (-3.725)[a]	-4.86 (-3.793)[a]	0.73	0.49	13.47[a]	10
11	Iron & Steel Industry	330	49.39	-1.23 (-0.428)	-2.263 (-0.861)	-0.10	2.32	0.38	14
12	Agricultural machinery equipment	350	-22.55	1.681 (0.737)	0.492 (0.229)	-0.17	1.78	0.27	11
13	Electrical industrial machinery	360	-17.95	4.804 (2.157)[b]	-0.788 (-0.387)	0.24	1.79	3.09	14
14	Motor vehicles & parts	374	3.24	1.853 (0.753)	-0.869 (-0.386)	-0.78	1.98	0.53	14

* Average of 14 states
Figures within brackets indicate T-values.
** Regression could not be estimated due to very few observations.

(a) Significant at 1 percent level.
(b) Significant at 5 percent level.

TABLE : 4.17

REGRESSION RESULTS OF STATES WITH A POPULATION LESS THAN AVERAGE* POPULATION.-3 DIGIT LEVEL
(1974-75,1975-76)

SR.	INDUSTRY	IND. CODE (NIC)	INTER-CEPT β_{1o}	GROWTH COEFF-ICIENT β_{11}	SIZE COEFF-ICIENT β_{12}	$\bar{R}^2$	STANDARD ERROR	F	No.OF OBSR.
1	Grain Mill products	204	6.80	1.148 (1.224)	-1.09 (-1.171)	0.32	0.87	3.56	12
2	Manufacture & Refining of sugar	206	1.223	0.88 (0.555)	-0.423 (-0.469)	0.03	0.78	1.15	11
3	Manufacture of hydrogenated oils, vanaspati, ghee	210	25.98	0.43 (0.13)	-1.755 (-0.654)	0.48	0.65	3.83	9
4	Cotton, Spinning, weaving.	231	-69.38	3.935 (3.366)[a]	2.587 (3.027)[a]	0.45	0.88	6.24[b]	14
5	Spinning weaving of other textiles. (synthetics)	247	-19.84	-0.508 (-0.248)	1.457 (1.132)	0.27	0.81	2.07	7
6	All types of textile garments including wearing apparel.	264	-148.20	0.249 (0.04)	8.351 (0.906)	0.31	0.64	0.64	4
7	Wooden Furniture & Fixtures	276	-68.07	3.465 (1.52)	2.396 (0.981)	0.05	1.57	1.19	8
8	Manufacture of pulp, paper	280	35.69	-1.512 (-2.036)[b]	-1.396 (-3.236)[a]	0.49	0.43	5.33[b]	10
9	Manufacture of fertilizers pesticides	311	-84.54	6.426 (1.87)	2.379 (0.637)	0.16	2.46	1.98	12
10	Cement, lime, plaster	324	-194.65	0.834 (0.312)	10.98 (1.75)	0.20	0.74	1.63	6
11	Iron & Steel Industry	330	75.38	-3.096 (-1.089)	-3.171 (-1.533)	0.02	2.13	1.18	14
12	Agricultural machinery equipment	350	93.18	-2.786 (-0.781)	-4.409 (-2.175)[b]	0.34	1.74	3.15	9
13	Electrical industrial machinery	360	-6.08	-0.385 (-0.124)	0.536 (0.298)	0.19	1.59	0.18	11
14	Motor vehicles & parts	374	31.30	-1.617 (-1.158)	-1.111 (-1.683)	0.11	0.53	1.44	8

* Average of 14 states
Figures within brackets indicate T-values.

(a) Significant at 1 percent level.
(b) Significant at 5 percent level.

ANNEXURE - 4.2

LIST OF STATES WITH PCI(*) LESS THAN AND GREATER THAN PER CAPITA NET NATIONAL PRODUCT (1974-75).

LESS THAN NATIONAL AVERAGE	GREATER THAN NATIONAL AVERAGE
Bihar	Andhra Pradesh
Karnataka	Gujarat
Kerala	Haryana
Madhya Pradesh	Maharashtra
Orissa	Punjab
Rajasthan	West Bengal
Tamil Nadu	
Uttar Pradesh	

* PCI - PER CAPITA INCOME.

