

**CAPITAL SHIFT ACROSS INDUSTRY GROUPS AND STATES IN
THE FACTORY SECTOR**

Dissertation submitted to the Jawaharlal Nehru University in partial fulfillment of the
requirements for the award of the degree of

MASTER OF PHILOSOPHY

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2002**



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CERTIFICATE

I, Rajeev Kumar, certify that the dissertation entitled “**CAPITAL SHIFT ACROSS INDUSTRY GROUPS AND STATES IN THE FACTORY SECTOR**” for the degree of **MASTER OF PHILOSOPHY** is my bonafide work and may be placed before the examiners for evaluation.

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ACKNOWLEDGEMENT

This academic endeavour of mine would not have been possible without the help of a number of people without whose support this research work would not have been possible.

I am extremely grateful to my esteemed supervisor Prof. Ashok Mathur, whose able guidance helped me in completing this academic exercise. I thank Abinash, Sunil, Mahesh, Ajaya, Anurag and Abhishek for their support, moral or otherwise.

I am also thankful to the staff of JNU, NIPFP and CSO libraries, who have rendered active co-operation in the collection of relevant information and materials. I also duly acknowledge the Centre for Studies in Regional Development for providing the infrastructural support. I own responsibility for all the errors or omissions that might be there in this work.

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CHAPTER I

INTRODUCTION

1.1 RELEVANCE OF THE ISSUE

Level of industrialisation is an important indicator of development. With development, share of industry in total output and employment increases. According to Kuznets, productivity in industry is generally higher and grows at a faster rate in industry as compared to agriculture in the initial phases of industrialisation. This should result in increasing share of industry in output and employment for two reasons. Firstly, due to faster productivity growth in industry, industrial prices should fall at relatively faster rate. Secondly, income elasticity of demand for industrial goods being higher, increased productivity should lead to greater demand for industrial goods. This is what happened in the now developed economies.

In India, increase in the share of industry in total output has been reasonably well but on the employment front, Indian experience of industrialisation has failed in absorbing enough surplus labour from agriculture. John Weiss (1988) has studied some developing economies and grouped them on the basis of share of industry in output and employment. According to his criterion, India in the late eighties resembled the average of lower middle-income countries in terms of output composition but in terms of employment, it was

closer to low-income countries (Mookherjee, 1997). This nature of industrialisation gets reflected in rising capital intensity of Indian industry.

By considerations of balanced regional development, secondary sector has performed better than other sectors. Mathur (1983), in his study of movements in sectoral inequality across the states during 1950-51 to 1975-76, finds that inequality in the secondary sector started declining around early sixties, almost coinciding with the start of rise in inequality in the primary and tertiary sector. However, this declining trend in inequality in the secondary sector might not have lasted beyond mid-seventies as Dasgupta, Maiti, Sarkar, Mukherjee and Chakrabarti (2000) found a slight divergence among the states in manufacturing output between 1970-71 and 1995-96.

One thing that is generally accepted is that the secondary sector on the whole has contributed the least in increasing the state income inequality (Dholakia, 1985). This suggests that even without any consideration regarding the location of industries, if pace of industrialisation is increased for the economy as a whole, it should result in a more even development than the situation when industry grows at a slower pace.

Investment plays the dual role of increasing the productive capacity and creating demand in the economy. Although lack of capital formation is considered to be the most important factor responsible for underdevelopment, merely raising the rate of capital formation would not be sufficient. Utilisation of

the existing stock of capital and distribution of investment across the sectors and subsectors and across different regions greatly affect the degree to which capital formation gets translated into development of the economy.

Productivity of capital as well as employment generating capacity of capital varies across the industry groups and therefore, investment in different industry groups is likely to have different impacts on growth and employment. However, mere allocation of investment to different industry groups based on the considerations of maximising growth and employment generation may not be sufficient. Inter-industry linkages have to be kept in mind before deciding on the optimal investment pattern. Extent of demand for individual industry groups' goods puts an extra restriction on the optimal distribution of investment across the industry groups.

Productivity of capital and its employment generating capacity varies across the states as well. Therefore, distribution of investment across the states also affects the extent to which capital is utilised for creating employment and for output growth. Dholakia (1979) had found a convergence in state per capita fixed capital at a faster rate than in state per-capita incomes between 1960-61 and 1970-71. This indicates that in the capital deficient states, utilisation of capital has been relatively better. Of course, the underlying assumption is that the states with relatively high per-capita incomes are the ones with larger per- capita capital.

Most of the studies on regional pattern of industrialisation have focussed on the balanced regional development aspect, barring a few exceptions.

Goldar and Seth (1989) have studied the trends in industrial output in twelve major states for the period 1960-61 to 1985-86 with the objective of identifying some causes of the industrial deceleration experienced after the mid -sixties at the all India level. In their study, they found that industrially developed states of Maharashtra, Andhra Pradesh , Gujarat, Tamil Nadu and Karnataka maintained relatively stable growth rates throughout the period of the study, whereas other states either continued to decline or declined and recovered in the phases of deceleration and revival at the national level respectively. They attribute this to fall in public investment during the deceleration phase as those states with high intensity of public investment revived and declined along with the national trend in industrial growth.

With the introduction of new economic policy in 1991, Indian economy took a big leap towards liberalisation. Restrictions on investment, whether with regard to reservation for the small-scale sector or policies influencing the location of industries, were gradually lessened. Licensing, financial incentives and many other regulations are being done away with. These changes in industrial policy along with changes in other spheres, e.g., trade policy changes, are likely to have some influence on industrial structure as well as regional pattern of industrial investment. In this light, it becomes important to study the nature of changes in investment pattern across industry groups and states and their implications.

1.2 OBJECTIVES OF THE STUDY

In the backdrop of the above discussion, the present exercise attempts to study the pattern of investment across the industry groups to begin with. It would also be useful to see if there has been any change in this pattern between the eighties and the nineties. Attempt is also made to see the trend in employment and net value added in the two periods along with the changes in industrial structure.

Trends in capital intensity and factor productivity have been studied for the two periods to ascertain the impact of structural change in industry on capital intensity and factor productivity, if any. Public sector has for long been accused for rising capital intensity in Indian industry. In the present study, attempt has been made to see whether there has been any change in the role of public sector with regard to rising capital intensity in the factory sector in recent years.

The impact of the shift in investment pattern across the industry groups on output growth, employment generation and productivity is also proposed to be analysed. This would throw light on whether the change in investment pattern in the nineties has been favourable or otherwise with regard to output growth and employment generation i.e., efficiency in the use of available capital stock.

A study of distribution of investment across the states is also proposed. For this purpose, changing share of states in fixed capital during the two periods is intended to be studied along with the performance of the states in terms of growth and employment generation in the factory sector. It is also proposed to see if there have been converging tendencies among the states with regard to per capita fixed capital and per capita net value added. It would also be useful to study the nature and direction of relative capital shifts for the states. This exercise would tell whether individual states have lost or gained due to change in investment pattern across the states during the two periods.

Trends in capital intensity and productivity in different states have also been studied. Further, attempt has been made to assess the employment and output generating potential of fixed capital in different states in the two periods and if the investment pattern across the states has been in accordance with the relative potential of the states. This study also plans to see the extent of concentration of capital in a state across the industry groups and the extent to which capital in an industry group is concentrated in the states. Further, the impact of the trends in these concentrations on investment pattern and output growth in the states would also be examined.

Investment pattern across the states is expected to get influenced by a number of factors like credit availability, level of infrastructural development, profitability, public investment, and demand conditions in the

states. Per capita Net State Domestic Product can be an indicator of the last factor. Attempt is also made to see whether these factors have had any influence on the change in investment pattern in the nineties.

1.3 DATA SOURCE

The main data for this study is the *Annual Survey of Industries* (ASI). The year 1998-99 onwards ASI stopped publishing provisional results for the factory sector and attempts were made to arrive at efficient quick estimates. Another major change that was introduced in 1998-99 was the new system of classification of industries. This change was accompanied by introduction of some new categories of industries as well as reorganisation of the existing ones. Further, quick estimates cover only ten variables at two-digit NIC level. These changes made a comparison with the results for earlier years under NIC-87 difficult. For this reason, this study covers the period up to 1997-98 only.

The Central Statistical Organisation brings out summary (or provisional) results of ASI for the entire factory sector, comprising both the census and the sample sectors. The survey covers all the factories registered under the Factories Act (1948), which consists of establishments using power and employing 10 or more workers and those not using power but employing 20 or more workers on any day of the preceding twelve months. In addition to all manufacturing and processing units, electricity generation and distribution, gas and steam, water works and supply, storage and warehousing services and all repair services are covered by the survey. On the other hand, oil storage and

distribution units, establishments coming under the control of the department of defence production, restaurants and cafes and technical training institutions are excluded from ASI, though they are registered under the Factories Act (1948).

ASI divides these factories into two sectors—census and sample. Factories employing 50 or more workers and using power, and those employing 100 or more workers without using power are covered without any exception in the survey. All electricity undertakings irrespective of their size, units in industries with less than fifty units and units located in nine relatively less industrialised states and union territories are also included in their entirety. In the rest of the non-census sectors, half of the factories in each industry group in each of the states are covered by rotation in the survey.

This process covers the list of factories maintained by the registration authorities. However, a large number of establishments are found to be non-existent at the time of the survey. Another problem with the ASI estimates arises because reference period for ASI is April—March each year, whereas the information furnished by the factories relate to the accounting years of respective factories. ASI also leaves out unregistered manufacturing, which is important in terms of its contribution to total manufacturing.

In the present study, figures for Net Value Added, fixed capital, number of employees, total emoluments and profits have been taken from various

issues of summary and provisional results of ASI. Value figures have been deflated to 1981-82 prices by relevant deflators obtained from the *Handbook of Industrial Policy and Statistics*. Net Value Added and profits have been deflated using the wholesale price index for manufactured products, whereas emoluments and fixed capital have been deflated using the price index for industrial workers and wholesale price index for plant, machinery and transport equipments respectively. A major problem with the reported values of fixed capital is that these figures represent a simple aggregation of the actual money value of annual additions to capital stock over a period of time without making any adjustment for price changes over the period.

Mid-year estimates of population and figures for net state domestic product have been taken from Statistical Abstract of India. State wise per capita credit to industry, density of rail, road, and telephone connections in the states in 1990 and decadal average growth rates of the above have been obtained from Centre for Monitoring Indian Economy (District Profiles, October 2000). Values of these variables for 1998 have been calculated using the decadal average growth rates. Data on installed capacity and gross generation of electricity in the states in 1989-90 and 1997-98 have been taken from CMIE (Current Energy Scene in India, July 1990 and Energy, March-April 1999). Finally, gross block of public sector enterprises in different states have been obtained from Public Enterprises Survey. Methodology of the study has been discussed in the main chapters.

1.4 STRUCTURE OF THE STUDY

Chapter II deals with investment patterns across the industry groups and its impact on net value added and employment. The chapter starts with a study of trend in fixed capital in different industry groups during the period 1980 to 1998 and an overview of overall industrial performance during the period. Next section in this chapter looks at the trends in capital intensity and factor productivity and tries to associate any change in trends with the changing investment patterns. Sector wise distribution of fixed capital over the period 1980-98 is studied with an eye on the role of public sector in the trends in capital intensity and factors productivity. Total factor productivity growth in the eighties and nineties are calculated for all the industry groups separately and the patterns of investment in the two periods are evaluated with considerations of exploiting the inter-industry productivity differentials.

Next section in chapter II deals with the calculation of output and employment elasticities with respect to fixed capital. These elasticities indicate to the relative efficiency with which capital has been used in different industry groups. Further it is also analysed as to the extent to which the actual pattern of investment across industry groups has been in accordance with these elasticities.

In chapter III, change in investment pattern across the states and its implication are considered. First section of this chapter looks at trend in growth of capital in fifteen states covered in the study. This is accompanied by trends in

growth of employment and fixed capital. Dispersions in per capita net value added and per capita fixed capital have also been studied in this section.

Next section of chapter III deals with shift analysis for per capita fixed capital. This analysis gives an insight regarding the direction of shift of capital across the states and which states account for convergence and divergence and to what extent. This analysis has been carried out for the eighties and the nineties separately. This would give an idea regarding the change in relative importance of states in terms of investment in the factory sector.

