CMDR Monograph Series No. - 50

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Abstract

The paper analyses the size, growth and productivity performance of the unorganized manufacturing sector in India during 1978-79 – 2000-01. The study shows evidence of increase in size with a slowdown in the reforms period. Evidence indicates that the rate of growth varies widely across the two-digit industries but the variation in growth rate is smaller in the 90s. Textiles and machinery goods were the fastest growing segments of Indian unorganized manufacturing sector in the reforms period. Both the partial factor productivity approach and total factor productivity approach reflect that productivity of the sector has improved during the period under study. The decomposition of productivity growth into technical change and efficiency change reveals that the latter has been the major contributor to TFPG during the period under study. It is also found that capital intensity and wage rate are essential factors for augmenting labour productivity levels in the sector.

JEL Classification: D24; O47; R11

Keywords: Unorganized Manufacturing; Reforms; Productivity Growth

*This study forms a part of my Ph.D thesis submitted to IIT Madras. I am thankful to my supervisor Malathy Duraisamy for valuable insights and advice. Helpful comments from D Jayaraj, Uma Rani, P R Panchamukhi, Suresh Babu and Mihir K Mahapatra are gratefully acknowledged. The usual disclaimers apply.

1. Introduction

Manufacturing is an important sector in the Indian economy accounting for about 31 percent of the non-agricultural sector and 25 percent of the overall GDP in India (Kalirajan and Bhide, 2004). This sector with a growth rate of 9.3 per cent was a fast growing segment of India's domestic economy in the 1990s (Thomas, 2002). India's manufacturing sector has a large unorganized component (comprised of units with less than 10 employees using power and those units with 10 to 19 employees not using electric power) employing about 3/4th of the manufacturing workforce and contributing to 17 percent of the total NDP of the unorganized non-agricultural sector (Kulashreshta and Singh, 2001). An interesting observation is that in the post 1997-98 period, output in the organized sector has grown at a slower rate than in unorganized manufacturing and this is due among other things to emergence of flexible production systems and substantial increase in outsourcing by the organized sector (Kalirajan and Bhide, 2004). Urbanisation and rural to urban migration are the other reasons for the rapid growth of unorganized manufacturing sector. Given the crucial role of the manufacturing sector in India's economic growth, more attention needs to be directed to the sector and this implies that the large and burgeoning unorganized segment of the sector cannot be ignored. Thus there is a need to study the size, structure and performance of unorganized manufacturing sector in India.

There is a large body of literature on growth, productivity, and other aspects of the organized manufacturing sector. Surprisingly, only a small number of studies have addressed these issues in the context of the unorganized manufacturing sector. This bias is even clearly visible in the Indian statistical systems (Kundu, 1998)[1] . Breman attributes this neglect " both to lack of knowledge regards the lower level of the urban economy and the lack of affinity with methods of research that could increase that knowledge" (Breman, 1999: 409). Given this lacuna, it become crucial to analyze the growth and productivity performance of the unorganized manufacturing sector which forms the subject of inquiry of the present study.

The present study is an attempt to analyze the structure, employment, and levels and changes in factor productivity and intensity in the unorganized manufacturing sector at the aggregate and disaggregate level, for the period 1978-79 to 2000-01. Specifically, the study addresses the following objectives:

1. To analyze the size, structure and growth of the unorganized manufacturing sector during the pre-reforms and reforms periods
2. To study the trends in factor productivities and factor intensity in the unorganized manufacturing sector during the pre-reforms and reforms periods

3. To determine the sources of labour productivity growth in the unorganized manufacturing sector
4. To examine inter-industry variation in total factor productivity growth and its components namely, technical change and technical efficiency change

The scheme of the paper is as follows. Section 2 presents a selective review of literature on the unorganized manufacturing sector in India. The database, variables and methods used in the study are discussed in section 3. Section 4 examines the size, structure and growth of the sector. The levels and changes in factor productivities and factor intensity are analyzed in section 5. In section 6, the determinants of labour productivity growth are analyzed. The total factor productivity growth is decomposed into technical change and efficiency change and this is presented in Section 7. Last section summarizes the major findings of the study.

2. Review of Literature

Most of the studies on the unorganised sector have considered the size and growth of the sector and its contribution to GDP, etc. (Visaria and Jacob, 1996; Kulshreshta and Singh, 1998; Kulshreshta and Singh, 2001; Mitra, 2001; Kabra, 2003). It has been shown that over the years the value addition by the sector has dwindled fairly markedly but the number of people employed in the sector has increased. Recently there have been some attempts to measure the productivity performance in the sector (Duraisamy, 2000; Unni et al., 2001; Kundu et al., 2001; Bhalla, 2001; Raj and Duraisamy, 2005). Some studies have found a large part of the informal sector units to be functioning at a low level of labour productivity (Duraisamy, 2000; Kundu, 2001). Duraisamy (2000) has found striking growth in the productivity of capital employed in the sector but the units are found to be operating with low level of capital assets (Kundu, 2001). Bhalla (2001) computed TFP growth in the unorganized manufacturing sector for two periods, 1984-85 to 1989-90 and 1989-90 to 1994-95 using growth accounting method. The study reported a positive TFP growth in NDMEs in the rural areas and a high negative TFP growth in DMEs in the urban areas in the first period. The growth in TFP in the second period was negative in both types of enterprises in urban and rural areas. Unni et al. (2001) found that the unorganised sector has witnessed positive labour and capital productivity only during the late 80's. They observed that both the organized and unorganized sector in India witnessed a decline in TFP during the period under study. The TFP growth was higher in the pre-reforms period but appeared to decline in the reforms period, especially in the unorganized sector. However, this study has classified the unorganised manufacturing sector into certain broad categories like basic goods, intermediate goods, capital goods,

consumer goods, etc. and has not taken account of the industries at a more disaggregate two-digit level. Raj and Duraisamy (2005) examined the productivity performance of the sector for the period 1984-85 to 1994-95 using partial factor productivity ratios. The study has considered only the OAMEs and NDMEs. It has been found that the sector has recorded a better performance during the period in terms of value added per unit, labour productivity and capital productivity, and the performance was more striking in labour intensive industries.

Available studies on the unorganized manufacturing sector are mostly at the aggregate level, or refer to specific region, or sector. Further, the studies have mostly considered the period up to 1994-95. There is paucity of research on Total Factor Productivity (TFP) growth in the sector, sources of TFP growth – technical efficiency change and/or technical change - particularly at the disaggregate industry level. The present study makes an attempt to fill these visible gaps in the literature.