ANNEXURE - 4.3

LIST OF STATES WITH PCI LESS THAN AND GREATER THAN PER CAPITA NET NATIONAL PRODUCT (1982-83).

LESS THAN NATIONAL AVERAGE	GREATER THAN NATIONAL AVERAGE
Andhra Pradesh	Gujarat
Bihar	Haryana
Karnataka	Maharashtra
Kerala	Punjab
Madhya Pradesh	
Orissa	
Rajasthan	
Tamil Nadu	
Uttar Pradesh	
West Bengal	

ANNEXURE - 4.4

LIST OF STATES WITH POPULATION BELOW AND ABOVE AVERAGE POPULATION OF 14 STATES. (1974-75 & 1982-83)

STATES BELOW AVERAGE POPULATION	STATES ABOVE AVERAGE POPULATION
Gujarat	Andra Pradesh
Haryana	Bihar
Karnataka	Madhya Pradesh
Kerala	Maharashtra
Orissa	Tamil Nadu
Punjab	West Bengal
Rajasthan	Uttar Pradesh

CHAPTER 5

CONCLUSIONS

In this dissertation we have discussed the industrial sector in terms of its spatial structure and sectoral structure. The structure of the manufacturing industries has also been discussed at a disaggregated level. In this chapter, we briefly recapitulate the major discussions and findings of the study.

In chapter 2 we had discussed the extent of industrial disparities across the various states in India. R.V. Dadibhavi studied the per capita incomes in the registered manufacturing sector of the different states in India for the years 1970-71, 1980-81 and 1986-87. His study revealed that there was very little change in the position of the states over the years. Almost throughout this period, Maharashtra, Gujarat, West Bengal, Tamil Nadu and Haryana were the five highest ranked states, except for West Bengal which lost its position in 1986-87. On the other hand, in 1970-71, Jammu and Kashmir, Himachal Pradesh Rajasthan and Uttar Pradesh were amongst the poorest industrial states. The position of Orissa deteriorated, while that of Uttar Pradesh improved in 1986-87. According to Dadibhavi, there was an increase in industrial disparity from 1970-71 to 1980-81 while there was almost no change in the disparty level from 1980-81 to 1986-87.

In contrast, some other studies have revealed that over the years, infact regional disparities have declined. R.H. Dholakia's study revealed that the coefficient of variation, weighted by population for the registered manufacturing decreased from 77.68% in 1979-80 to 72.38% in 1984-85. In addition, Dhar and

Sastry(1968), Nair(1982), V.K. Seth(1987) observed inter-state convergance in the industrialization process in India.

As a part of this dissertation we calculated the growth rates of value added in registered manufacturing of 14 states, in the 1960's, 1970's and for 1981-86. Our study revealed that during the seventies, the fastest growth was experienced by Punjab, Kerala, Karnataka, Orissa, Haryana, Tamil Nadu and Andhra Pradesh. But the 1960's showed a much higher growth rate compared to the 1970's. In the seventies very low growth rate was registered in West Bengal and Uttar Pradesh. However, Uttar Pradesh emerged as the growth giant in the period from 1981-86. Other states which recorded high growth rates in this period were Andhra Pradesh, Haryana, Madhya Pradesh and Rajasthan. West Bengal continued to register very low rate of growth. The other states which registered very low growth rates were Gujarat, Kerala and Orissa. Thus it is clear that there exist significant disparties in industrial growth rate in the economy.

Dholakia in his empirical study revealed the advantages of having regional spread of industries; his results indicated that if the degree of regional concentration of industry was reduced by one percentage point it would increase the growth rate of industry on an average by 0.16 percentage points.

Some of the possible reasons for these disparities could be the location of industries in a certain area due to the nearness of market, purchasing power differences and technological factors. Certain authors have also tried to establish a relationship between the size of a firm and its locational pattern.