Further in this chapter, trends in capital intensity and productivity for the states are studied. Elasticities of net value added and employment with respect to fixed capital have been calculated as well. This gives an indication regarding the relative efficiency of capital in the states in terms of output and employment generation. Actual investment pattern has been considered along with these elasticities in order to give an evaluation of the pattern in the two periods with respect to utilisation of the potential for growth and employment generation.

The chapter ends with a study of the trend in concentration of capital within industry groups for the fifteen states and spread of individual industry groups across the states. The desirability of specialisation versus diversification of industry base of the states and the regional dispersal of individual industry groups has been assessed and actual distribution of investment across the industry groups and the states in the two decades have been examined in the light of the above.

Chapter IV starts with a detailed survey of literature regarding industrial dispersal and factors responsible for differential rates of investment across the states. Relative importance of different factors and the changes, if any, in their importance over the nineties in explaining the disparity in industrial investment across the states is attempted to be determined as well in this chapter.

CHAPTER –II

CAPITAL SHIFT ACROSS INDUSTRY GROUPS AND ITS IMPLICATIONS

2.1 INTRODUCTION

The new economic policy introduced in 1991 was expected to give a boost to the industrial sector. Acceleration in industrial production was witnessed till 1995-96, since when signs of a slow down have become visible. After the industrial stagnation from mid-60's till late 70's, industrial production started picking up, more or less coinciding with the initial phase of deregulation and delicensing. The process of liberalisation gained speed rapidly after 1991 and has had varied degrees of impacts on different industries within the factory sector.

In recent years, productivity as a source of growth has gained recognition as compared to the earlier sole consideration about investment. This is the need of the hour as capital is scarce [Ahluwalia, 1991]. But at the same time, it is very important to direct and distribute capital in a way so as to maximise the gains from it. In fact, relative productivity along with employment and output generating potential should form the basis of capital allocation to different industry groups. It is with this consideration that the trends of fixed capital at disaggregated level have been studied for the 80's and 90's.

The data source for this chapter is mainly Annual Survey of Industries [ASI]. All value figures are at 1981-82 prices. Net value added and

profits have been deflated using the annual Wholesale Price Index for manufactured products. Fixed capital and emoluments have been deflated by Wholesale Price Index for machinery and transport equipment and Consumer Price Index for industrial workers [CPI (IW)] respectively.

2.2 TRENDS IN CAPITAL SHIFT AND INDUSTRIAL PERFORMANCE DURING 1980 TO 1998

Changing shares of fixed capital in different industry groups over the period 1980-81 to 1997-98 throw some light on whether investment pattern across industries has changed or not, although any shift in investment pattern for a short span of time is not likely to change the shares in fixed capital appreciably. Still, by looking at Table 2.1, it can be noticed that the most striking changes in the 90's have come about in chemical and chemical products (30) and electricity (40). While the share of chemical and chemical products (30) rose from 5.1 per cent in 1988-89 to 15.6 per cent in 1997-98, that of electricity (40) declined from 42.1 per cent in 1989-90 to 28.7 per cent in 1997-98. Manufacture of food products (20-21), textiles (23), metal products (34) and other manufacturing (38) have increased their shares while rubber, plastic, petroleum and coal products (31) and transport equipment and parts (37) have decreased their shares in the 90's as compared to the 80's. One remarkable thing is that in the 90's, year-to-year fluctuations in the shares of different industry groups are more pronounced. Before going into industry-wise disaggregated analysis, a look at overall industrial performance over the period of study is desirable. There was a

TABLE 2.1
YEAR WISE SHARE IN FIXED CAPITAL OF DIFFERENT INDUSTRY GROUPS

1980-81 1981-82 1982-83 1983-84 1984-85 1985-86 1986-87 1987-88 1988-89 1989-90 1990-91 1991-92 1992-93 1993-94 1994-95 1995-96 1996-97 1997-98

20-21	4.0	3.8	3.6	3.9	3.7	3.6	3.7	3.6	3.7	4.4	4.1	4.2	4.2	4.3	4.6	4.6	4.4	5.1
22	0.5	0.4	0.4	0.5	0.4	0.6	0.6	0.6	0.8	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.9	1.0
23	3.7	3.5	3.8	3.8	3.7	3.7	3.5	3.0	3.0	2.7	2.6	2.5	2.6	2.9	3.3	3.6	3.8	4.5
24	1.6	1.8	2.2	2.4	2.2	2.1	2.2	2.4	2.0	2.4	2.5	2.7	2.7	3.1	3.1	3.4	3.6	3.6
25	0.3	0.3	0.3	0.3	0.4	0.3	0.2	0.3	0.5	0.4	0.4	0.4	0.2	0.2	0.2	0.3	0.2	0.2
26	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.5	0.4	0.4	0.4	0.5	0.4	0.7	0.9	0.9	0.9	1.0
27	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.3	0.2
28	2.8	2.9	3.1	3.3	3.6	2.5	3.1	2.8	3.0	2.3	2.4	2.3	2.1	2.3	3.7	2.5	3.0	2.8
29	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.3
30	2.3	3.0	3.3	3.9	3.8	4.2	4.1	4.0	5.1	11.9	12.0	11.3	11.4	12.0	12.7	14.8	13.9	15.6
31	12.4	11.6	9.8	10.3	9.5	10.6	10.7	10.0	10.4	4.2	4.4	4.4	4.4	5.2	4.4	4.8	7.0	5.6
32	2.3	2.6	2.9	3.4	3.3	4.3	4.9	4.9	5.3	4.8	4.1	4.5	4.0	4.4	4.4	4.4	5.1	5.0
33	14.4	15.0	14.8	14.5	14.8	13.9	13.1	13.1	13.0	12.0	16.2	17.1	17.2	16.6	16.2	17.0	13.8	14.4
34	0.9	0.8	0.8	0.9	0.8	0.8	0.7	0.9	1.1	0.8	1.0	1.0	1.0	1.3	1.2	1.3	1.4	1.4
35-36	5.0	5.0	5.2	5.4	5.1	5.8	5.0	5.3	5.9	5.6	5.5	5.5	5.7	5.3	5.4	5.4	5.6	5.3
37	4.6	4.4	4.2	3.8	4.1	4.1	4.2	4.0	4.1	3.6	3.1	3.3	3.3	3.2	3.0	3.5	4.4	3.6
38	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.6	0.7
39	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.4
40	43.3	43.1	44.1	41.9	42.9	41.6	42.3	43.2	40.2	42.1	39.1	38.3	38.3	35.8	34.2	30.7	30.0	28.7
41	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.3	0.2	0.3	0.3	0.2
42	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
43	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
74	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
97	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.2
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Calculated from Annual Survey of Industries (Summary Results), Various Issues

lot of debate regarding the causes of industrial revival during the 80's. Ahluwalia [1991] argues that the revival of the 80's was because of productivity growth, which in turn was caused by increased investment in infrastructure and better efficiency in its use, industrial and trade policy reorientation and supportive role played by agriculture. Against these mainly supply side arguments, Chandrasekhar [1988] stresses that the single most important cause of revival was the fast growth of the service sector within which, the major contributor was the growth of non-productive government expenditure on public administration and defence. This increase in public expenditure did not lead to employment expansion but to an increase in real incomes in the middle and lower middle class resulting in enhanced demand for consumer durable goods.

Whatever may be the reason for revival, the most remarkable feature of this revival was the dismal performance on employment front, although fixed capital and net value added grew at a fast pace. Table 2.2 shows employment growth to be negative for many years in the 80's. Compared to this, the growth in employment improved during the 90's for the factory sector as a whole. After the new economic policy was introduced in 1991, the year that saw a dip in growth rates, Indian industry achieved very high rates of growth but it did not last beyond 1995-96. Ahluwalia (1991) points to rising real wage rates along with higher levels of employment growth relative to output and capital growth in the preceding period (i.e., 1965 to 1980) being responsible for the "jobless growth" in the factory sector. Nagaraj (1994) contests this hypothesis and argues that though the number of employed workers declined in the manufacturing sector in the 80's, number of man days worked increased, probably due to more

intensive utilisation of existing stock of labour or rising reliance on contract labour. Correcting employment figures for the above, he finds the wage rate to have grown at a rate of 1.6 per cent only during the 80's.

Compared to the 1980's, manufacturing as well as the factory sector growth in the 1990's was more employment generating. Goldar (2000) attributes this to slow down in growth of real wages and faster growth of small and medium sized factories, which are relatively more labour intensive. Against this, Nagaraj (2000) finds the investment boom to have led to employment expansion in the 90's. Nagaraj's view finds support if the last two years' figures for fixed capital and employment growth in Table 2.2 are looked at.

A comparison of growth in fixed capital, employment and net value added from 1980-81 to 1989-90 and 1989-90 to 1997-98 reveals that for all industry groups together, growth in value added is approximately the same but fixed capital and employment have grown faster in the 90's [Table 2.3]. This is a cause of concern as factors have grown at higher rates in the 90's but value added has not. At disaggregated industry level, employment growth is positive in all the industry groups except repair services in the 90's, although growth is lesser as compared to 80's in the manufacture of beverages and tobacco (22), leather and leather products (29), chemicals and chemical products (30) and non-metallic mineral products (32). Out of these groups, leather and leather products (29), chemicals and chemical products (30) and non-metallic mineral products (32) showed impressive growth rates in the 80's. During the 80's, electrical machinery,

TABLE 2.2
ANNUAL GROWTH RATES
(All Industries)

	F.C	EMP	NVA
1981-82	4.8	0.8	16.0
1982-83	14.7	3.0	10.7
1983-84	14.7	-2.3	13.8
1984-85	7.1	0.6	-3.1
1985-86	0.8	-5.1	5.1
1986-87	6.6	-0.4	5.8
1987-88	12.1	4.6	3.4
1988-89	0.8	-0.5	11.8
1989-90	8.5	5.2	12.5
1990-91	15.1	0.2	9.5
1991-92	-0.7	0.4	-4.3
1992-93	15.7	6.2	17.2
1993-94	13.0	0.0	15.1
1994-95	13.1	4.5	11.0
1995-96	16.9	10.4	17.7
1996-97	5.8	-3.4	-1.3
1997-98	7.4	2.3	4.7

Source: Annual Survey of Industries(Summary Results), Various Issues.

TABLE 2.3
COMPOUND AVERAGE GROWTH RATE

NIC	1980-81 TO 1989-90			1989-90 TO 1997-98		
	F.C.	EMP.	NVA	F.C.	EMP.	NVA
20-21	8.5	-1.9	13.7	12.7	2.6	5.6
22	11.2	3.0	10.9	16.8	1.8	8.8
23	4.0	-2.4	0.9	17.7	0.1	1.2
24	12.8	3.1	9.6	16.1	2.7	6.3
25	8.2	-2.8	-2.8	2.1	0.2	5.3
26	13.0	5.7	13.8	22.6	10.9	11.9
27	7.1	-0.9	2.1	9.6	0.5	4.3
28	5.3	0.0	6.3	13.5	2.7	4.3
29	7.9	6.5	10.9	12.7	2.2	8.7
30	29.2	14.0	20.9	14.5	4.3	11.2
31	-4.7	-7.8	1.6	14.8	5.0	4.1
32	16.9	2.6	9.6	11.1	0.2	7.7
33	5.6	0.2	7.9	13.1	1.5	11.7
34	6.8	1.4	5.9	18.3	3.2	6.6
35-36	9.1	1.5	8.0	9.9	1.2	5.8
37	4.9	-0.3	6.8	10.7	1.9	8.5
38	12.0	2.9	8.2	15.1	6.7	13.0
39				24.1	12.2	15.1
40	7.3	2.4	10.1	5.5	2.2	11.6
41	21.3	6.5	-16.3	15.0	3.2	92.8
42	0.4	2.1	5.9	6.3	5.0	8.0
74	10.4	5.7	8.0	4.9	4.5	9.6
97	-5.0	-6.9	2.7	15.2	-1.7	0.4
TOTAL	7.7	0.6	8.3	10.6	2.5	8.4

Source: Annual Survey of Industries(Summary Results), Various Issues.

chemicals and broadly consumer durable goods grew faster than other industries in terms of both value added and fixed capital. These industries maintained their dominance in the 90's while manufacture of basic metal and alloys (33), other manufacturing industries (38) and water works and supply (42) gained in the 90's in terms of growth in value added and fixed capital. Variations in growth rates across industries increased in the 90's. Chandrasekhar [1996] attributes this to factors like import liberalisation which might have worked against the across the board stimuli like government expenditure or total investment with varying degrees in different industries in the 90's.