3. Data, Variables and Methods Data

The study is based exclusively on secondary data. The data are drawn from the large national surveys conducted by the National Sample Survey Organization (NSSO) in its 33rd (1978-79), 40th (1984-85), 45th (1989-90), 51st (1994-95) and 56th (2000-01) rounds. In order to obtain the figures for the unorganized sector as a whole, data for each enterprise type (OAMEs, NDMEs and DMEs) and by location (rural and urban) have been added. In order to examine the impact of reforms, the entire time period (1978-2001) has been sub-divided into Pre-Reforms period (1978-79 to 1989-90) and Reforms period (1989-90 to 2000-01)[2].

A major issue that needs to be solved while comparing the NSSO rounds is the choice of National Industrial Classification (NIC). The NSSO has used different NIC in its different survey rounds. The report for the 33rd and 40th rounds provides data as per NIC 1970, those for 45th and 51st as per NIC 1987 and the latest 56th round report as per NIC 1998. While concordance of NIC 1987 with 1970 required only the interchanging of divisions 30 and 31, matching of NIC 1987 with NIC 1998 requires a greater degree of approximation by relevant grouping. The exact concordance between 2-digit industry groups of NIC 1987 with that of NIC 1998 requires data on some 3- and 4-digit industrial divisions which are not readily available in the published report for 56th round (Report Numbers 478 and 479). Therefore, one has to depend on the unit level data for the 56th round available from the NSSO. In this study, the nineteen two digit industries are reclassified into 15 industry groups to enable comparison across various rounds following the NIC 1987. Details of 15 industry groupings clubbed for the

purpose of this study (which may differ with the groupings made in other studies) are given below.

Variables

The size and structure of the sector are analyzed using four indicators/variables namely, number of enterprises, employment, fixed capital stock and gross real value

Table 1 - Concordance Table

Name of the Industry	NIC 1987 (Two digit)	NIC 1998
Manufacture of food products	20 - 21	151 + 152 + 153 + 154 + 15544
Manufacture of beverages, Tobacco and related products	22	(155 - 15544) + 16
Manufacture of cotton textiles, wool, silk and man-made fibre textiles and jute and other vegetable fibre textiles	23 + 24 + 25	171 + 01405
Manufacture of textile products (including wearing apparel)	26	172 + 173 + (181 – 18104)
Manufacture of wood and wood products; furniture and fixtures	27	20 + 361
Manufacture of paper and paper products and printing, publishing and allied industries	28	21 + 22
Manufacture of leather and products of leather, fur and substitutes of leather	29	18104 + 182 + 19
Manufacture of basic chemicals and chemical products (except products of petroleum and coal)	30	24
Manufacture of rubber, plastic, petroleum and coal products; processing of nuclear fuels	31	23 + 25
Manufacture of non-metallic mineral products	32	26
Basic metal and alloys industries	33	27 + 371
Manufacture of metal products and parts except machinery and equipment	34	2811 + 2812 + 289
Manufacture of machinery and equipment other than transport equipment	35 - 36	2813 + 29 + 30 + 31 + 32 + 3311
Manufacture of transport equipment and parts	37	34 + 35
Other manufacturing industries	38	(33 – 33111) + 369

added. The definition and measurement of these variables are as follows.

Gross Real Value Added

Gross value added figures have been used to represent output. Use of gross value added at constant prices to represent output is a common practice in the Indian empirical literature (Goldar, 1986; Ahluwalia, 1991; Balakrishnan and Pushpangadan, 1994; Balakrishnan and Pushpangadan, 1998). Studies on the unorganized manufacturing sector in India have by and large used the single deflation method to deflate the gross value added (Unni et al., 2001; Rani and Unni, 2004). The implicit deflators of gross domestic product of the unorganized manufacturing available at the two-digit industry group level have been used to deflate gross value added at the industry level. The advantage of using this deflator is that it not only takes care of the general changes in the price level in the economy, but also the changes in the prices of those goods and services that constitute the value added, namely, the output and inputs. In this sense, this deflator has the advantage of the double deflation method. Since the values of gross domestic product were expressed in three different bases (1970-71, 1981-82 and 1993-94), they have been arithmetically brought to a common base year (1993-94) through splicing method.

Fixed Capital Stock

The measurement of capital input is rather problematic, and has been a controversial topic in theoretical as well as empirical literature (for a discussion on capital stock measurement see Raj and Mahapatra, 2006). Despite its limitations, most studies in the unorganized manufacturing sector in India have used book value of total fixed assets owned by the unit on the closing date of the accounting year to represent capital input (Unni et al., 2001; Rani and Unni, 2004). Fixed assets include land, buildings and other constructions, plant and machinery, transport equipment, tools and other fixed assets that have a normal economic life of more than one year from the date of acquisition. The use of gross figures to represent the capital stock can be justified in the case of developing countries such as India in general, and unorganized manufacturing sector in particular, on the ground that capital stocks are more often used at approximately constant levels of efficiency for a period far beyond the accounting life measured by normal depreciation until they are eventually discarded or sold for scrap (Salim and Kalirajan, 1999; Hossain and Karunaratne, 2004). In essence, the value of old machine may decline but it need not lead to any decline in the current services of the capital equipment. Due to the absence of data on fixed capital stock formation at the industry level, the present study used gross fixed capital stock formation by unregistered manufacturing sector at the all India level to deflate fixed capital stock in the unorganized manufacturing sector. The values are expressed in 1993-94 prices.

Employment

Total number of persons engaged is taken as the measure of labour input. As both workers, working proprietors and supervisory/managerial staff can affect productivity, so number of persons engaged is preferred to number of workers. Workers include full-time, part-time, hired and other workers.

Number of Enterprises

The unorganized manufacturing sector is comprised of three types of enterprises, namely, Own Account Manufacturing Enterprises (OAMEs), Non-Directory Manufacturing Enterprises (NDMEs), and Directory Manufacturing Enterprises (DMEs). OAMEs employ only family labour while NDMEs and DMEs employ hired labour. The number of workers is less than six in case of NDMEs and more than or equal to six in case of DMEs. The data on total number of enterprises were not available for the unorganized sector as a whole. In order to arrive at it, data for each enterprise type (OAMEs, NDMEs and DMEs) and by location (rural and urban) have been summed.

Methods

The performance of the sector is examined using growth in value added and changes in employment and share of investment during the pre-reforms and reforms period. Growth rates, shares and factor ratios are computed. The productivity estimates are obtained using partial and total factor productivity methods. Econometric technique is used to estimate the determinants of labour productivity growth. Non-parametric method namely DEA and Malmquist index are used to obtain estimates of TFP and its components. The methods are discussed in relevant sections.

4. Size, Structure and Growth of the Sector

Size of the Sector

The size of unorganized manufacturing sector and changes in it over the last two decades are analyzed using indicators such as number of enterprises, employment, fixed capital stock and gross value added. Table 2 shows the basic features for the period 1978 - 2001. It may be observed that the number of enterprises and workers in the unorganized manufacturing sector have almost doubled in about two decades since 1978-79. All the indicators witnessed positive average annual growth during the pre-reforms (1978-79 to 1989-90) and reforms period (1989-90 to 2000-01). Surprisingly, in the latter period, there has been a decline in growth especially in number of enterprises and employment.