Athough the government has tried to tackle the problem of reducing regional disparities, more concerted efforts in this direction are required.

In chapter 3, we have presented a review of various studies relating to economic and structural change. The best documented generalization of development is that, as per capita income increases, the share of manufacturing in output increases, while that of agriculture decreases. We have reviewed the studies of S. Kuznets, W. Hoffman, H. Chenery, United Nations and P. Temin. All these studies basically point out to the increasing contribution of the manufacturing sector and declining percentage contribution of the agricultural sector as income increases in an economy. Certain exceptions though have been pointed out.

Chenery has made vast contribution to the literature on the patterns of industrial growth. In seeking explanations to the pattern of industrial growth, he has examined various demand and supply factors. Chenery expects some degree of uniformity in the patterns of growth of various countries basically due to certain similarities in demand and supply conditions. Chenery estimated linear logarithmic regression equations in which per capita value added depended on per capita income and population. His results were more or less in conformity with his hypothesis. His study also revealed that, as income increases, the importance of consumer goods in manufacturing declines, while that of investment goods increases. The intermediate goods, however maintained a fairly constant share of the total. Further, according to Chenery, supply changes are more important in explaining the growth of industry than are the changes in demand.

He emphasized the relative importance of import substitution as a cause of high growth rate. In the case of factors resonsible for the unexplained variations, he referred to effects of market size, income distribution, factor proportions and regional distributions.

Chenery and Taylor obtained a better explanation of the share of industry in national product by using more variables which were not previously included in Chenery's study. These variables were: share of gross fixed capital formation, share of primary exports, and share of manufactured exports in GNP. Further, they also subdivided their sample on the basis of population, into large and small countries. These subgroups revealed differences in patterns of growth. Infact, they also examined the effects of trade patterns for the 2 subgroups. Again distinct development patterns emerged for each of the cases especially when the industrial sector was disaggregated into its component industries. Chenery and Taylor also examined the similarity of inter-temporal and inter country patterns and their study indicated interesting results. A majority of countries tended to move parallel to the cross-country pattern.

Chenery and Syrquin, in their study of 1975, attempted a comprehensive statistical analysis of the essential features of development. They attempted the comparison and reconciliation of time series and cross-section analysis to identify universal patterns of change. The effect on the basic processes of accumulation, allocation and distribution as an economy develops was also examined by them.

In his study of 1979, Chenery developed an interindustry model to explain the interrelations among changes in domestic demand, capital flows, the structure of production and international trade. The results indicated sectoral differences in demand, trade and production. Chenery also gave a dynamic analysis of the relation between changes in flows of external capital and the corresponding changes in the structure of domestic production and external trade. In his recent study of 1986, Chenery tried to explore the interrelations between the growth of developing countries and the changing structure of their economies in subsequent studies, Chenery made a more comprehensive analysis of the relation between economic development and structural change.

During the post independance period, the Indian Industrial scene has undergone a vast transformation. There has been a structural transformation, with the primary sector receding in its importance in the percentage contribution to the national income, while the secondary sector improving its share, although at a slow pace. V.C. Sinha has also pointed to this structural change. similarly, Dadibhavi in his study on the industrial structure of India, pointed out that the percentage share of the primary sector in the net domestic product was 61.3% in 1951 while, it declined to 45.8% in 1981. During the same period the share of the secondary sector increased from 14.3% to 21.4% and the tertiary sector share also increased from 24.4% to 32.8%.

In chapter 4, we discussed the basic empirical excercise undertaken in this dissertation. We have attempted to examine the responsiveness of value added to selected manufacturing

industries to changes in variables such as per capita income and population. Population has been used as a proxy for market size, which would give an insight into the possibilities of scale economies. This is based on a similar study conducted by H.B. Chenery in 1960. Our empirical excercise is a cross-sectional study conducted at two different points of time: 1974-75 pooled with 1975-76 and 1981-82 pooled with 1982-83. The states have been taken to be the units of observation.