2.3 CAPITAL INTENSITY AND FACTOR PRODUCTIVITY

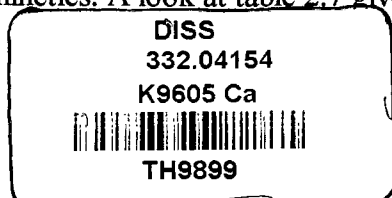
There has been almost a secular increase in capital intensity right from second five-year plan. It is this trend in capital intensity that has restricted the share of industrial employment in total employment from growing in tandem with that of industrial output in total output [Mookherjee, 1997]. Table 2.4 shows capital intensity, labour productivity and capital productivity for all the industry groups for the years 1980-81, 1989-90 and 1997-98. From 1980-81 to 1989-90, only water works and supply (42) had a marginal decline in capital intensity whereas in the nineties, capital intensity did not decline even for a single industry group. Ahluwalia [1991] lists four probable reasons for an across the board increase in capital intensity, i.e. distortions in labour market, highly protective trade regime which moved the structure of production away from considerations

TABLE 2.4

NIC	1980-81			1989-90			1997-98		
	K/L	O/L	O/K	K/L	O/L	O/K	K/L	O/L	O/K
20-21	0.10	0.06	0.56	0.26	0.22	0.84	0.55	0.27	0.50
22	0.04	0.06	1.59	0.08	0.12	1.56	0.23	0.20	0.88
23	0.12	0.13	1.13	0.21	0.18	0.86	0.75	0.19	0.26
24	0.24	0.18	0.75	0.55	0.32	0.58	1.46	0.42	0.29
25	0.04	0.12	2.73	0.11	0.12	1.04	0.13	0.17	1.33
26	0.09	0.13	1.39	0.17	0.25	1.48	0.37	0.27	0.71
27	0.09	0.09	0.96	0.18	0.11	0.63	0.36	0.15	0.42
28	0.34	0.17	0.50	0.54	0.29	0.54	1.20	0.33	0.27
29	0.14	0.12	0.90	0.15	0.18	1.16	0.34	0.29	0.87
30	0.44	0.33	0.74	1.36	0.55	0.41	2.88	0.93	0.32
31	0.85	0.31	0.37	1.14	0.75	0.66	2.32	0.70	0.30
32	0.22	0.12	0.56	0.71	0.22	0.31	1.62	0.40	0.24
33	0.82	0.22	0.27	1.31	0.44	0.33	3.11	0.94	0.30
34	0.16	0.18	1.15	0.25	0.27	1.07	0.75	0.35	0.47
35-36	0.23	0.25	1.09	0.44	0.44	1.00	0.86	0.63	0.74
37	0.31	0.19	0.59	0.49	0.34	0.70	0.95	0.57	0.60
38	0.18	0.20	1.11	0.39	0.31	0.82	0.70	0.50	0.70
39				0.09	0.18	2.14	0.19	0.23	1.18
40	1.96	0.21	0.10	2.99	0.40	0.13	3.83	0.80	0.21
41	0.68	0.25	0.37	2.21	0.03	0.01	5.28	4.30	0.82
42	0.47	0.17	0.37	0.40	0.24	0.59	0.45	0.30	0.67
43							8.26	1.72	0.21
74	0.37	0.09	0.23	0.55	0.11	0.19	0.57	0.16	0.27
97	0.07	0.12	1.60	0.09	0.28	3.23	0.31	0.33	1.07
TOTAL	0.43	0.16	0.38	0.79	0.32	0.40	1.45	0.49	0.34

of comparative advantage, low interest rates and tax benefits on investment which reduced effective tax rate of more capital intensive project. Before verifying the above causes, it would be useful to take a look at growth in capital intensity from Table 2.5. Capital intensity as a whole increased at a faster rate during the nineties. Even at disaggregated level, growth in capital intensity during the nineties was less but still impressive for only a few industry groups, most of which were the industries with substantial growths in the eighties, i.e. manufacture of food products (20), chemicals (30) and non-metals (32). Manufacture of paper and paper products (28), leather and leather products (29), basic metal and alloys (33) and metal products (34) experienced significantly higher growths in capital intensity in the nineties as compared to the eighties.

In the nineties, real interest rates have grown to unprecedented levels and degree of protection from trade has been reduced significantly. So, going by Ahluwalia's argument, these developments should have led to decline in capital intensity in the nineties, but that has not occurred. The factor that Ahluwalia has stressed upon most is distortion in labour market. Even after ignoring Nagaraj's argument regarding increased man-days worked during the eighties and the effective rate of growth of wages being only 1.6 per cent, labour market distortion does not give sufficient explanation for the higher growth of capital intensity during the nineties. Observation of table 2.5 reveals that during the nineties growth in wage-rate was considerably lower than that in the eighties. This trend in wage-rate fails to explain the even higher growth in capital-intensity in the nineties. A look at table 2.7 gives a possible explanation for rising capital



**TABLE 2.5
COMPOUND AVERAGE GROWTH RATE**

NIC	1980-81 TO 1989-90					1989-90 TO 1997-98				
	K/L	O/L	K/O	EMO/L	EMO/O	K/L	O/L	K/O	EMO/L	EMO/O
20-21	10.7	15.9	-4.5	8.1	-6.7	9.8	2.9	6.7	0.8	-1.7
22	7.9	7.6	0.2	3.0	-4.3	14.7	6.8	7.4	0.8	-4.9
23	6.6	3.5	3.0	0.1	0.7	17.7	1.2	16.3	-0.7	-1.7
24	9.4	6.3	2.9	1.4	-4.7	13.0	3.4	9.2	0.0	-2.9
25	11.3	0.0	11.3	1.5	1.5	1.9	5.1	-3.0	1.7	-2.7
26	7.0	7.7	-0.7	0.6	-6.6	10.6	0.9	9.6	0.9	0.1
27	8.1	3.0	4.9	2.4	-0.6	9.1	3.8	5.1	-0.2	-3.4
28	5.4	6.3	-0.9	3.0	-3.1	10.5	1.6	8.8	0.9	-0.5
29	1.2	4.1	-2.8	-0.9	-4.8	10.3	6.4	3.7	0.8	-4.5
30	13.4	6.0	6.9	3.8	-2.1	9.8	6.7	3.0	0.7	-4.9
31	3.4	10.1	-6.2	0.5	-8.8	9.3	-0.9	10.3	0.7	1.5
32	14.0	6.8	6.7	1.8	-4.8	10.8	7.5	3.1	2.0	-4.4
33	5.3	7.6	-2.2	2.5	-4.8	11.4	10.0	1.3	1.6	-6.7
34	5.4	4.5	0.8	1.1	-3.2	14.6	3.3	11.0	2.1	-0.8
35-36	7.5	6.4	1.0	3.0	-3.2	8.6	4.6	3.9	1.3	-2.7
37	5.1	7.1	-1.8	3.3	-3.5	8.6	6.4	2.0	1.4	-4.0
38	8.8	5.2	3.5	0.6	-4.3	7.8	5.8	1.9	1.9	-3.1
39				0.0	0.0	10.6	2.6	7.8	-1.4	-3.7
40	4.8	7.5	-2.6	5.4	-1.9	3.2	9.1	-5.5	0.9	-6.6
41	13.9	-21.4	45.0	1.7	29.4	11.5	86.9	-40.3	3.3	-40.8
42	-1.7	3.7	-5.2	4.6	0.8	1.3	2.8	-1.5	2.5	0.0
43				0.0	0.0				0.0	0.0
74	4.5	2.2	2.2	4.0	1.8	0.3	4.8	-4.3	0.2	-3.9
97	2.0	10.4	-7.5	2.4	-7.3	17.2	2.1	14.8	1.2	-0.6
TOTAL	7.0	7.7	-0.6	3.3	-4.0	7.9	5.8	2.0	0.9	-4.0

Source: Calculated from Annual Survey of Industries (Summary Results), Various Issues

intensity. For all industry groups together, average rate of return on fixed capital has increased in the nineties and this might have encouraged the firms to increase capital intensity at a faster pace. Infact, a less protective trade regime might have led to this rise in profitability.

As table 2.5 shows, there is a decline in wage-share like in the eighties and still the factory sector in general and consumer durables in particular have grown at impressive rates during the nineties. This is in line with Chandrasekhar's [1996] contention that in the nineties, growth has been sustained by a consumption boom helped by an increase in consumer credit as a result of financial sector reforms.

Table 2.4 shows labour productivity, capital productivity and capital intensity for different industry groups for the years 1980-81,1989-90, 1997-98. Growth in capital intensity inflates partial labour productivity and deflates capital productivity. In some cases, increase in capital intensity may be associated with modernisation leading to more efficient use of factors, but when a rise in capital intensity is associated with a substantial decline in capital productivity, it is likely that there has been a mere substitution of capital for labour [Ghose, 1994].

Labour productivity increased for all industry groups except rubber, plastic, petroleum and coal products (31). Capital intensity has increased over both periods in all the industry groups except for water works and supply in the eighties. With regard to capital productivity, textile products on the whole, wood and wood products (27), chemicals (30), non metallic mineral products

(32), metal products (34) and machinery and equipment (34) show a decline despite the fact that some of these industry groups achieved remarkable growth rates in value added during the eighties. Compared to this, capital productivity declined in most of the industry groups, jute and other vegetable fibre textiles (25), gas and steam generation (41), electricity (40) and storage and warehousing services (74) being the exceptions. For the factory sector as a whole, capital intensity, labour productivity and capital productivity grew from 0.43 to 0.79, 0.16 to 0.32 and 0.38 to 0.4 and from 0.79 to 1.45, 0.32 to 0.49 and 0.4 to 0.34 in the eighties and nineties respectively. From Table 2.5, it can be seen that in the eighties, labour productivities grew faster in food industry (20), beverages and tobacco (22), textile products (26), rubber, plastic and petroleum (31) and storage and warehousing services (74). In the nineties, the leading sectors in labour productivity growth were non-metallic minerals (32), basic metals and alloys (33) and electricity (40).

Rising capital intensity makes it difficult to ascertain the factor productivity growth arising from better utilisation of capacities, technical progress and improved skills of labour [Ahluwalia, 1991] and therefore, the concept of total factor productivity growth is used. Lot of debate is going on regarding the measurement of total factor productivity growth. Issues of debate range from growth accounting versus production function technique to different manners in which inputs could be deflated. Studies based on different methods have yielded results that contradict each other [Unni, Lalitha and Rani, 2001]. The most acceptable among these estimates is that by Ahluwalia (1991). She found a turnaround in productivity growth during the eighties.

Table 2.6 gives the total factor productivity growth for the periods 1981 to 89, 1989 to 98 and 1981 to 1998 based on the estimate:

$$\Delta \ln TFP(t) = \Delta \ln NVA(t) - \Delta \ln S_L L(t) - \Delta \ln (1 - S_L) K(t)$$

where, TFP (t) = total factor productivity in year t.

NVA (t) = net value added in year t.

K (t) = fixed capital in year t.

L (t) = no of employees in year t.

S_L (t) = share of emoluments in net value added.