Table 2 Size and Growth of the Unorganized Manufacturing Sector

Variable	1978-79	2000-01	Growth Rate	Pre-reforms Period	Reforms Period
Enterprises (in lakhs)	84.69	170.24		6.77	0.4
Employment (in lakhs)	182.14	370.81		6.89	0.4
Fixed Capital (in billion)	71.16	495.98		14.14	5.79
Gross Value Added (in billion)	86.57	412.28		12.23	3.77

Note: (i) Pre-reforms period corresponds to 1978-79 to 1989-90 and Reforms period corresponds to 1989-90 to 2000-01.

(ii) Real Annual Average Growth has been estimated using $\left(\frac{Y_t}{Y_0}\right)^{1/n}$.

Source: National Sample Survey Organization (NSSO) surveys on the unorganized manufacturing sector, various rounds.

A similar pattern of decline in growth rate is noticed across different types of enterprises, namely OAMEs, NDMEs and DMEs, during the reforms period (Table 3). In other words, compared to the pre-reforms period, the growth of number of enterprises, employment, fixed capital and gross value added witnessed a fall irrespective of types of enterprises and location (rural and urban).

Table 3: Size and Growth of the Sector by Types of Enterprises and Location

Variable		1978-79	2000-01	Pre-Reforms (GR)	Reforms Period (GR)
Enterprises (in lakhs)					
Types	OAME	71.78	146.65	6.99	0.36
	NDME	9.56	17.12	5.46	0.46
	DME	3.35	6.47	5.4	1.21
Sector	Rural	63.68	119.35	6.76	-0.23
	Urban	21.01	50.9	6.8	2.09
Employment (in lakhs)					
Types	OAME	116.14	250.61	7.76	0.2
	NDME	27.86	55.62	6.26	0.77
	DME	38.13	64.58	4.37	0.91
Sector	Rural	125.04	239.86	6.94	-0.18
	Urban	57.11	130.95	6.79	1.58
Fixed Capital (in Rs. billion)					
Types	OAME	29.05	194.28	15.92	3.92
	NDME	19.72	134.17	15.55	4.38
	DME	22.39	167.52	9.6	10.47
Sector	Rural	38.24	190.34	12.92	3.61
	Urban	32.92	305.64	15.41	7.49
Gross Value Added (in Rs. Billion)					
Types	OAME	34.25	174.3	13.35	3.46
	NDME	17.62	103.15	14.76	3.61
	DME	34.7	134.82	9.33	4.32
Sector	Rural	38.69	182.68	12.25	3.67
	Urban	47.88	229.6	12.21	3.85

Source: NSSO surveys on the unorganized manufacturing sector, various rounds

Analyzing the growth of the sector by enterprise type in the pre-reforms period, it is found that OAMEs and NDMEs demonstrated higher growth rates in all the indicators where as in the reforms period DMEs overtook these two enterprise types (Table 3). Similarly, comparing the rural and urban areas it may be seen that there was not much difference in the pre-reforms period but in the reforms period the growth rate in all the indicators is higher in urban compared to rural areas. In fact, growth of enterprises and employment is negative in rural areas.

Structure of the Sector

For a better understanding the structure of the sector is examined in terms of four indicators at the dis-aggregate two-digit industry level. The NSSO provides data for 19 two-digit industries. For the purpose of the study, they are grouped into 5 broad industry groups: Food and related (21, 22); Textiles and related (23, 24, 25, 26); Wood, paper and leather (27, 28, 29); Minerals and metal (32, 33, 34); and others (30, 31, 35, 36, 37, 38). The structure of the sector is analyzed by examining the changes in the share of each industry group in the four indicators, number of enterprises, employment, fixed capital stock and gross value added between two different time points, 1978-79 and 2000-01. Figures 1 to 4 show the share of each industry group in total number of enterprises, employment, fixed capital stock and value added in 1978-79 and 2000-01.

Share in Enterprises

In terms of share in enterprises to total, the manufacture of textiles and cotton goods (30.7 per cent) is the major industrial activity, closely followed by the manufacture of food and beverages (30 per cent) in 2000-01. These two industry groups together account for about 2/3rd of the total enterprises in the unorganized manufacturing sector. Comparing the share in enterprises in 1978-79 and 2000-01, a striking finding is the significant increase in the share of food and related, category which includes the manufacture of food and beverages. During the same period, all categories except the category representing 'other' manufacturing industry groups witnessed decline in the share in enterprises (Figure 1).

Share in Employment

Textiles and food products are the major industries that employed largest number of workers (57 percent) in the sector in 2000-01. However, comparing the share in employment between 1978-79 and 2000-01, the manufacture of food and related items shows evidence of considerable improvement in relative importance from 23.6 percent to 27.6 percent compared to textiles, which recorded considerable erosion in its share from 35.8 percent to 29.1 percent (Figure 2).

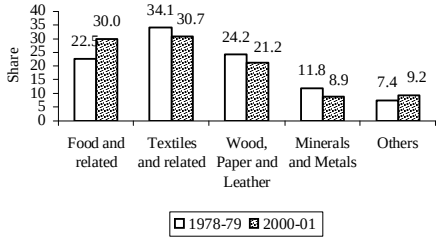


Figure 1 Industry Category wise Share of Number of Enterprises in the Unorganized Manufacturing Sector
Source: 33rd and 56th rounds of NSSO Surveys

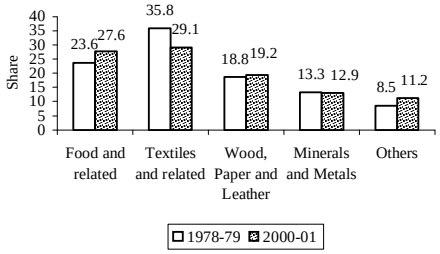


Figure 2 Industry Category wise Share of Number of Workers in the Unorganized Manufacturing Sector
Source: 33rd and 56th rounds of NSSO Surveys

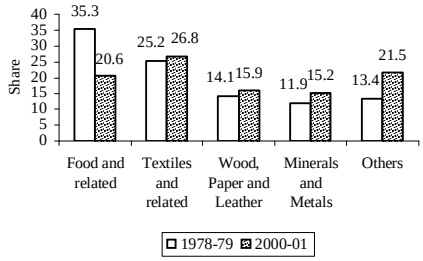


Figure 3 Industry Category wise Share of Fixed Capital Stock in the Unorganized Manufacturing Sector
Source: 33rd and 56th rounds of NSSO Surveys

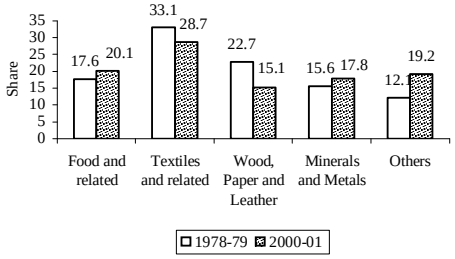


Figure 4 Industry Category wise Share of Gross Value Added in the Unorganized Manufacturing Sector
Source: 33rd and 56th rounds of NSSO Surveys

Share in Fixed Capital Stock

The manufacture of textiles and related goods has maintained its supremacy in fixed capital stock as well. While most of the industry groups have increased their share in fixed capital stock over the period, manufacture of food and beverages alone emerges as the category that has registered a marked decline in its share from 35.3 percent in 1978-79 to 20.6 percent in 2000-01 (Figure 3).