For the years 1981-83, we tried to capture the broad picture of the responsiveness of the value added of major sectors of the economy to changes in per capita income and population. The regression results have revealed that the growth elasticity in the case of the primary sector is less than unity. While that of the secondary and tertiary sector is above unity. All the cofficients are positive, excepting for the size coefficient in the case of the primary sector, which is negative. The $\bar{R}^2$ was found to be above 0.58 in all sectors. This is similar to that of Chenery's finding. Using the regression equation, we have also estimated the change in percentage contribution of the major sectors to the total income, at 2 different levels of income, @ Rs.500 and Rs. 1500 per capita. Our results are consistent with theory, that with an increase in per capita income, the percentage contribution of the primary sector declines while that of the secondary and tertiary sector increases.

We have also estimated the pooled regression equations at the 2 digit level of industrial classification for 1981-82, 1982-83. The income coefficients of all the capital goods industries are highly significant. For consumer goods industries such as

food products, Beverages, cotton textiles, wool, silk industry and intermediate industries such as chemical products and rubber, plastic, petroleum, the growth elasticity is high. In the case of size elasticities, for petroleum products, our results are similar to Chenery's findings that, the elasticity is above unity. Besides this, size coefficients for industries such as food products, Beverages, and electrical machinery were found to be significant.

To obtain a greater insight into certain prominent cases, we also estimated the regression at the 3 digit level for both the points of time. High growth elasticity was observed in the case of grain mill products, sugar, textile garments, fertilizers and electrical machinery industries. While the size coefficients were found to be highly significant in industry groups of cotton spinning weaving, manufacture of sugar, and electrical industry.

The regression results of the 3 digit level for 1974-75, 1975-76, indicated that the growth elasticities are fairly high in case of some consumer goods industries, and fertilizers and pesticides. The size elasticity is observed to be very high for textile garments and the $\bar{R}^2$ is as high 0.85. However, the size coefficient for paper products is negative. This is probably because the paper industry in spatially concentrated and it may center to several states.

The structural pattern at the 2 points of time indicate many similarties and few changes. At both points of time, the growth elasticities are high in case of the food products, fertilizers and electrical industry. Regarding the differences, it was

observed that size elasticity was below unity for manufacture of sugar at the earlier point of time, while in 1981-82, 1982-83, it was above unity. Again, there seems to be a shift from an influence of size to an influence of income in the case of textile garments industry. Comparing all the cases of 2 and 3 digit levels of classification discussed earlier, the growth elasticities are high for consumer goods industries and electrical industry. Regarding size coefficient, it was high especially in case of food products and manufacture of sugar.

Another direction of investigation has also been pursued. The set of observations have been divided into two groups (i) States above the per capita national income and (ii) States which are below the national average. This was studied to see if there is a difference in the structural pattern of the less developed and more developed states.

The less developed states generally indicate a tendency for substantial positive response to changes in income, in comparision to the more developed states. At the two digit level of industrial classification, (1981/83), the growth elasticity in the case of the less developed states, has a high positive elasticity, while the more developed states indicate for many industries, a negative elasticity. The value added of the consumer and capital goods responds positively to changes in income in the case less developed states. The significance of the size elasticities are however, observed only in a few cases. The percentage of variation explained for the developed states is however observed to be higher than the less developed group. At the 3 level of industrial classification for 1974/76, the growth

elasticity is much higher for wooden furniture fixtures for the less developed group than the developed group of states. In all the cases, the value added of electrical industrial machinery responds positively to changes in income and population.