The yearly estimates have been averaged over the years to obtain the average total factor productivity growths for the above-mentioned periods. As the estimates indicate, total factor productivity growth during the period 1989-98 is 1.1 per cent, which is quite low as compared to the estimate for the period 1981-89, which is 3.9. Jute and other vegetable fibre textiles (25), non-metallic mineral products (32), electricity (40) and storage and warehousing services (74) are the only industry groups for which estimates of TFPG are higher in the nineties. Surprisingly, TFPG for chemicals, which grew the most in the eighties and maintained a reasonably good growth rate in the nineties, is -3 and -4.6 in the two periods respectively. This dissociation between rate of growth of net value added and rate of growth of productivity is further strengthened if the very low and identical correlation coefficients between industry wise average growth of net

TABLE 2.6
INDUSTRY-WISE TFPG

	1981-98	1981-89	1989-98
20-21	3.3	9.1	-2.6
22	1.0	4.6	-1.8
23	-1.8	2.0	-2.9
24	-1.4	1.5	-1.3
25	2.2	-0.8	4.7
26	-1.3	3.6	-5.1
27	-0.5	-0.2	-2.5
28	0.3	4.8	-0.7
29	2.0	3.7	1.6
30	-1.9	-3.0	-4.6
31	0.2	7.5	-3.5
32	-0.4	-0.7	1.4
33	3.9	4.9	2.0
34	-1.3	1.8	-4.5
35-36	0.8	2.3	0.4
37	3.2	4.8	2.4
38	0.4	0.2	1.5
39	0.0	0.0	0.0
40	5.7	4.7	6.5
41	0.0	0.0	0.0
42	2.7	3.8	2.1
43	0.0	0.0	0.0
74	-0.2	-4.3	4.2
97	2.7	9.3	0.3
TOTAL	2.4	3.9	1.1

Source: Annual Survey of Industries(Summary Results), Various Issues

value added and productivity for the two periods are considered [Table 2.8]. This is contrary to what Verdoorn's law suggests. Ahluwalia (1991) had found a significant and positive relationship between her estimate of TFPG and rate of growth of value added. She also found a negative correlation between capital intensity and TFPG across industries. In the present study, capital intensity was found to be negatively but weakly correlated with productivity growth in the eighties but the correlation coefficient not only turned out to be positive, its magnitude also increased to 0.45 (Table 2.8) in the nineties. A possible explanation for this could be the gradual removal of restrictions during the nineties leading to the utilisation of existing excess capacities in the industries due to increases in capital intensity during the earlier period. This explanation further gains strength, if we consider the high negative correlation between rate of growth of capital and TFPG on the one hand and between rate of growth of capital intensity and TFPG on the other (Table 2.8).

TABLE 2.7
AVERAGE RATE OF RETURN ON F.C.
1980-1990 1990-1998 1980-1998

20-21	20.8	17.2	19.2
22	59.4	64.2	61.5
23	-6.2	-4.4	-5.4
24	10.1	8.8	9.5
25	-35.5	-17.1	-27.3
26	43.2	67.9	54.2
27	19.2	13.1	16.5
28	3.6	10.1	6.5
29	11.3	35.8	22.2
30	29.5	15.3	23.2
31	15.0	28.3	20.9
32	11.0	9.0	10.1
33	4.4	5.0	4.6
34	22.6	11.2	17.5
35-36	27.1	27.1	27.1
37	10.1	19.5	14.3
38	37.2	26.9	32.6
39	0.0	8.8	3.9
40	0.2	1.6	0.9
41	8.8	32.7	19.4
42	13.4	23.5	17.9
43	0.0	1.5	0.7
74	-4.6	5.3	-0.2
97	19.3	24.7	21.7
TOTAL	7.2	9.9	8.4

Source: Annual Survey of Industries(Summary Results),
Various Issues

2.4 CONTRIBUTION OF PUBLIC SECTOR TO RISING CAPITAL INTENSITY

The impressive growth in industrial production during 1950-65 was accompanied by a substantial increase in capital intensity. Emphasis on heavy industries, import substitution and most importantly, state led investment have been cited as the reasons for such a trend in capital intensity during the first phase of industrialisation. This also meant that share of industrial employment in total employment did not rise at par with share of industrial output in total output of the economy (Mookherjee, 1997). Public sector is considered to be largely responsible for this trend in capital intensity.

However, the situation has drastically changed over the period of this study. Table 2.9 gives the percentage share of public and wholly private sector in fixed capital, employment and net value added as well as capital intensity, labour productivity and capital-output ratio in public and wholly private sectors in 1980-81, 1989-90 and 1997-98.

Share of public sector in fixed capital has been declining throughout the eighties and nineties, with the decline in the nineties being more pronounced. In terms of employment, public sector maintained its share in the nineties. The trend in public sector's share in net value added was similar to that in employment.

A remarkable thing since the eighties has been the trend in capital intensity. In contrast to the earlier phases of industrialisation, increase in capital

TABLE 2.8

CORRELATION COEFFICIENTS

	1980-89	1989-98
(CAG K,Eok)	0.10	-0.22
(CAG K,EIk)	-0.04	-0.16
(CAG K,T)	-0.66	-0.71
(CAG K/L,T)	-0.46	-0.64
(CAG NVA,T)	0.05	0.05
(K /L,T)	-0.20	0.45
(CAG K,Avg.profit rate)	0.20	0.45

CAG:Compound Average Growth Rate

K :Capital

Eok :Elasticity of Output w.r.t. Capital

EIk :Elasticity of Employment w.r.t. Capital

T :TFPG

L :Labour

NVA:Net Value Added

TABLE 2.9

PERCENTAGE SHARE

		1980-81	1989-90	1997-98
FC	PUB	67.6	55.04	34.15
	PVT	26.1	37.44	52.65
EMP	PUB	26.6	27.36	24.05
	PVT	67	65.98	68.9
NVA	PUB	28.1	30.07	28.44
	PVT	65.8	60.82	59.32

STRUCTURAL RATIOS

		1980-81	1989-90	1997-98
FC/EMP	PUB	98590	264201	602934
	PVT	15110	74522	324547
NVA/EMP	PUB	16361	58553	185784
	PVT	15185	49105	135268
FC/NVA	PUB	6.03	4.51	3.25
	PVT	1	1.52	2.4

Source: Annual Survey of Industries(Summary Results), Various Issues.

intensity was higher in the private sector as compared to the public sector. Growth in labour productivity has been higher in the public sector despite a slower growth in capital intensity in the public sector. This suggests that public sector units have been more efficient in the eighties as compared to their performance in the past. This view gets strengthened if the trend in capital-output ratio is considered. Although the capital-output ratio is still higher in the public sector, it has declined considerably (from 6.03 to 3.25) between 1980-81 and 1997-98 whereas the ratio has rapidly increased (from 1.00 to 2.40) in the private sector during the same period.

This development is all the more disturbing as private sector led growth in capital intensity has meant that capital has moved to consumer goods industries. Along with the gradual withdrawal of the government, this trend poses serious questions regarding the future of industrial growth, as investment in infrastructure is not forthcoming. Increased investments in infrastructure are required to sustain the industrial growth (Sandesara, 1992).

2.5 RESPONSE OF OUTPUT AND EMPLOYMENT WITH RESPECT TO FIXED CAPITAL

Table 2.10 shows the output and employment elasticities with respect to fixed capital for all the industry groups for the period 1980-81 to 1989-90 and 1989-90 to 1997-98. The elasticities have been estimated using the equations

$$\text{Ln NVA} = a_1 + b_1 \text{Ln F.C} + e_1,$$

and
$$\text{Ln EMP} = a_2 + b_2 \text{Ln F.C} + e_2$$

for all the groups separately using time-series data.

Here, NVA = net value added (in Rs Lakhs).

F.C = fixed capital (in Rs Lakhs) and,

EMP = No of employees.

In the above equations, b_1 and b_2 are the output and employment elasticities with respect to fixed capital.

In the eighties, output elasticities were negative for manufacture of textiles (23), gas and steam generation (41) and water works and supply (42), whereas employment elasticities were negative for food products (20), manufacture of textiles (23), jute and other vegetable fibre textiles (25), wood and wood products (27), paper and paper products (28), transport equipment and part (37) and water works and supply (42). Out of these, only elasticities of employment for manufacture of food products (20) and textiles (23) were found to be significant. Output elasticities for food products (20) and leather and leather products (29) were greater than one and so was employment elasticity for repair services.

In the nineties, output elasticity for non-manufacturing sector on the whole was very impressive with elasticities for gas and steam generation (41), electricity (40) and storage and warehousing services (74) being 2.913, 1.811 and 1.249 respectively. Elasticity of output for none of the industries was found to be

TABLE 2.10
EMPLOYMENT AND OUTPUT ELASTICITIES WITH RESPECT TO FIXED CAPITAL

	1980-81 TO 1989-90				1989-90 TO 1997-98			
	b1	T values	b2	T values	b1	T values	b2	T values
20-21	1.351	9.291	-0.361	-2.539	0.639	6.455	0.216	10.884
22	0.728	5.885	0.058	0.62	0.468	8.365	0.134	4.417
23	-0.09	-0.393	-0.449	-2.67	0.151	1.85	0.035	1.359
24	0.579	5.85	0.263	7.503	0.406	2.729	0.219	9.938
25	0.094	0.49	-0.148	-1.06	0.576	2.914	0.428	3.287
26	0.794	6.454	0.354	6.55	0.585	6.412	0.52	23.903
27	0.373	4.409	-0.093	-1.933	0.431	4.036	0.126	4.346
28	0.47	2.41	-0.022	-0.033	0.431	3.536	0.184	4.754
29	1.265	9.035	0.755	7.884	0.451	2.849	0.256	7.866
30	0.815	5.6	0.476	4.694	0.868	7.733	0.337	11.076
31	0.664	3.786	0.887	4.936	0.505	4.151	0.334	12.226
32	0.444	4.801	0.124	4.837	0.486	2.802	0.044	1.29
33	0.878	2.741	0.128	1.815	0.852	3.371	0.166	3.445
34	0.779	11.564	0.158	2.121	0.495	6.55	0.231	5.978
35-36	0.759	11.283	0.155	5.485	0.666	9.463	0.179	4.449
37	0.784	4.446	-0.038	-0.615	0.85	7.424	0.254	5.672
38	0.668	3.768	0.252	7.118	0.934	8.209	0.474	17.823
39					0.635	7.009	0.49	7.731
40	0.967	3.837	0.291	3.596	1.811	9.51	0.468	2.852
41	-0.402	-1.146	0.287	5.405	2.913	4.616	0.167	2.079
42	-1.019	-1.839	-0.445	-1.9	0.823	2.542	0.485	3.017
43					0.996	3.101	0.148	1.152
74	0.767	1.025	0.498	4.367	1.249	3.201	0.566	4.469
97	0.395	1.457	1.019	6.855	0.366	2.409	0.054	0.595
TOTAL	0.9	11.347	0.01	0.258	0.874	22.773	0.281	10.496

Source: Annual Survey of Industries(Summary Results), Various Issues.

negative and so was the case with employment elasticity. A noticeable feature of the nineties is the decrease in the ranges within which the employment elasticity varies for the factory sector as a whole and output elasticity varies for the manufacturing sector. Employment elasticity in the nineties varies from 0.035 for manufacture of textiles (23) on the one end to 0.566 for storage and warehousing services (74) on the other. For all industries, elasticity of output with respect to fixed capital is slightly lower and elasticity of employment is reasonably higher in the nineties as compared to the eighties.

Table 2.11 divides the industry groups in four categories for both the periods. These categories have been formed by considering whether or not the response of value added and employment is good to an increase in the amount of fixed capital in a particular industry. Dividing points of categories have been taken to be 0.5 and 0.2 for output and employment elasticities with respect to fixed capital respectively. Industries with high employment generating potential in response to investment in fixed capital indicate towards a high degree of complementarity between the factors. Out of the industries falling in this category, those that also show high growth rates of value added in response to investments in fixed capital have been shown in the upper-left quadrants in Table 2.11. These are the industry groups in which investment in fixed capital would yield the best results. On the other end are the lower-right quadrants that contain industry groups where investment in fixed capital would be the least beneficial.

TABLE 2.11
RESPONSE TO INCREASE IN FIXED CAPITAL

1980-81 TO 1989-90
EMPLOYMENT GENERATION

HIGH LOW

GROWTH IN VALUE ADDED	HIGH	24,26,29,30 31,38,40,74	20-21,22,33,34 35-36,37
	LOW	41,97	23,25,27, 28,32,42

1989-90 TO 1997-98
EMPLOYMENT GENERATION

HIGH LOW

GROWTH IN VALUE ADDED	HIGH	20-21,25,26,30,31, 37,38,40,42,74	33,35-36,39, 41,43
	LOW	24,29,34	22,23,27,28, 32,97

Source: Table 2.10

In the eighties, manufacture of wool, silk and man made fibre textiles (24), textile products (26), leather products (29), chemicals (30), rubber, plastic and petroleum products (31), other manufacturing industries (38), electricity (40) and storage and warehousing services (74) fell in the upper left quadrant. In terms of investment in fixed capital as well, these industries were the favoured ones except for manufacture of rubber, plastic and petroleum products (31). Industries which lied in the lower right quadrant were manufacture of textiles (23), jute and other vegetable fibre textiles (25), wood and wood products (27), paper and paper products (28), non metallic mineral products (32) and water works and supply (42). The growth of fixed capital has not been as low as would have been desirable for this category [Table 2.3]. Except for manufacture of textiles (23) and water works and supply (42), all other industry groups in this quadrant have received more investment in fixed capital than the desirable level.