Share in Gross Value Added

In the case of value added too, manufacture of products related to textiles and food are the best performers. However, the manufacture of textiles and related items has registered a decline in its share from 33.1 percent to 28.7 percent where as food and related category has marginally improved its share. Besides textiles, the manufacture of wood, paper and leather has also registered a significant decline in its share from 22.7 percent to 15.1 percent (Figure 4).

Increase in the Number of Enterprises, Employment, Fixed Capital Stock and Gross Real Value Added

In order to have more insights on the above trends discussed for the broad industry categories, the analysis is repeated at the two-digit industry level which yields an interesting picture. Table 4 shows that number of enterprises, employment, fixed capital stock and value added have increased in all the industries during the period under study. It is apparent from the table that beverages industry has primarily contributed to the growing importance of food and related category. At the same time, the manufacture of cotton and textiles registered an absolute increase in the four variables but the performance was still below that of beverages, contributing to the decline in share of the textiles category (Table 4). Further, the increase in capital stock was three fold compared to the increase in employment in most of the industries. Perhaps this is indicative of a shift towards more capital-intensive production process in these industries.

Table 4 **Indices of Enterprises, Employment, Fixed Capital Stock and Gross Value Added in the Unorganized Manufacturing Sector**

Change over 1978-79				
	1978-79 = 100			
Industry Class	Enterprises	Employment	Fixed Capital Stock	Gross Value Added
Food	187	187	365	418
Beverages	1078	692	918	656
Cotton	128	114	406	215
Textiles	249	246	1087	465
Wood	211	237	689	212
Paper	390	321	1088	528
Leather	70	100	441	443
Chemicals	381	399	656	384
Rubber	216	198	679	299
Minerals	159	216	791	597
Basic Metal	144	132	394	256
Metal Products	188	225	1123	382
Machinery	326	336	1008	677
Transport	85	189	1322	446
Others	286	285	1611	943
All Industries	225	220	672	394

Source: Computed using NSSO survey data.

In sum, our analysis shows evidence of increase in size with a slowdown or decline in the reforms period. The analysis at the disaggregate industry level points to the declining importance of textiles and related industry in terms of the four indicators of size and structure used in the study.

Growth of Unorganized Manufacturing Sector

Growth in Real Value Added

The gross value added (GVA) by the unorganized manufacturing sector registered a growth of 9.4 percent and 4.4 percent respectively in the pre-reforms (1978-79 to 1989-90) and reforms period (1989-90 to 2000-01). The rates of growth, however, showed marked variation across the two-digit industries and, for the same industry, between the two time periods, which is shown in the accompanying chart and explained below.

Figure 5 shows rate of growth of value added in the two-digit industries, with rate of growth in the pre-reforms period plotted on the X-axis and those in the reforms period on the Y-axis. The origin in the scatter plot corresponds to the growth rates for the total unorganized manufacturing sector as a whole - 9.4, 4.4 respectively in the pre-reforms and reforms period. The first quadrant

represents those industries whose growth rates are above the average for the unorganized manufacturing sector as a whole in the pre-reforms and reforms periods; and the second quadrant includes those industries with growth rates above the average for the reforms period but below the average for the pre-reforms period. The other two quadrants are similarly defined and shown in the diagram.

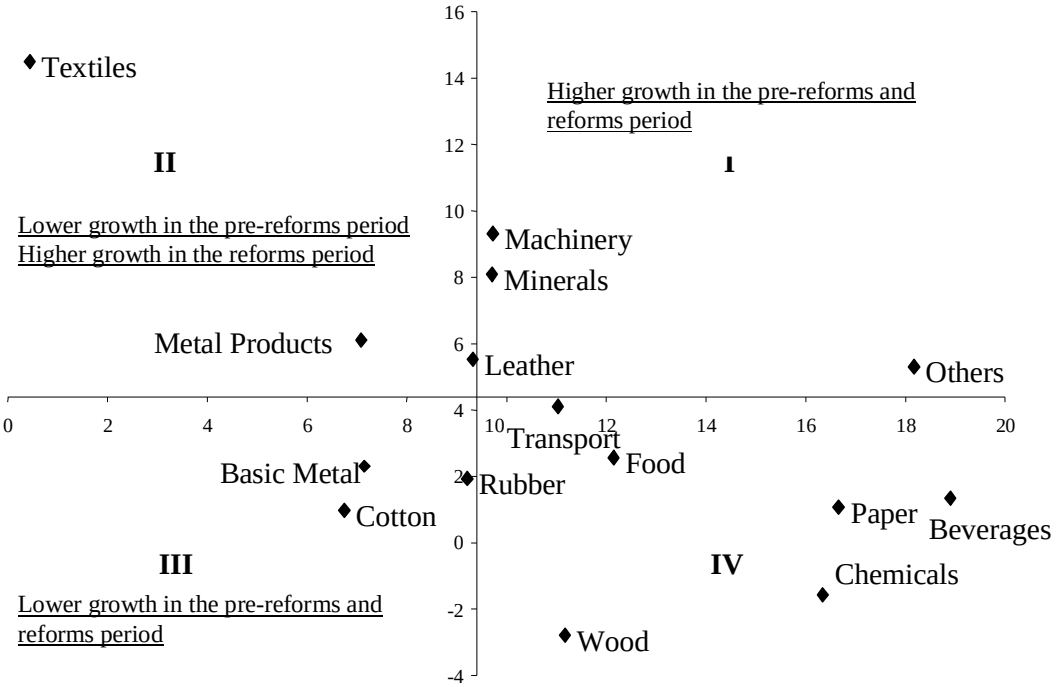


Figure 5 Rates of Growth of Gross Value Added in Two-Digit Industries, Unorganized Manufacturing Sector in India

Note: All value figures are at constant 1993-94 prices.
Source: Computed using NSSO survey data.