Besides examining the differences in the structural pattern on the basis of the development of states, are have also attempted to examine this on the basis of population. We grouped the states on the basis of higher and lower population to the average, and computed the regressions for the two groups separately. This gives an insight into the size effects. At the two digit level of classification (1981/83), the higher populated group responds positively to changes in income to a greater extent compared to the lesser populated group. For wooden furniture fixtures industry, the income elasticity is negative for the less populated group of states, while it is positive for the higher populated group. The percentage of variation explained in the case of the higher populated group is generally higher than in the case of less populated group. Excepting for the leather and fur products, where the percentage of variation explained in the case of the less populated group is 94%, it is not significant in the case of the higher populated group. For the same point of time, at the 3 digit level, the lesser populated group, react more positively to income changes compared to the 2 digit level. For the higher populated group, the income elasticity is quite high in case of the electrical industry; this phenomenon does not emerge for the less populated group. The regression results for the earlier point on time i.e. 1974-75, 1975-76, at the 3 digit level, indicates for the higher populated

group a more positive response compared to the lesser developed group. However the size coefficient is negative in the case of industry groups: pulp, paper; and cement lime and plaster. This could be because these industries are more concentrated in space, and may cater to the national economy as a whole.

Though our empirical study has brought out certain differences in the structural patterns, in the various cases considered, we do acknowledge the fact that the scope of this study is limited in some respects. The units of observation are considered to be the states, which in all cases may not reveal the true effect of income and size. A more accurate picture may emerge if the study is conducted at the national level. Moreover, we have not considered the effects of other variables such as capital formation and international trade, which may be important factors influencing the structural pattern of industries. However, due to time constraints and difficulty of obtaining accurate data at the state level, we have not been able to overcome these limitations.

The size effect is generally more applicable in case of the consumer goods industries, where the market is compartively more localized. Industrial output, incase of certain industries, which serve the national market may not be determined by regional considerations.

We can point to certain policy implications which do emerge from the study. In industries, where the growth elasticity is high, those industries would generally be given more support, but in view of optimal policy implications, this may not be followed

in certain cases. For instance, if the growth elasticity is high for those industries, which may not be beneficial to the society as whole, then such industries may not be given the required support.

BIBLIOGRAPHY

1. Ahluwalia I.J. (1985) Industrial Growth in India, Stagnation since the mid 60's. Oxford University Press, Delhi.

2. Ahluwalia I.J., (1986) "Industrial Growth in India. Performance and prospects". Journal of Development Economics 23(1), Sept. pp-1-18.

3. Alagh Y.K. (1985) "Some aspects of planning policies in India:. Govind Vallabh Pant Memorial lecture, Allahabad.

4. Alagh Y.K. (1983) "Indian Industrialization: Regional Structure and Planning choices". Man and Development 5(1). March pp 62-83.

5. Chenery H., Robinson S., Syrquin (1986) Industrialization and Growth, A Comparative study. A world Bank Research Publication. Oxford University Press.

6. Chenery H.(1979) Structural change and Development Policy, New York. Oxford University Press.

7. Chenery H. and Syrquin M.(1975) Patterns of Development, 1950-1970, London. Oxford University Press (for the World Bank).

8. Chenery H.B. and Taylor L. (1968), "Development Patterns, Among countries and over Time". Review of Economics and Statistics. Vol L NO.4 Nov.

9. Chenery H.B. (1960) "Patterns of Industrial Growth" American Economic Review. Sept.

10. Dadibhavi R.V.(1991) "Growth of Industry and Industrial Infrastructure: An Inter-State Analysis". Yojna Jan 1-15 Vol 34, Nov.24 pp 9-12.

11. Dadibhavi R.V.(1987) "Industrial structure and Pattern of Development in India". Indian Journal of Industrial Relations vol 22 No. 3

12. Dhar P.N. and Sastry D.V.(1968) "Inter State variations in Industry", Economic and Political Weekly, March 22.

13. Dholakia R.H. (1989) "Regional aspect of Industrialization in India". Economic and Political Weekly, Nov.18.

14. Dholalia R.H. (1979), "An Inter-State analysis of Capital and output in registered manufacturing sector". Indian Journal of Industrial Relation. vol 15(1) pp. 63-73.

15. Florence, P. Sargent (1948) Investment Location and size of Plant, A realistic Inquiry into the Structure of British and American Industries, Cambridge University Press. U.K.