During the nineties, manufacture of food products (20-21), jute and other vegetable fibre textiles (25), textile products (26), chemicals (30), rubber, plastic and petroleum (31), transport equipment (37), other manufacturing industries (38), electricity (40), water works and supply (42) and storage and warehousing services (74) fell in the upper left quadrant. Out of these, manufacture of jute and other vegetable fibre textiles (25), electricity (40) and storage and warehousing services (74) received relatively less investment. Industry groups which lied in the lower right quadrant during the nineties were – manufacture of beverages, tobacco and related products (27), paper and paper products (28), non-metallic mineral products (32) and repair services (97). Surprisingly enough, in all these industries, growth of fixed capital has been

remarkably high. This strongly suggests that the investment pattern across industry groups has been much worse in the industries as compared to the eighties, considering its implication for growth and employment. Moreover, investment shares in absolute terms were more in the industries, which already had high shares in fixed capital during the entire period of 1980-98 [Thomas, 2002].

It appears that growth or employment generation has not been the guiding factor for capital formation in individual industries. Profitability seems to have some impact, at least in the nineties, considering the correlation coefficients of 0.2 and 0.45 between average rate of growth of capital and average rate of return on capital during the eighties and nineties respectively [Table 2.7]. One of the reasons for this could be the increasing share of private investment in the factory sector.

CHAPTER –III

CAPITAL SHIFT ACROSS THE STATES

3.1 INTRODUCTION

Industrial dispersal across regions was one of the important objectives in the initial stage of planned development. Second and third five-year plan emphasised the need to develop infrastructure in backward areas and to promote small-scale industries in order to achieve regional equality. Industrial licensing and financial incentives, beginning from seventies, were also supposed to reduce regional imbalance (Ahluwalia, 1991). However, there have been major changes with regard to these policies in the eighties and nineties.

Earlier studies on convergence or otherwise of state incomes have given contrasting results. Dholakia (1994), in his study of twenty states, found marked tendencies of long-term convergence of economic growth over the period 1960-61 to 1989-90. He finds 1980-81 as the year of break in the trend, after which poorer states started growing at a faster rate as compared to the developed states. A more recent study (Dasgupta, Maiti, Mukherjee, Sarkar and Chakrabarti, 2000) covering the period 1960-61 to 1995-96 concludes that states have diverged in terms of per capita state domestic product. They have studied the convergence hypothesis at sectoral level and have found that agriculture showed a high level of divergence, while in the industrial sector, there has been divergence but at a lower rate. Tertiary sector and infrastructure were found to be showing converging tendencies among the states.

Rate of investment is an important determinant of economic growth and hence differential rates of investment should have a significant

bearing on the trend in regional disparity. Surprisingly, not much work has been done on spatial variation in investment.

In the liberalised environment of the nineties, investment pattern across industry groups and regions is likely to be affected. This could happen because of two reasons. Firstly, share of public investment has been declining, which means that more and more investment decisions are likely to be guided by profitability considerations. Secondly, gradual weakening of industrial location policies and phased removal of incentives to invest in backward areas as well as restrictions to entry in many industries should result in private investment flowing into industries and regions which give higher rates of return on investment.

It is the main purpose of this study to ascertain if there has been any change in investment pattern over space in the nineties vis-à-vis the eighties. It is also intended to study the change in industrial composition of the states. Finally, the long-run impact of such changes on output growth, employment generation and balanced regional development is analysed.

The main data source for this chapter is Annual Survey of Industries. Net value added and profit have been deflated using wholesale price index for manufactured products at 1981-82 prices. Fixed capital has been deflated by the wholesale price index of machinery and transport equipment at 1981-82 prices. Investment, wherever it appears, means net addition in fixed capital over the relevant year.

3.2 GROWTH OF FIXED CAPITAL IN THE STATES

Table 3.1 shows the share of fifteen states in the total stock of fixed capital in all the fifteen states together. In 1980-81, shares of Maharashtra, Bihar, Andhra Pradesh, Uttar Pradesh and Gujarat were relatively high, whereas, Assam, Orissa and Haryana were at the other end. Shares of different states in a particular year does not make much sense as these are not comparable due to difference in the sizes of the states. However, if the shares of different states in 1989-90 are observed, some interesting things show up. While Bihar's share dropped significantly over the period, it declined reasonably in Andhra Pradesh, Rajasthan, Karnataka and Kerala. Uttar Pradesh, Tamil Nadu, Orissa, Maharashtra and Madhya Pradesh increased their shares in total fixed capital over the decade. For other states, the change was not very significant. One strange thing about this period was the strange mix of some industrially backward and some developed states among the states attracting relatively higher levels of investment.

In the nineties, shares in fixed capital dropped significantly for Bihar and Madhya Pradesh and to a lesser extent for Orissa and Punjab. Significant gains in terms of investment in the factory sector were achieved by Gujarat and Karnataka. The latter of the two might have benefited from astonishingly high growth in software industry during this period. An important difference between these two decades is the fact that the states attracting high

TABLE 3.1

	1980-81	1989-90	1997-98
A.P.	9.2	7.2	7.8
ASSAM	1.0	0.9	1.0
BIHAR	11.5	6.4	3.5
GUJARAT	9.0	9.1	15.8 ✓
HAR	3.2	3.0	2.6
KAR	4.4	3.8	6.1
KERALA	2.7	2.2	2.0
M.P.	7.1	8.3	5.3
MAHA	16.0	18.1	18.7
ORISSA	2.5	4.8	3.7
PUNJAB	4.5	4.8	3.9
RAJ	4.5	3.9	3.7
T.N.	6.9	9.0	8.5 ✓
U.P.	10.4	11.3	10.9 ✓
W.B.	7.1	7.0	6.4
TOTAL	100	100	100

Source: Calculated from ASI(Summary Results), Various Issues.

level of investment were mostly industrialised states. In the nineties, the combined share of Maharashtra and Gujarat in total manufacturing investment in India was as high as 34.6 percent while it was only 27.9 percent in the eighties (Thomas, 2002).

The manner in which net value added and employment have grown along with fixed capital across the states, is shown in table 3.2. In the eighties, there was impressive growth in fixed capital in Gujarat, Madhya Pradesh, Maharashtra, Orissa, Punjab, Tamil Nadu and Uttar Pradesh. Out of these states, growth in net value added in Maharashtra and Gujarat were below the average growth. In terms of employment generation, these two states performed very badly. Other states with fast growth in capital performed reasonably well with regard to net value added and employment growths. Bihar, Andhra Pradesh and Kerala received investment at well below the average rate despite the fact that net value added grew at rates higher than the average. On employment front, only Andhra Pradesh performed well among these states.

In the nineties, capital grew rapidly in Andhra Pradesh, Assam, Gujarat, Karnataka and Maharashtra. Out of these states, only Andhra Pradesh and Karnataka did well in terms of growth in net value added and employment generation. Maharashtra and Gujarat improved their performance with respect to net value added and employment, but Gujarat's performance doesn't look impressive if the very high rate of growth of capital (18.3%) is considered. Bihar continued on its downslide both in capital and employment growth, but growth in net value added has been appreciable. Investment growth was relatively slow in Madhya Pradesh, Orissa and Punjab. Employment growth also slowed down in

these states but in terms of growth in net value added, only Punjab performed badly.

One noticeable development in the nineties has been the return to exclusive dominance of the industrialised states with regard to investment in fixed capital. Madhya Pradesh, Orissa and Punjab, the states with high growth rates in fixed capital in the eighties, witnessed a downturn in the nineties. A notable feature of investment in these states in the eighties was that it was employment generating and contributed to growth in net value added as well.

Table 3.3 shows Theil's measure of entropy for per capita fixed capital and per capita value added in years 1980-90 and 1997-98. Higher values of Theil's index indicate towards greater inter-state variation in the variable concerned. The index for per-capita fixed capital increased marginally from 0.10 in 1980-81 to 0.11 in 1989-90, but by 1997-98, it increased significantly to 0.17. Dispersion in per capita fixed capital across the states rose significantly in the nineties, but dispersion in per capita net value added declined, although this decline was much smaller than the decline in the eighties.

This trend in disparity in per capita fixed capital since 1980-81 could be a result of policy changes effected during 1980-81 to 1997-98, specially in the nineties. Dholakia (1979) had found a decline in state capital inequality at faster rate than in state income inequality between 1960-61 and 1970-71.

TABLE 3.2

	COMPOUND AVERAGE GROWTH RATES 1980-81 TO 1989-90			COMPOUND AVERAGE GROWTH RATES 1989-90 TO 1997-98		
	K	L	O	K	L	O
A.P.	4.6	2.3	8.6	11.4	4.9	13.8
ASSAM	7.0	-0.2	15.5	12.1	2.9	-1.3
BIHAR	0.7	-0.5	12.8	2.5	-3.5	8.1
GUJARAT	7.6	0.1	7.0	18.3	2.7	9.5
HAR	6.7	4.1	7.5	8.6	3.3	9.9
KAR	6.0	0.5	8.3	17.0	5.2	9.7
KERALA	5.0	-1.1	8.4	9.4	4.4	2.4
M.P.	9.4	2.7	9.3	4.3	1.4	8.4
MAHA	8.9	-1.0	7.3	11.0	2.3	7.6
ORISSA	15.4	2.0	13.9	7.0	1.5	7.3
PUNJAB	8.2	6.1	13.5	7.5	1.5	1.9
RAJ	5.7	3.5	7.8	9.7	1.4	12.2
T.N.	10.7	1.9	9.0	9.8	3.9	5.4
U.P.	8.4	0.4	13.6	10.0	-0.5	7.8
W.B.	7.3	-2.8	-0.6	9.2	1.5	10.6
TOTAL	7.4	0.6	8.3	10.5	2.4	8.0

TABLE 3.3

	THEIL'S INDEX	
	P.C.F.C.	P.C.NVA
1980-81	0.10	0.19
1989-90	0.11	0.14
1997-98	0.17	0.13

Source: Both Tables Calculated from ASI(Summary Results), Various Issues.

This trend in per capita fixed capital and per capita net value added indicates that capital productivity has gone up in states with less per capita fixed capital. This however may not be the case if there is an evidence of a highly unlikely situation of labour productivity having risen significantly in the states with low per capita fixed capital. A conclusive inference regarding this would only be possible in section 3.4. Converging trend in per capita net value added must have set in sometime in the eighties as Dasgupta, Maiti, Mukherjee, Sarkar and Charkrabarti (2000) had found that for the manufacturing sector, there was a mild divergence for the period 1970-71 to 1995-96.

3.3 CAPITAL SHIFT ACROSS STATES AND STATES RESPONSIBLE FOR THE SHIFT

Mathur (1983) has used a variant of shift analysis to study income shift by state for the period 1950 to 1975. An important advantage of this method is that it can identify the states responsible for narrowing or widening effect of growth during different periods. In the present study, shift analysis has been used to determine the extent of narrowing or widening of fixed capital base of the states during the periods 1980-81 to 1989-90 and 1989-90 to 1997-98.

Shift is positive during a period if the state's stock of fixed capital at the end of the period is higher than what it would have been if capital in the state had grown at the national growth rate. Otherwise, the state is said to have to a negative shift. The next step is to calculate total positive and negative shifts, which must equal in magnitude, and shares of states in total positive or negative

shift, whichever case applies. Aggregate share of states with initial per capita fixed capital below the national average and having positive shifts and aggregate share of states with initial per capita fixed capital above the national average and having negative shift are added up. If this sum exceeds the aggregate share of remaining states, it could be concluded that there has been a convergence in terms of fixed capital among the states. The difference between the two aggregate shows the extent of convergence.