Rates of Growth in Value Added across Industries

The estimated growth rates of GVA shows that in the pre-reforms period growth rates varied from a high of 18.9 percent in the manufacture of beverages to a low of 0.4 percent in the textiles industry. However, this wide variation in growth rates witnessed in the pre-reforms period, slightly declined in the reforms period, judging from the lower growth rates registered by the industries during the reforms period. The manufacture of textiles, machinery goods and minerals registered very high growth rates of 14.5 percent, 9.4 percent and 8.1 percent respectively during the reforms period while the manufacture of chemicals and wood products registered negative growth rates of –1.5 percent and – 2.8 percent respectively in the same period. Overall, the inter-industry variation in output growth was *smaller* in the reforms period.

The manufacture of machinery goods and minerals have registered growth rates above the average for the unorganized manufacturing sector as a whole both in the pre-reforms and reforms periods (see Figure 5, quadrant I). In contrast, three industries, namely basic metal, cotton and rubber (see Figure 5, quadrant III) have witnessed output growth below the average for the unorganized manufacturing sector in the two periods (Box 1). It is also observed that the growth of output in these industries further slowed down in the reforms period as compared to the pre-reforms period.

Box 1 Industry Performance

Industry	Performance
Machinery, Minerals	Higher growth in the pre-reforms and reforms period
Basic Metal, Cotton, Rubber	Lower growth in the pre-reforms and reforms period
Textiles, Metal Products, Leather	Upswing in growth in the reforms period
Wood, Chemicals	Slump in growth in the reforms period

Another interesting finding is that the rates of growth were less than the average (for the unorganized manufacturing sector) for three industries namely, metal products, leather goods and textiles in the pre-reforms period but were among the few industries that have registered growth rates above average for the sector in the reforms period (see Figure 5, II quadrant). In particular, performance of textile industry is noteworthy. The rate of growth of value added by the industry experienced a turnaround from lowest growth in the pre-reforms period (0.4 percent) to highest among all the industries in the reforms period (14.5 percent). It appears that these industries have benefited the most from the reforms initiated in the 90s. In contrast, wood products, chemicals, paper products, beverages, food products and transport goods (see Figure 5, IV quadrant) witnessed a reversal in their performance in the reforms period. They recorded very low growth rates in the reforms period, after an impressive performance in the previous decade.

Investment and Growth of Employment

This section presents a discussion on changes in investment, defined as addition to fixed capital stock and employment across industries in the unorganized manufacturing sector during the pre-reforms and reforms periods. From Table 5, it is evident that the sector witnessed an overall increase of about 160 lakh workers in the pre-reforms period and 40 lakh workers in the reforms period. The growth of employment was however not quite encouraging during the reforms period. In 10 out of 15 industries, employment increased in both the periods but the growth of employment declined substantially during the reforms period especially in industries producing food products and beverages (Table 5). In terms of investment, all industries registered a consistent growth in both the periods. However, the share of most of the industries in total investment declined in the reforms period.

In the pre-reforms period, only the manufacture of textiles recorded a decline in employment of 70,000 workers. On the other hand, industries such as wood products, beverages and food products registered the largest increase in employment in the same period. These three industries together accounted for around 60 percent of the total employment generated in the sector (94,10,000 out of 1,59,60,000).

Textiles industry that showed a decline in work force in the pre-reforms period recorded huge increase in employment in the reforms period (43,20,000) – which is 63 percent of total employment generated in the sector. As against this, the manufacture of cotton, wood products, basic metal and leather goods registered a considerable decline during the said period. In the 'jobless' decade of reforms period, 11,30,000 employees lost their jobs in the unorganized segment of the cotton industry (48 percent

of the total jobs lost); 6,50,000 workers were similarly affected in wood industry (27 percent of the total jobs lost), 4, 60, 000 in basic metal industry (19 percent of the total jobs lost) and 1,30,000 in leather goods industry (5 percent of the total jobs lost). In total, 23,70,000 jobs were lost as against 63,50,000 new jobs generated by the sector in the reforms period – number of jobs lost was 37 percent of the total jobs generated in the sector.

Increase in Employment (in '0000s)			Increase in Share of Investment (in		
Industry	Pre-reforms Period	Reforms Period	Industry	Pre-reforms Period	Reforms Period
Textiles	-7	432	Textiles	3.2	28.9
Food	234	62	Food	19.6	13.2
Metal Products	46	41	Others	9.2	9.5
Machinery	28	27	Metal Products	8.8	8
Beverages	301	23	Minerals	4.4	7.8
Minerals	144	19	Machinery	5.6	7.5
Paper	38	11	Wood	10.9	7
Others	135	11	Cotton	12	4.9
Rubber	10	7	Transport	0.9	3
Transport	6	2	Rubber	2.7	2.7
Chemicals	42	0	Paper	14.4	1.9
Leather	13	-13	Leather	1	1.6
Basic Metal	50	-46	Beverages	4.4	1.4
Wood	406	-65	Chemicals	2.6	1.4
Cotton	156	-113	Basic Metal	0.6	1.2
All Industries	1603	398	All Industries	100	100

Notes: (i) Pre-reforms period corresponds to 1978-79 to 1989-90 and Reforms period corresponds to 1989-90 to 2000-01.

Source: Computed using NSSO survey data.

Asymmetric Character of Investment

In the reforms period, the manufacture of textiles and food products and 'others' industry group together accounted for a major share in investment in the Indian unorganized manufacturing sector. In all, around 51 percent of the total investment was into these three industries. Of these, food products and others accounted for a consistently larger share in investment. Recall that textiles and food products are the major employment providers in the sector (Figure 2). The very low shares of investment – of less than two percent – in industries producing basic metal, chemicals, beverages, leather goods and paper products (these five industries together received 7.5 percent of the total investment) is another significant feature of the unorganized manufacturing sector. Leather goods, chemicals and basic metals received very low investment in both the decades.

Gainers and Losers in Output, Employment and Investment

The manufacture of textiles and metal products which as shown earlier, registered relatively high growth in value added, also generated largest number of jobs, and witnessed a sizeable share in investment in the reforms period (Box 2). The textile industry received the largest share in investment (28.9 percent) and employment (43, 20, 000 out of 63, 50, 000 jobs generated) during the said period. The manufacture of metal products, on the other hand, registered a consistent increase in employment (4, 60, 000 in the pre-reforms period and 4, 10, 000 in the reforms period) and maintained a consistent share in investment (8.8 percent in the pre-reforms period and 8.0 percent in the reforms period). Similarly, machinery goods and minerals also registered a consistent increase in employment, investment and value added in the pre-reforms period and reforms period.