16. Florence, P. Sargent (1962), Post-War Investment Location and size of Plant, cambridge University Press, U.K.

17. Gupta K.L. (1971) Development Patterns: An Interregional Study Quarterly Journal of Economics vol 85. pp. 644-666.

18. Gupta D. (1985) "Inter - State Industrial Disparties in India - the Changing scene," RBI occassional papers vol. 6 No. 1 June pp. 54-68.

19. Goldar B. and Seth V.K. (1989), "Spatial variations in the rate of Industrial growth in India". Economic and Political Weekly, June 3.

20 Hirschman A.O.(1958). The strategy of economic development, New Haven.

21. Kuznets S.(1957), "Quantitative aspects of economic growth of nations", II Economic Devlopment and cultural change, vol v (supplement) No.4 July.

22. Kaldor N. (1967) Strategic factors in Economic Development. Cornell University Press, Ithaca, N.Y.

23. Kundu Amitabh and Raza Moonis.(1982) Indian Economiy - The regional dimension, Centre for the Study of Regional Development, Jawahar Lal Nehru University, New Delhi.

24. Kurein C.T.(1989), "Indian Economy in the 1980's and on to the 1990's". Economic and Political Weekly April 15.

25. Koutsoyiannis A. (1977) Theory of Econometrics ELBS/Macmillan, London.

26. Lakdawala D.T. et.al.(1974), Regional variations in Industrial Development, Popular Prakashan Bombay.

27. Lahiri R.K. (1969) "Some aspects of inter-state disparities in industrial development in India". Sankhya, series B vol 31 (3,4).

28. Mrydal G.M. (1957) Economic Theory and Underdeveloped Regions, London.

29. Mathur Ashok (1989) "Some thoughts on regional development and the state policy in India. Paper presented at National seminar on development, modernization and social justice, Nov. Organised by Dr. Zakir Hussain Educational and Cultural Foundation.

30. Nair K.R.G.(1982) "Regional experience in a developing economy. Wiley Eastern Ltd. New Delhi.

31. Nagraj R.(1989) "Growth in manfacturing output since 1980, Some Preliminary Findings". Economic and Political Weekly, July 1.

32. National Council of Applied Economic Research (1964). Income and structure of Manufacturing Industry 1960-61. (A statewise analysis) Published by N.C.A.E.R. New Delhi.

33. Prasad P.H.(1988) "Roots of uneven regional growth in India". Economic and Political Weekly. Aug.13.

34. Raj K.N.(1984) "Some observation on economic growth in India over the period 1952-53 to 1982-83". Economic and Political Weekly, Oct 13.

35. Sastry D.V.S. and Kelkar U.R.(1987) "Regional disparities in Industrial Development". RBI occassional papers 8(3) Dec. pp. 265-275.

36. Seth Vijay(1987) Industrialization in India: A spatial perspective. Commonwealth Publishers Delhi.

37. Seth V.K.(1986) "State and spatial aspects of Industrialization in post independance India". Political Geography quarterly, vol 5 No.4, October pp. 331-350.

38. Singh M.B. (1989) New Dimensions is Industrial Geography (ed) N.K.P. Sinha, M.B. Singh. "Spatial Analysis of Manufacturing Industries in India". Lotus Publications, Varanasi.

39. Sinha V.C.(1984) "Industrial Growth in India. An evaluation". Southern Economist Dec.1.

40. Sundaram R.M. (1987), Growth and income distribution in India - Policy and Performance since independance.

41. Sutcliffe R.B. (1984) "Industry and Underdevelopment re-examined", Journal of Development Studies, vol 21 no.1 pp. 121-33.

42. Sutcliffe R.B. (1971) Industry and Underdevelopment, Addison Wesley, London.

43. Temin P. (1967) "A time series test of Patterns of Industrial Growth". Economic Development and cultural change, January 174-182.

44. United Nations, Development of Economic and Social affairs (1963), "A study of Industrial Growth, New York".

45. Weber A. (1929) The theory of location of Industry, Chicago University Press, N.Y.

46. Weiss J.(1988), Industry in Developing Countries. Theory policy and Evidence. Cromm Helm N.Y.

(1630)