It may be observed from table 3.4 that in the eighties, growth was accompanied by a significant narrowing down in fixed capital base of the states. In the nineties, the situation changed with growth not having any significant impact on convergence in percapita fixed capital of the states. The turnaround in investment pattern was remarkable when compared to the situation during the eighties.

During the eighties, narrowing down through negative shift was contributed by Andhra Pradesh, Bihar, Gujarat and Haryana with Bihar being the most prominent state among these. Narrowing down through positive shift was contributed by Madhya Pradesh, Orissa, Tamil Nadu, Assam and Uttar Pradesh.

In the second period, Gujarat was the dominant force in causing a widening through positive shift. Maharashtra was the only other state responsible for widening through positive shift during nineties. Widening of capital base through negative shift was mainly due to Bihar's inability to attract investment. West Bengal, Uttar Pradesh, Rajasthan and Kerala also contributed to widening

TABLE 3.4

CAPITAL SHIFT BY STATE

	1980-81 TO 1989-90		1989-90 TO 1997-98	
	POSITIVE	NEGATIVE	POSITIVE	NEGATIVE
A.P.(a)		[21.1]	A.P.(b)	[3.7]
ASSAM(b)	[1.9]		ASSAM(b)	[1.8]
BIHAR(a)		[37]	BIHAR(b)	14.7
GUJARAT(a)		[1.3]	GUJARAT(a)	70.1
HAR(a)		[14.4]	HAR(a)	[14.2]
KAR(b)		8.4	KAR(b)	[22.0]
KERALA(b)		5.6	KERALA(b)	1.1
M.P.(b)	[10.8]		M.P.(a)	[22.0]
MAHA(a)	9.9		MAHA(a)	2.4
ORISSA(b)	[45.5]		ORISSA(a)	[14.7]
PUNJAB(a)	4.9		PUNJAB(a)	[21.4]
RAJ(b)		12.2	RAJ(b)	3.7
T.N.(b)	[25.5]		T.N.(a)	[1.0]
U.P.(b)	[1.0]		U.P.(b)	2.7
W.B.(b)	[0.4]		W.B.(b)	4.5

	1980-81 TO 1989-90	1989-90 TO 1997-98
PERCENTAGE		
1. Percentage of +ve shift contributed by states initially below average per capita fixed capital	85.1	27.5
2. Percentage of -ve shift contributed by states initially above average per capita fixed capital	73.8	73.3
3. Average narrowing effect(=[1+2]/2)	79.45	50.4
4. Average widening effect(=100-[3])	20.55	49.6
5. Nature of net effect	Narrowing	Narrowing
6. Magnitude of net effect (=3-4)	58.9	0.8

States with 'a' and 'b' in the parentheses have higher and lower per capita fixed capital than the average respectively.

through negative shift. Other states' contribution was towards narrowing down which almost matched the overall widening effect.

An important thing that emerges from comparison between the shifts in the two periods is that in the nineties, industrially developed states like Maharashtra and Gujarat attracted investment at a faster rate than in the eighties. This indicates towards failure of the new policy regime with regard to arresting the growth in regional inequality. On the other hand, Bihar, which had a higher per capita capital stock investment than the average in the eighties and lower in the nineties for the fifteen states together, did badly in terms of attracting investment in both the periods. Uttar Pradesh, which contributed through positive shift in the eighties, fared badly in the nineties. Other states did not contribute to the dissimilar trends in the two periods.

Most of the states that saw a decline in per capita investment were the ones favoured by public investment. Declining share of public investment during the two periods might have led to this trend in industrial investment across the states. Some of these states are rich in natural endowments and still they have failed to attract private investment. Datta (1981) has studied the regional location of industry through the use of a modified Hecksher Ohlin model. Contrary to the Hecksher Ohlin theorem, West Bengal, which represented the rich states in capital endowment, was found to be losing ground relatively in capital-intensive industries.

Although dispersion of per capita fixed capital across the states increased marginally in the eighties and significantly in the nineties, shift analysis shows a tendency towards narrowing down in the eighties. This is so because

states like Bihar and Andhra Pradesh, which had higher per capita fixed capital than the average, and Orissa, Madhya Pradesh and Tamil Nadu, which had lower per capita fixed capital than the average in 1980-81, received investment at such rates that Bihar and Andhra Pradesh had per capita fixed capital well below and Orissa, Tamil Nadu and Madhya Pradesh much above the average at the end of the period. Analysis of shift for smaller periods would have given much better insights.

3.4 CAPITAL INTENSITY AND PRODUCTIVITIES ACROSS THE STATES

Table 3.5 shows capital intensity, labour productivity and capital productivity for the states in 1980-81, 1989-90 and 1997-98. In 1980-81, capital intensity was higher than the average in Bihar, Haryana, Madhya Pradesh, Orissa, Punjab and Rajasthan. Out of these states, Haryana had higher labour productivity than the average while other states had near average labour productivities. Bihar, Madhya Pradesh, Orissa, Punjab and Rajasthan had relatively low capital productivity in this group. Assam, Kerala, Tamil Nadu and West Bengal had relatively low capital intensities. Out of these states, only Assam had lower labour productivity than the average while the other three states had higher capital productivity than the average.

TABLE 3.5

	1980-81			1989-90			1997-98		
	K/L	O/L	O/K	K/L	O/L	O/K	K/L	O/L	O/K
A.P.	0.46	0.09	0.20	0.56	0.16	0.28	0.91	0.30	0.34
ASSAM	0.26	0.10	0.38	0.48	0.36	0.76	0.95	0.26	0.27
BIHAR	0.99	0.14	0.14	1.11	0.43	0.39	1.80	1.07	0.60
GUJARAT	0.43	0.17	0.40	0.81	0.31	0.38	2.52	0.52	0.21
HAR	0.63	0.21	0.34	0.79	0.29	0.37	1.17	0.47	0.41
KAR	0.36	0.16	0.44	0.58	0.31	0.54	1.36	0.44	0.32
KERALA	0.32	0.15	0.46	0.54	0.33	0.61	0.79	0.29	0.36
M.P.	0.72	0.19	0.27	1.26	0.34	0.27	1.58	0.58	0.37
MAHA	0.40	0.23	0.59	0.93	0.48	0.52	1.78	0.73	0.41
ORISSA	0.62	0.16	0.25	1.90	0.42	0.22	2.91	0.66	0.23
PUNJAB	0.64	0.17	0.27	0.76	0.32	0.42	1.19	0.32	0.27
RAJ	0.78	0.18	0.24	0.94	0.27	0.28	1.77	0.60	0.34
T.N.	0.28	0.16	0.57	0.60	0.30	0.49	0.94	0.33	0.36
U.P.	0.44	0.10	0.23	0.89	0.31	0.35	1.98	0.59	0.30
W.B.	0.25	0.15	0.62	0.60	0.19	0.31	1.08	0.37	0.34
TOTAL	0.44	0.16	0.37	0.80	0.32	0.40	1.47	0.49	0.33

Source: Calculated from ASI(Summary Results), Various Issues.

By 1989-90, capital intensity in Punjab and Haryana went down but other states with high capital intensity in 1980-81 remained so. Maharashtra was a new entrant to this group of states with high capital intensity but it still had high labour and capital productivity. Labour productivity went up in Bihar and Orissa, with the former showing an improvement in capital productivity as well. Karnataka and Andhra Pradesh joined the group of states with low capital intensity in 1989-90. Capital productivity in Karnataka was high but it was not so in Andhra Pradesh.

Capital intensity further decreased in Haryana and Punjab during the nineties while it rose significantly in Bihar, Maharashtra, Orissa, Rajasthan and Uttar Pradesh. Gujarat, which had maintained average level of capital intensity till 1989-90, witnessed maximum growth in capital intensity during the nineties. Surprisingly, labour as well as capital productivity was very high in Bihar in 1997-98. Maharashtra managed to keep the factor productivities relatively high but capital productivity in Gujarat and Orissa were well below average capital productivity.

Investment pattern across states has been somewhat puzzling in the nineties. Gujarat, with low capital productivity, received investment at a much higher rate than most of the states while Bihar received relatively lower level of investment, although capital productivity was high in Bihar during the nineties. Institutional and non-economic factors might have been responsible for such distribution of investment across the states.

3.5 OUTPUT AND EMPLOYMENT ELASTICITIES WITH RESPECT TO FIXED CAPITAL

As seen in section 3.2, interstate disparity in per-capita fixed capital rose very fast during the nineties and this was accompanied by a marginal decrease in disparity in per capita net value added. This suggests that capital productivity might have risen faster in the states with relatively less per capita capital. Leaving aside the consideration of balanced regional development and focussing on maximization of net value added and employment generation at national level requires that optimal distribution of capital across the states is studied. For this purpose, it is important to determine the relative efficiency of capital in different states.

Output and employment elasticities with respect to fixed capital indicate towards relative efficiency of capital in promoting growth and generating employment in different states. Table 3.6 gives these elasticities for the fifteen states considered.

During the eighties, output growth potential of capital were maximum in Bihar and Assam but for both these states, employment elasticity was negative. Karnataka, Kerala and Punjab were the other states with relatively high elasticity of net value added with respect to fixed capital. Punjab and Karnataka also had high employment elasticities. were Andhra Pradesh, Haryana, Rajasthan and Tamil Nadu were the states with high employment elasticities. Andhra Pradesh, Tamil Nadu and Haryana had reasonable output elasticities as well. So, in order to make the best use of capital, major investment destination in.

TABLE 3.6
OUTPUT AND EMPLOYMENT ELASTICITIES WITH RESPECT TO FIXED CAPITAL

	1980-81 to 1989-90		1989-90 to 1997-98	
	Eok	Elk	Eok	Elk
A.P.	0.45	0.99	0.37	0.61
ASSAM	1.21	-0.09	-0.05	0.37
BIHAR	4.23	-0.74	1.56	-1.05
GUJARAT	0.36	0.03	0.14	0.10
HAR	0.40	0.87	0.45	0.41
KAR	0.67	0.19	0.23	0.34
KERALA	0.88	-0.52	0.12	0.71
M.P.	0.27	0.31	0.61	0.24
MAHA	0.46	-0.19	0.32	0.16
ORISSA	0.21	0.12	0.23	0.09
PUNJAB	0.56	1.08	0.09	0.22
RAJ	0.35	0.71	0.39	0.12
T.N.	0.44	0.42	0.23	0.53
U.P.	0.46	0.07	0.25	-0.04
W.B.	-0.04	-1.03	0.37	0.21
TOTAL	0.43	0.13	0.28	0.22

Eok = Elasticity of output with respect to fixed capital

Elk = Elasticity of labour with respect to fixed capital

Source: Calculated from ASI(Summary Results),Various Issues.

eighties should have been Punjab, Karnataka, Andhra Pradesh, Tamil Nadu and Haryana.

Table 3.2 reveals that only Punjab and Tamil Nadu received investments at rates higher than the average during the eighties. On the other hand, Gujarat, Orissa and West Bengal, which should have been among the least favoured destinations, received fairly high levels of investment. Thus, it can be concluded that the allocation of investment in fixed capital across states was not optimal with regard to output growth and employment generation in the eighties. In the nineties, output elasticities with respect to fixed capital were relatively high Andhra Pradesh, Bihar, Haryana, Madhya Pradesh, Rajasthan and West Bengal. Andhra Pradesh and Haryana had high employment elasticities whereas Madhya Pradesh and West Bengal had near average employment elasticities. None of the states with high employment elasticity had even an average output elasticity with respect to fixed capital. So, the preferred destination of investment should have been Andhra Pradesh, Madhya Pradesh, Haryana and West Bengal. Out of these states, only Andhra Pradesh received investment at an above average rate. On the other hand, for Gujarat, Orissa and Uttar Pradesh, both the elasticities are low but still Gujarat received investment at a rate much higher than any other state.

The correlation coefficients between rate of growth of capital for the states with output and employment elasticities in the two periods were -0.63 and 0.18 , and -0.61 and 0.43 respectively. This indicates that though the distribution of investment across the state failed badly in exploiting the output potential of capital in both the periods, investment pattern with regard to employment generation was much better in the nineties as compared to the

eighties. This also gets reflected in much higher growth in employment in the nineties as compared to the eighties.