Box 2 Industry Performance: Gainers and Losers

Industries	Performance
Textiles, Metal Products	High employment generation, high investment and high value added growth
Beverages, Paper Products	High employment generation, low investment and low value added growth
Wood Products, Cotton Goods	Employment decline, high investment and negative value added growth
Textiles, Food Products	Major employment generators and investors

Beverages and paper products though generated more jobs but recorded low investment and low value added growth in the reforms period. But compared to the pre-reforms period, these industries generated less number of jobs in the reforms period. On the other hand, manufacture of wood products and cotton goods had shed their work force and made more investment in capital stock but ended up producing below the average production (for the unorganized manufacturing sector) during the reforms period.

In sum, our analysis shows that the growth of value added has declined in this period, implying that the unorganized manufacturing sector failed to sustain the growth momentum attained in the earlier period. This has been primarily on account of slow growth of employment and investment during the said period. At the disaggregate industry level, manufacture of textiles and machinery goods were the fastest growing segments of Indian unorganized manufacturing sector during the reforms period. In contrast, performance of some of the major employment providers in the sector, particularly the manufacture of wood products, cotton products and beverages, is quite disappointing during the same period. Next, we examine the factor productivities and factor in the unorganized manufacturing sector.

5. Levels and Changes in Partial Factor Productivity and Factor Intensity in the Unorganized Manufacturing Sector

Productivity growth has long been recognized as an important driver of economic growth and a determinant of international competitiveness of a country relative to others. According to Kuznets (1966), an essential element in the development and structural transformation of the developed economies was the fast growth in industrial productivity (Duraisamy, 2000).

To examine the productivity in Indian Industry various methods have been employed. These include partial factor productivity or single factor productivity (ratio of output to a single input), multi-factor productivity (ratio of output to more than one input) or total factor productivity (ratio of output to all the inputs used in the production process) methods. The partial factor productivity method considers only one factor of production at a time while assuming the contribution from other factors of production constant. Therefore, it fails to capture the contribution of all the factors as a whole in the total output. In order to circumvent this problem, total factor productivity approach is suggested. However, it is not rational to ignore partial factor productivity approach. Balakrishnan

(2004) argues that labour productivity merit attention in its own right and serves a different purpose for which the total factor productivity is not a substitute. It is argued that labour productivity is a measure of potential consumption and a steady rise in the productivity of labour is necessary for a sustained increase in the standard of living of a population. An attempt to ignore changes in labour productivity reflects an inadequate concern for potential increase in consumption. Thus, there is a strong case for measuring labour productivity particularly in the Indian context (Balakrishnan, 2004). Taking cognizance of it, an attempt is made in this paper to capture the levels and trends in both partial and total factor productivity in Indian Industrial sector.

The present section captures the productivity performance of the sector using select factor ratios. The study considered the following structural ratios:

1. Enterprise productivity – Gross real value added / Number of enterprises
2. Labour productivity – Gross real value added / Number of workers
3. Capital productivity – Gross real value added / Real fixed assets
4. Capital intensity – Real fixed assets / Number of workers
5. Emoluments per worker – Real emoluments / Number of workers

Total emoluments primarily constitute wages to workers, bonus paid and other benefits and so on. To obtain real emoluments, the nominal value has been deflated using Consumer Price Index (CPI) with base 1981-82. The definition and measurement of other variables namely, number of enterprises, employment, fixed capital stock and gross real value added are as discussed before. The variation across industries, an average worker in each industry and variation across the two time periods are analyzed in terms of these structural ratios and shown in Table 6.

Table 6 - Indices of Capital Intensity, Value Added per Unit, Labour Productivity, Capital Productivity and Emoluments per Employee, 2000-01

	1					2			3				
Industrial	**Difference between industries, 2000-01**					**Average per worker,**			**Increase over 1978-79**				
Group	**Unorganized Manufacturing = 100**					**CLR = 100**			**1978-79 = 100**				
	VAU	**CLR**	**VAL**	**VAK**	**EMOL**	**CLR**	**VAL**	**EMOL**	**VAU**	**CLR**	**VAL**	**VAK**	**EMOL**
Food	98	105	93	89	58	100	53	3	223	195	223	115	136
Beverages	29	23	38	165	12	100	98	3	61	133	95	72	14
Cotton	120	88	93	106	126	100	63	7	168	356	188	53	218
Textiles	85	94	102	108	94	100	64	5	187	442	189	43	194
Wood	54	52	63	120	45	100	71	4	100	291	89	31	162
Paper	234	306	163	53	248	100	32	4	135	339	164	49	120
Leather	170	131	162	124	160	100	74	6	635	442	443	100	606
Chemicals	106	120	90	75	143	100	44	6	101	164	96	58	107
Rubber	314	285	199	70	310	100	41	5	138	343	151	44	215
Minerals	188	77	110	142	143	100	84	9	376	366	276	75	260
Basic Metal	374	260	268	103	287	100	61	6	177	299	194	65	151
Metal Products	201	182	178	98	184	100	58	5	204	500	170	34	240
Machinery	424	304	281	93	351	100	55	6	208	300	202	67	159
Transport	582	459	286	62	424	100	37	5	524	699	235	34	162
Others	152	138	141	102	147	100	61	5	330	566	331	59	130
All Industries	100	100	100	100	100	100	59	5	176	306	179	59	167

Notes: CLR = fixed capital stock per employee (capital to labour ratio); VAU = value added per enterprise (enterprise productivity); VAL = value added per employee (labour productivity); VAK = ratio of value added to fixed capital stock (capital productivity); and EMOL = emoluments received per employee. All value figures are at constant 1993-94 prices for two-digit industries in India.
Source: Computed using NSSO survey data.

Difference between Industries in Factor Ratios, 2000-01

The value added per enterprise varied widely across the various two-digit industries (Table 6, major column 1). The ratio was highest in the manufacture of transport goods (582) and lowest in the manufacture of beverages (29) for the period 2000-01. The average value added per unit in the unorganized manufacturing sector is set at 100 for the year 2000-01. A value over 100 indicates that the industry has outperformed the average for the unorganized manufacturing sector as a whole and vice versa, if the value is below 100 for any industry. It can be seen that capital-labour ratio also shows wide variation across the different industries. In 2000-01, the manufacture of transport goods was the most highly capital intensive industry whereas the manufacture of beverages was the least capital intensive one. Labour productivity ranged from 286 in the transport industry to 38 in the manufacturing of beverages. Capital productivity did not show much variation across industries in comparison with other ratios. Interestingly, beverages industry was more productive in terms of capital as compared to other industries in 2000-01. Emoluments per employee, on the other hand, showed wide variation across the industries with the highest in transport industry (Rs. 424) and lowest in the manufacture of beverages (Rs. 12). The value added per unit, capital-labour ratio, labour productivity, capital productivity and emoluments per employee are above the unorganized manufacturing sector average in the manufacture of leather goods and basic metals and 'others' industrial category. It is found that industries with relatively high capital intensity such as transport, machinery, paper, rubber and basic metal have registered high levels of value added per enterprise, labour productivity and emoluments per employee but low capital productivity. On the other hand, those industries that were relatively low capital intensive turned out to be more productive in capital. Perhaps the capital is less sufficiently utilized in the former set of industries compared to the latter. The finding also emphasizes the need to make more investment in the sector so that the productivity level can be substantially enhanced.

Average per Worker

In this subsection, we discuss whether average employee in an industry is receiving emoluments proportionate to his/her contribution in the value added. Assume that an employee is supplied with a fixed capital stock of Rs. 100, then what would be his contribution to value added and how much he would get back as emoluments in the present situation. An average employee in the beverages industry would have added a value of Rs. 98, if he were provided with a fixed capital stock of Rs. 100. On the other hand, the value added by a worker would be a mere Rs. 32, if the worker were employed in the paper industry (See Table 6, major column 2). Clearly capital

requirement per unit of value added is very high in the paper industry. As expected, emoluments received by an employee is apparently very low in the unorganized manufacturing sector, and our estimates show that the workers in most industries do not receive emoluments commensurate with their productivity or the contribution they made in the value added. Emoluments received and value added by an employee is higher than the all industry average in cotton, leather, minerals and metal industries. In the minerals industry, if fixed capital sock per employee is Rs. 100, value added by him is Rs. 84 and emoluments received is Rs.9 (Table 6, major column 2). In the cotton industry, one of the major employment providers in the sector, an average worker received Rs 7 as emoluments, one of the highest in the sector, when he added value equivalent to Rs 74 using capital worth Rs. 100. This is not the case with all employment providers in the sector. For instance, the beverages industry's contribution to value added per worker is the highest (98) but emoluments per worker is the lowest. In a capital-intensive industry such as manufacture of paper products, an average employee received emoluments (Rs. 4) less than the all industries average and added value of only Rs. 32. An employee in the manufacture of machinery goods – a capital intensive industry with the best growth performance in the reforms period – received emoluments per worker slightly higher than the all industries average (Rs. 6) and added value slightly lower than the average compared to a similar employee in the manufacture of paper goods.

Difference between Time-Periods: 1978-79 to 2000-01

For the unorganized manufacturing sector as a whole, there has been an increase in enterprise productivity, labour productivity, capital to labour ratio, emoluments per worker and decline in capital productivity in 2000-01 over 1978-79 (see Table 6, major column 3). In all the industries except beverages, value added per enterprise has increased during the same period. The manufacture of leather products and transport goods registered the largest increase in enterprise productivity. Between 1978-79 and 2000-01, capital-labour ratio has increased in all the industries. Transport goods, others, metal products, leather goods and textile products have witnessed the largest growth in capital-labour ratio. In 12 out of 15 industries, labor productivity has increased during the period under study. Value added per labour has declined in the manufacture of beverages, wood products and chemicals. Capital productivity has declined in all except food and leather industries. Emoluments per employee has declined only in the manufacture of beverages. An average employee in the leather industry received the largest increase in emoluments during the period under study. Interestingly, barring a few exceptions, the relatively more capital-intensive industries have recorded a better performance in terms of labour productivity, value added per unit and emoluments per employee over the period, 1978-79 to 2000-01. This possibly points to the importance of investing more in the fixed capital stock in the sector in order

to make the sector more productive and efficient.

6. Determinants of Labour Productivity Growth

Factors such as economies of scale, increasing capital labour ratio and increase in wage rate have considerable influence on labour productivity growth (Salter, 1960; Hahn and Mathews, 1964). The previous analysis has shown that relatively more capital-intensive industries are more productive and efficient than the less capital-intensive ones. Even though the emoluments per employee has increased considerably during 1978-79 to 2000-01, the workers in the sector did not receive emoluments commensurate with the contribution they made to value added. It is important to see how changes in these factors affect the productivity of labour in the unorganized manufacturing sector. A double logarithmic function is specified and estimated using multiple regression technique. The productivity growth function is expressed as:

$$\ln (APLG) = á + \ln (CAPG) + \ln (EMOLG) + \ln (GVAG) + u \qquad (1)$$

where

APLG = growth of labour productivity

CAPG = growth of capital intensity

EMOLG = growth of emoluments per employee

GVAG = growth of gross value added

u = error term

Labour productivity growth is regressed on growth of value added, capital labour ratio and emoluments per worker. A positive and significant relationship is expected between growth of labour productivity and value added. Growth in labour productivity can also be due to increase in capital intensity through the substitution of capital for labour or the availability of more machines per worker[1] . Increase in growth of emoluments per worker could positively influence the productivity of labour, particularly in sectors such as unorganized manufacturing sector where emoluments paid is very low. The equation is estimated for pre-reforms and reforms period. For the pre-reforms period, we have taken observations for 15 industries for three time periods 1978-79, 1984-85 and 1989-90. Data on 15 industries for the periods 1989-90, 1994-95 and 2000-01 are considered for the reforms period. The regression results are shown in Table 7.

Table 7 OLS estimates of Determinants of Labour Productivity Growth in India's Unorganized Manufacturing Sector

Explanatory Variables	Pre-reforms period	Reforms period
Intercept	-5.508*	-2.375*
	(-3.969)	(-2.673)
Growth in Value Added	0.842*	0.349*
	-8.201	-4.026
Growth in Capital Intensity	-0.151*	0.488*
	(-1.967)	-5.202
Growth in Emoluments per Employee	0.623*	0.173
	-5.279	-1.479
$\bar{R}^2$	0.791	0.787
N	30	30

Note: * significant at 10 % level or above
Source: Computed using NSSO survey data.

The coefficient of the growth of value added is positive and statistically different from zero in both the pre-reforms and reforms periods. A 10 percent increase in growth of value added is associated with an 8 percent and 3 percent increase in labour productivity growth in the pre-reforms period and reforms period respectively. Growth of capital intensity or capital-labour substitution is an important determinant of labour productivity growth in the reforms period as observed from the positive and statistically significant effect of growth of capital intensity. A 10 percent increase in growth of capital intensity, other things remaining the same, in the reforms period is associated with a 5 percent increase in growth of labour productivity. The positive sign of the estimate of the coefficient of growth of emoluments per employee shows that the growth in the wage rate would enhance the productivity of labour. However, the coefficient of growth of emoluments per employee is not statistically significant in the reforms period. In sum, this exercise shows that the realization of economies of scale has become increasingly important over the decades as a determinant of productivity growth in India's non-factory sector. Another important finding is that labour productivity growth can be improved by increasing the wages paid to the employees. Again, the availability of more machines per worker, holding other factors constant, has significantly contributed to labour productivity growth reflecting the complementary role played by the capital input in improving the efficiency of labour input. On the whole, the coefficient of determination (R^2)reported in

Table 7 reveals that these variables explain about 80 percent of total variation of labour productivity growth in the unorganized manufacturing sector during pre-reforms and reforms periods.