3.6 SPECIALISATION OF THE STATES

Table 3.7 shows specialisation coefficients for the states in 1980-81, 1989-90 and 1997-98. Higher specialisation coefficient for a state means that the industrial base of that state is less diversified. In 1980-81, Bihar had the least diversified industrial base. This was probably due to location of large capital intensive industries so that capital was concentrated in very few industries. High specialisation coefficient might be a result of linkages not having developed in the state. Other states with relatively high degree of specialisation in 1980-81 were Assam and Rajasthan. Maharashtra, Tamil Nadu, Kerala and West Bengal had highly diversified industrial base in that year.

In 1989-90, apart from Bihar, Assam, Karnataka and Orissa also had relatively less diversified industrial base. During the eighties, Tamil Nadu and Uttar Pradesh also diversified their industrial base while Maharashtra and Kerala retained their diversified industrial structure. West Bengal's industrial base became less diversified although, relatively speaking, West Bengal still had a diversified structure. Nineties saw many states turning towards specialising their industrial base. Tamil Nadu, Uttar Pradesh, Gujarat, Andhra Pradesh, Karnataka, Kerala, Madhya Pradesh and Maharashtra had a relatively diverse industrial base.

TABLE 3.7

	SPECIALISATION COEFFICIENTS		
	1980-81	1989-90	1997-98
A.P.	0.19	0.19	0.13
ASSAM	0.39	0.70	0.50
BIHAR	0.50	0.45	0.52
GUJARAT	0.29	0.25	0.28
HAR	0.22	0.22	0.34
KAR	0.26	0.37	0.23
KERALA	0.18	0.18	0.22
M.P.	0.27	0.25	0.26
MAHA	0.13	0.16	0.18
ORISSA	0.27	0.33	0.36
PUNJAB	0.27	0.27	0.37
RAJ	0.30	0.29	0.34
T.N.	0.16	0.14	0.18
U.P.	0.31	0.17	0.16
W.B.	0.10	0.20	0.32

TABLE 3.8**CORR. COEFF. WITH SPECIALISATION COEFF.**

	1980-81	1989-90	1997-98
P.C.F.C.	-0.20	-0.46	-0.29
P.C.NVA	-0.57	-0.36	-0.38

CORR. COEFF. WITH LOCALISATION COEFF.

	1980-81	1989-90	1997-98
P.C.F.C.	-0.23	-0.34	-0.43
P.C.NVA	-0.19	-0.34	-0.43

Source: Both Tables Calculated from ASI(Summary Results), Various Issues.

Almost all other states' industrial structure became less diversified over the nineties.

The trend in specialisation suggests that in most of the industrialised states, extent of specialisation is relatively less. Table 3.8 supports this view. Correlation coefficient between per capita fixed capital and specialisation coefficients of the states was negative for all the three years considered. This negative association between the two was most pronounced in 1989-90. This means that capital is concentrated in relatively fewer industries in the states where capital is relatively scarce and some of the capital scarce states increased their specialisation during the eighties. Degree of specialisation increased during the eighties and declined during the nineties in capital abundant states. Also, degree of specialisation was more in the states where growth of net value added in the factory sector was slow in the eighties. This inverse relationship became weaker during the eighties and stabilised in the nineties. Probably, this was due to faster growth in some of the industrially backward states in the eighties. On average, diversification of industrial base of a state would attract extra investment and the state's net value added would also grow faster. Awasthi (1991), in his study of industrial structure of the states between 1961 to 1978, had found that most diversified states were those that were at a higher level of industrialisation.

Dholakia (1989) recommended greater specialisation of industrial structure in southern states and diversification in northern states. His idea was that

factor proportion equalisation across states would lead to increased growth of national economy. But only capital intensity would not suffice unless industrial structure of the states is also studied. In the nineties, the two southern states of Andhra Pradesh and Karnataka performed exceptionally well by diversifying their industrial base while the other southern states, which increased specialisation in their industrial base, did not do as well.

3.7 REGIONAL SPREAD OF INDUSTRIES

Table 3.9 shows localisation coefficients of different industry groups in 1980-81, 1989-90 and 1997-98. Manufacture of jute and other vegetable textiles (25), wood and wood products (27), leather and leather products (29), basic metals and alloys (33), gas and steam generation (41) and storage and warehousing services (74) were highly localised in all the three years except for manufacture of basic metals and alloys (33) which spread rapidly over space in the nineties. During the eighties, manufacture of non-metallic mineral products (32) and repair services (97) got concentrated in fewer states only to spread again in the nineties. Manufacture of wool, silk and man-made fibre (24), paper and paper products (28), metal products (34), transport equipment and parts (37) and electricity (40) spread out during the eighties. Out of these industries, manufacture of metal products (34), transport equipment and parts (37) and electricity (40) got more localised again during the nineties while the remaining industries in this group maintained their degree of localisation. During the nineties, manufacture of textiles (23) got concentrated in fewer areas while

TABLE 3.9

	LOCALISATION COEFFICIENTS		
	1980-81	1989-90	1997-98
20-21	0.25	0.22	0.18
22	0.26	0.29	0.33
23	0.34	0.29	0.27
24	0.46	0.36	0.37
25	0.77	0.80	0.78
26	0.33	0.31	0.40
27	0.50	0.42	0.52
28	0.35	0.28	0.27
29	0.53	0.49	0.52
30	0.28	0.27	0.28
31	0.24	0.24	0.18
32	0.32	0.39	0.33
33	0.50	0.48	0.29
34	0.32	0.20	0.32
35-36	0.22	0.19	0.24
37	0.40	0.32	0.39
38	0.38	0.33	0.36
39	0.00	0.41	0.57
40	0.16	0.10	0.16
41	0.52	0.63	0.53
42	0.46	0.37	0.60
43	0.00	0.00	0.00
74	0.58	0.66	0.51
97	0.26	0.42	0.30

Source: Calculated from ASI(Summary Results), Various Issues.

manufacture of rubber, plastic, petroleum and coal spread to the new states.

Correlation coefficients of per capita net value added and per capita fixed capital with localisation coefficient show almost identical trends. The relationship between localisation coefficient and per capita fixed capital is negative in all the three years. This negative relationship has become stronger, both between 1980-81 to 1989-90 and 1989-90 to 1997-98. The industries, which are concentrated in few areas, are likely to receive less capital and their output growths are also likely to be slower. However, this cannot be generalised for all industry groups as certain industries are dependent on some states' specific characteristics.

CHAPTER IV

FACTORS AFFECTING DISTRIBUTION OF INDUSTRIAL INVESTMENT AMONG THE STATES

4.1 INTRODUCTION

Uneven development of regions within a country can be attributed to a number of factors. One of the most important ones is investment. Investment plays a vital role in economic development. In fact it has a dual role. It increases the capacity of the economy to produce goods and services, thus easing the supply constraint. On the other hand, it generates employment and increases demand in the economy, thereby easing the demand constraint.

The problem of regional disparities is a legacy of the colonial period. At independence India inherited an economy characterised by enormous differences in the levels of development and living standards among its states. Apart from the differences in land settlement systems, investment policies of the British played a major role in generating this pattern. Public investment, which was mainly in irrigation and railways, was concentrated in a few pockets in line with interests of the colonial masters (Bharadwaj 1982).

After independence one major method used by the government to deal with the problem of regional disparities was to direct investment to backward

regions. In the second and third five year plans, the need to develop infrastructure in backward areas and to promote small-scale industries was recognised. Freight equalization and industrial licensing were also supposed to encourage investment in less developed areas. Basic industries were located in backward areas (steel plants in Bhilai and Rourkela, heavy electrical plant in Bhopal etc.,). Incentives were provided to private investors to set up investment in backward regions. However, despite all these efforts, the problem of regional disparities shows no sign of abating (Mathur 1994). Some studies show that it has aggravated in recent years (Ahluwalia 2000, Kurian 2000).

Against this backdrop, it is proposed here to look into the factors affecting industrial investment and to see whether some explanation can be provided for its variation among states. It should be borne in mind that the factors affecting public investment and those affecting private investment are entirely different. While the former depends on the policies of the government the latter is generally guided by profitability. The factors considered here are those influencing private investment. However, the data that has been used here are for total industrial investment as data on state-wise industrial investment by ownership is not available.

4.2 INVESTMENT THEORIES

Before moving on to the exercise, some of the theories of investment are being briefly reviewed here. Sarkar (1970) has considered investment theories of three categories. The first category consists of those which

take profits (total profits or profit rates) as an important determinant of investment. Investment can be dependent on (a) current profits, or (b) retained profits, or (c) other variables like output, sales, prices etc., which ultimately affect profits. The basis of the profits theory is that an increase in the level of profits actually experienced over a period of time may well lead to the expectation of continued increases in the future. In estimating the stream of net income of any prospective investment, businesses are likely to come up with higher figures of future returns if the estimates are being made at a time when their profits and economy-wide profits are rising than they would if the conditions are adverse. In other words, the firms come up with higher estimates of Marginal Efficiency of Capital leading to an increase in the level of profit maximising capital stock. This in turn results in higher investment.

The second category of investment theories is the well-known accelerator theories of investment. According to the accelerator theory, the incentive to acquire more capital goods arises not because the current profit record is favourable but the increases in output are putting pressure on firms' productive capacity. So the rate of investment spending is made to depend on changes in the level of output i.e.,

$$I_t = w (Y_t - Y_{t-1}), \quad \text{where}$$

I_t = Investment in period t,

w = capital-output ratio,

Y_t, Y_{t-1} = output in periods t and t-1 respectively.

The accelerator theory has a number of limitations. Two of them are:

- It does not hold in the presence of excess capacity
- It assumes perfectly elastic supply of financial resources

The third category of investment theories emphasises on the financial factors. For instance, the rate of interest charged on the firms' borrowings could influence investment.

The above theories do not present an exhaustive list of factors affecting industrial investment. There are several other determinants. Two of the important ones are 'infrastructure' and 'credit'.

4.3 OTHER DETERMINANTS

Infrastructural development is very important for industrial development of a region because it not only acts as an input or externality in other industries' production but it also creates massive demand due to sheer magnitude of the investment associated with it.

Infrastructure can be classified into two types-social and physical. The former consists of education, health care etc., while the latter consists of transport, irrigation, power, telecommunications etc. Infrastructure plays a vital role under Albert Hirschman's strategy of 'Unbalanced Growth'. There are two variants of Hirschman's strategy of unbalancing the economy. The first one is to

effect a large increase in social overhead capital (infrastructure). Increased availability of infrastructure services will attract private investment to directly productive activities. The second option before the government is to invest directly in directly productive activities. The consequent shortages in social overhead capital will generate pressures for increasing its availability. Hirschman calls the former strategy 'development via excess capacity' and the latter 'development via shortages' (Hirschman 1958). While development via excess capacity is a continuous smooth self-propelling process, development via shortages takes place in a disorderly manner.

Mathur (1994) examines spatial pattern and availability of three key infrastructural facilities—irrigation facilities, installed capacity for power generation and length of road network. Using regression he finds that the latter two facilities are important determinants of output growth.

A similar result is obtained by Ghosh and De (1998). Using Principal Component analysis they have combined six infrastructural variables (relating to transport, power, irrigation and telephones) to arrive at a Physical Infrastructure Development Index (PIDI). They find that PIDI plays an important role in explaining the differential income performances of the states. However, Dadibhavi (1991), in a study spanning the period 1970-71 to 1982-83, finds that the differential growth rates of power supply, surfaced road, and industrial credit do not explain the variations in industrial growth across states.

Kurian (2000) looks at the inter-state distribution of some infrastructure variables in the post reform period. In the case of power consumption, he finds that per capita power consumption in the more developed states is higher than the national average and it is lower than the national average for less developed states. While per capita power consumption in Punjab is 790 kWh, in Assam it is 108 kWh. Even though power consumption is an indicator of the level of activity in the economy, Kurian argues that it also reflects availability. Similarly in the motor vehicles, the all-India average was 44 vehicles per 1000 persons in 1997; it varied from a low of 16 in Bihar to a high of 103 in Punjab. Similar disparities are found in other infrastructure variables also—telecom density, irrigation etc.

Another major determinant of industrial investment is the availability of credit. Availability of cheap credit enhances the profitability of the investment. In India public sector commercial banks, development banks and other all-India Financial Institutions, including the private sector ICICI, have been providing credit at reasonable rates under various schemes to investors so as to induce them to take their investment to backward regions. Kurian (2000) shows that in the in the financial assistance disbursed by all-India Financial Institutions, developed states like Maharashtra and Gujarat individually corner more assistance than all the less developed states put together. As regards banks, bank branches are fairly distributed across the states. However, he finds that while the advanced states account for about 54 per cent of bank deposits, they get about 65 per cent of credit. The backward states account for 31 per cent of deposits and 21 per cent of

credit. This clearly shows that resources are flowing from the backward states to the advanced states. Also, credit-deposit ratios are much more favourable to the advanced states. This ratio captures the discrepancy between credit absorption and deposit mobilisation.

Public investment also plays an important role in influencing private investment. Since public investment is not guided entirely by profitability considerations the government can direct it into those areas where private investment is shy of entering. If public investment is in infrastructure, by enhancing the availability of infrastructural facilities, it will attract private investment—what Hirschman called ‘development excess capacity’. However, even if it is in productive activities, it will attract private investment through normal linkage effects. In the debate surrounding the industrial stagnation in India since the mid-sixties, many writers had pointed to the slowing down of public investment as a major factor responsible for industrial slowdown. (Patnaik and Rao 1977, Srinivasan and Narayana 1977). Even though that was in the overall national context, it holds good in the regional context also.

However in recent years, the importance of public investment has come down on two counts. Firstly, a natural concomitant of liberalisation has been retreat of the State from economic activities. Secondly, the budget constraint of the government has become more binding in recent years.

4.4. ROLE OF DIFFERENT FACTORS IN DETERMINING THE DISTRIBUTION OF INDUSTRIAL INVESTMENT ACROSS STATES

As observed in chapter III, dispersion in investment in fixed capital across the states increased during the nineties. In the light of these findings, it is attempted here to ascertain the role of different factors that led to rising disparity in fixed capital in the nineties. For this purpose, the effects of different factors on investment would be estimated for the years 1989-90 and 1997-98. Changes in relative importance of the factors in explaining the pattern of investment in two years would throw some light on the effects of changed economic environment in the nineties.

In the backdrop of the above discussion, the method of our study can now be formulated. As mentioned earlier, the objective here is to arrive at the factors affecting industrial investment. For this multiple regression is used. The equation is as follows:

$$Y_i = \beta_1 + \beta_2 X_1 + \beta_3 X_2 + \beta_4 X_3 + \beta_5 X_4 + \beta_6 X_5 + u_i,$$

where,

Y = Per Capita Investment in Fixed Capital

X_1 = Composite Index of Infrastructure

X_2 = Per Capita Net State Domestic Product

X_3 = Three Year Average of Per Capita Profits in the Factory Sector

X_4 = Per Capita change in Gross Block of Public Enterprises during the year

X_5 = Per Capita Credit to Industry

A word about the composite index is in order. This index has been constructed by combining different infrastructural variables using the statistical technique called Principal Component Analysis. Under this method, a set of correlated variables is combined into principal components. This is done by first standardizing the data matrix, and then deriving the correlation matrix. The eigen vectors associated with the eigen values of the correlation matrix are then multiplied with the standardized matrix to get the principal components. Here, weighted average of the first two principal components have been taken. Infrastructural variables that have been used to construct the composite index are ratio of gross generation of electricity and installed capacity in the states, road length per hundred square kilometer, telephone connections per hundred persons in the states. The data for these have been collected from District Profiles (CMIE, Oct 2000), Energy (CMIE, March-April, 1999) and current Energy scene in India (CMIE, July 1990).

Data for fixed capital and profits have been taken from Annual Survey of Industries while the data for per capita credit to industry were obtained

from District Profiles (CMIE, Oct 2000). Data for Gross Block of public enterprises and net state domestic products at 1980-81 prices have been obtained from Public Enterprises Survey and Statistical Abstract of India respectively.

Fixed capital and Gross block have been deflated using the wholesale price index of machinery and equipment while profits have been deflated using the wholesale price index of manufactured products. Mid-year population estimates were taken from Statistical Abstract of India.

Before the results are discussed, clarifications with regard to choice of variables need to be made. Average of per capita profits have been taken using the current and two preceding years' profit figures. This has been done because the profits of the recent past influence investment decisions according to the profit theory of investment. For electricity variable, the ratio of gross generation and installed capacity has been used. This ratio not only captures the availability, but also the efficiency in use of this component of infrastructure.

Net state domestic product has been used because it is an important indicator of the demand situation in an economy. Public investment has been considered to have a significant influence on regional disparity through direct and indirect effects on state economies (Ahluwalia, 2000; Prasad, 1988). Since the data on state-wise public investment in industry is not available, change in gross block, over the year has been taken as a proxy for public investment. According to Kumar (2000), gross block is the major component of fixed capital stock.

The results obtained from the regression exercised are summarised below:

1989-90

R^2	β_2	β_3	β_4	β_5	β_6
0.402	202.859	0.058	0.962	0.989	-0.237
t-values	1.92	0.61	1.16	0.98	-0.86

1997-98

R^2	β_2	β_3	β_4	β_5	β_6
0.377	226.41	-0.124	1.773	0.559	-0.071
t-values	0.703	-0.36	1.29	0.998	-0.36

In 1989-90, only infrastructure index appears to have a significant influence on per capita investment in the states. At 10 per cent level of significance, a state would have increased its per capita investment by Rs 202.859 if it managed to increase the index of infrastructure by one. An alternative interpretation could be that a state where infrastructure index is higher than any other state by Rs one would have a higher per capita investment by Rs 202.859. None of the other factors explain any change in per capita investment even at 10 percent level of significance although coefficient of per capita profits has a relatively high t-value. Surprisingly, per capita credit has a negative influence on investment, though it is not significant.

Another regression involving only infrastructure index was also run. For the regression equation

$$Y = \beta_1 + \beta_2 X_1 + u,$$

the result was as follows:

R^2	β_2
0.281	176.896
t-value	2.255

Though the magnitude of coefficient declined somewhat, the level of significance rose to 5 per cent level.

For 1997-98, none of the coefficients were significant along with per capita credit, net state domestic product also had a negative sign. Taking per capita profit alone as independent variable, the equation

$$Y = \beta_1 + \beta_4 X_3 + u$$

yielded the following result:

R^2	β_4
0.240	1.262
t-value	2.024

The coefficient was significant at 10 per cent level of significance. The results suggest that if the per capita profit in a state were higher by Rs one, per capita investment would be higher by Rs 1.262.

Comparing the results for the two years indicates that the levels of infrastructure stopped being the dominant determinant of investment pattern across the states in the nineties and profitability became the most important factor affecting capital shift across the states. Falling share of public investment in the factory sector might have led to the increase in importance of profit as determining factor. Declining role of infrastructure as the guiding force could be due to the fact that the states with high infrastructure index may be facing a shortage, as infrastructure development has not been at par with industrial growth.

CHAPTER V

CONCLUSION

The main purpose of this study was to analyse the investment pattern in the factory sector across the industry groups and the states. Impact of the patterns in the eighties and the nineties were studied. An attempt was made to evaluate the impact of different factors in determining the investment pattern across the states and if over the nineties, their importance has changed. Major finding of the study are summarised below.

For the whole of the factory sector, growth in net value added in the eighties and the nineties were not very much different, but fixed capital and employment grew faster in the nineties. This suggested that productivity in the liberalised economic environment actually declined. At least for the period under study, reforms do not seem to have had any positive influence on efficiency in production.

Growth in capital intensity was also higher in the nineties as compared to the eighties. Unlike the past, private sector has been more responsible for increasing capital intensity since the eighties. Capital intensity in the public sector has not been rising as fast as in the private sector, while capital and labour productivity has been rising in the public sector, more so in the nineties. At disaggregated level, growth in capital intensity in nineties were most

pronounced in manufacture of food products, chemicals and chemical products, non-metallic mineral products, paper and paper products, leather and leather products, basic metals and alloys and metal products.

Capital productivity declined in most of the industry groups in the nineties, whereas it improved slightly over the eighties. Total factor productivity growth in the nineties was also relatively lower as compared to the eighties. Surprisingly, some of the industry groups with impressive growth in the net value added also witnessed a decline in the total factor productivity growth. Across the industry groups, the relationship between capital intensity and total factor productivity growth was insignificant in the eighties that turned significant and negative in the nineties.

Elasticity of employment with respect to fixed capital was higher in the nineties as compared to the eighties, whereas elasticity of net value added was slightly less. The range, between which elasticities for different industry groups varied, was smaller in the nineties. This indicates that there is scope for diversification of industrial base without compromising on efficiency. The actual investment pattern across the industry groups was not in line with considerations of exploiting the employment generating and productive capacity of capital.

In the eighties, a strange mix of some industrialised and some industrially backward states gained in terms of investment. In the nineties, this trend changed with industrialized states dominating in terms of attracting

investment. Bihar saw a secular and rapid decline in its share in fixed capital over the two periods.

There was marginal increase in disparity in per capita fixed capital in the eighties but it increased rapidly during the nineties. Disparity in per capita net value added decreased substantially across the states, while the decrease was much smaller in the nineties. This means that capital deficient states had relatively higher capital productivity during the period of the study.

As per the shift analysis for per capita fixed capital, there was convergence in the eighties, whereas there was negligible convergence during the nineties. However, such a result was obtained because states like Bihar and Andhra Pradesh, which had higher per capita fixed capital than the average, and Orissa, Madhya Pradesh and Tamil Nadu, which had lower per capita fixed capital than the average in 1980-81, received investment at such rates that Bihar and Andhra Pradesh had per capita fixed capital well below and Orissa, Madhya Pradesh and Tamil Nadu much above the average in 1989-90. When this is considered along with the trend in disparity in per capita fixed capital, it may be deduced that convergence took place during some initial years following 1980-81. Thereafter, disparity increased as some states which were initially above average in terms of per capita fixed capital, not only became below average states but their share continued to decline, specially during the nineties. This effect was not captured by shift analysis. In the nineties, Gujarat, in a major way, and

Maharashtra attracted investment at high rates with their contribution being towards widening in terms of per capita fixed capital of the states.

There was no clear relationship between growth of capital intensity and capital productivity across the states in the eighties. This may be due to the fact that some of the states with high capital productivity witnessed very slow growth in employment resulting in high capital intensity in those states. In the nineties, investment pattern does not appear to be guided by capital productivity in the states. Gujarat, which had quite low capital productivity, received investment at a rate higher than any other state.

Elasticity of net value added with respect to fixed capital was lower in the nineties as compared to the eighties, whereas employment elasticity in the nineties was greater. Some of the industrially backward states had high output in the eighties but employment elasticity was not as good in these states. However, some of these states improved their employment elasticity as well in the nineties. Investment pattern was equally bad in the two decades on the consideration of output elasticity across the states but on the consideration of employment generation, distribution of capital across the states was slightly better in the nineties.

Most of the industrialised states had relatively more diversified industrial base. The states with lesser degree of specialisation generally received more investment and their growth in net value added was also higher.

Specialisation increased in many states in the nineties. This does not auger well for the future with regard to growth as well as regional balance.

For most of the industry groups, the extent of regional spread either declined or remained same during the nineties. The trend in regional distribution of fixed capital in different industry groups in the eighties was opposite to that in the nineties. An industry which was concentrated in few states, was likely to receive less investment and the growth in net value added was also likely to be slow. The trend in the nineties in this regard was undesirable.

Among the factors considered to be affecting the rate of investment in different states, level of infrastructure was found to be the most significant factor before liberalisation. In the nineties, profitability was the single most important factor that explained the variation in rate of investment across the states.

Emergence of profitability as the major criterion for movement of capital may be a result of gradual decline in the share of public investment in total industrial investment. Infrastructure relatively lost its explaining power regarding the movement of investment in the nineties. This could be a result of very high growth in industry in the states with very high level of infrastructure. As growth in infrastructure did not keep pace with industrial growth in these states, capital inflow in these states might have slowed down.

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