7. Total Factor Productivity Growth and its Decomposition

In the empirical exercise attempted in this section, we report Malmquist total factor productivity growth, which is estimated using Data Envelopment Analysis (DEA) method. DEA envelopes observed input-output data without requiring *a priori* specification of functional forms that turns out to be its major advantage. In contrast, different specifications of the production function under the parametric approach provide different results and this remains a methodological problem. Secondly, DEA is more appealing than the econometric model as inefficiency is likely to be correlated with the inputs (Gong and Sickles, 1992). However, DEA is not free from drawbacks, either. These drawbacks include the following. First, measurement error and statistical noise are assumed to be nonexistent. Second, it does not allow for statistical tests typical of the parametric approach.

The Malmquist TFP Growth

The Malmquist index is defined using distance functions. In this study, an output distance function is used to consider a maximum proportional expansion of the output, given the inputs. To be specific, the Malmquist TFP index measures the TFP growth change between two data points by calculating the ratio of the distances of each data point relative to a common technology. Following Färe et al. (1994), the output-oriented Malmquist TFP change index between period s (the base period) and period t (the terminal period) is given by

$$m_0(y_s, x_s, y_t, x_t) = \frac{d_0^s(y_t, x_t)}{d_0^s(y_s, x_s)} \left[\frac{d_0^s(y_t, x_t)}{d_0^t(y_t, x_t)} \frac{d_0^s(y_s, x_s)}{d_0^t(y_s, x_s)} \right]^{1/2}$$

where the notation $d_0^s(y_t, x_t)$ represents the distance from the period *t* observation to the period *s* technology. A value of m_0 greater than one will indicate positive TFP growth from period *s* to period *t* while a value less than one indicates a TFP growth decline. In equation (1), the term outside the square bracket measures the output-oriented measure of Farrell technical efficiency between period *s* and period *t* and the term inside measures technical change, which is the geometric mean of the shift in the technology between the two periods. In other words, TFP growth can be decomposed as,

TFP Growth = Technical Efficiency Change (Catching up Effect) × Technical Change (Frontier Effect)

An important issue that has to be addressed while measuring TFP growth is the returns to scale properties of the technology in use. The present study uses a CRS technology because the estimates based on the assumption of VRS technology may not

properly reflect the TFP gains or loses resulting from scale effects (Grifell-Tatjé and Lovell, 1995). Hence it is important that CRS be imposed upon any technology that is used to estimate distance functions for the calculation of a Malmquist TFP index. We have used the linear programming (LP) technique called DEA to calculate the distance functions[1] . This requires solving of four LPs for each industry. The LPs are:

$$\begin{aligned}
\left[d_0^t(y_t, x_t)\right]^{-1} &= \max_{\phi\lambda} \phi, \\
st \qquad -\phi y_{it} + Y_t\lambda &\geq 0, \\
x_{it} - X_t\lambda &\geq 0, \\
\lambda &\geq 0,
\end{aligned}$$

$$\begin{aligned}
\left[d_0^s(y_s, x_s)\right]^{-1} &= \max_{\phi\lambda} \phi, \\
st \qquad -\phi y_{is} + Y_s\lambda &\geq 0, \\
x_{is} - X_s\lambda &\geq 0, \\
\lambda &\geq 0,
\end{aligned}$$

$$\begin{aligned}
\left[d_0^t(y_s, x_s)\right]^{-1} &= \max_{\phi\lambda} \phi, \\
st \qquad -\phi y_{is} + Y_t\lambda &\geq 0, \\
x_{is} - X_t\lambda &\geq 0, \\
\lambda &\geq 0,
\end{aligned}$$

and

$$\begin{aligned}
\left[d_0^s(y_t, x_t)\right]^{-1} &= \max_{\phi\lambda} \phi, \\
st \qquad -\phi y_{it} + Y_s\lambda &\geq 0, \\
x_{it} - X_s\lambda &\geq 0, \\
\lambda &\geq 0,
\end{aligned}$$

where y_{it} is a MXI vector of output quantities for the *i*-th industry in the *t*-th year;
x_{it} is a KXI vector of input quantities for the *i*-th industry in the *t*-th year;
Y_t is a NXM matrix of output quantities for all N industries in the *t*-th year;
X_t is a NXK matrix of input quantities for all N industries in the *t*-th year;
λ is a NXI vector of weights and f is a scalar.

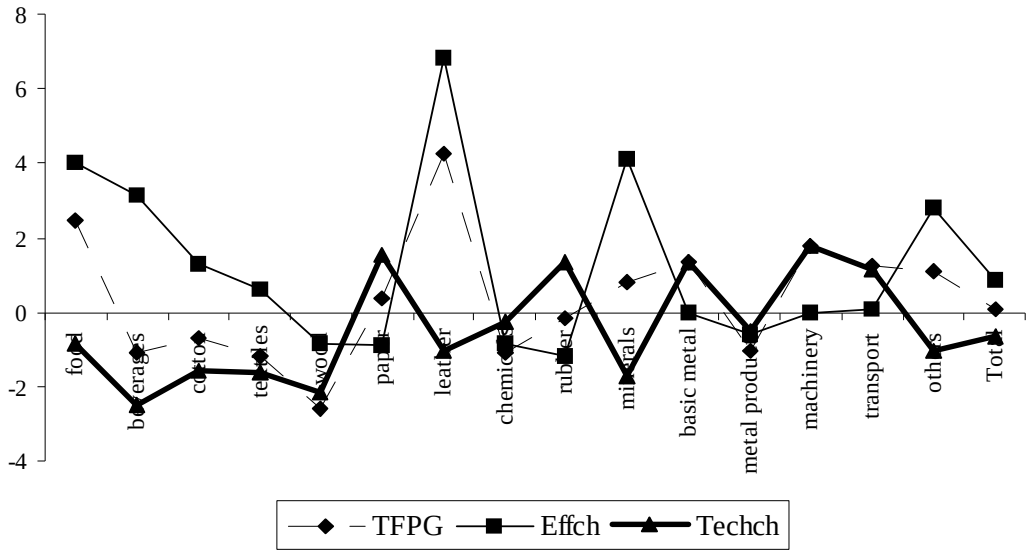
The Malmquist TFP growth rates are reported in Table 8 and diagrammatically represented in Figure 8. The TFPG rates measured using the Malmquist index shows that the productivity grew at a rate of 0.07 percent per annum (hereafter, pcpa) during the period, 1978-79 to 2000-01. In 8 out of 15 industries, the TFP reported positive growth rates. The manufacture of leather products and food products registered the highest TFP growth rate of 4.24 pcpa and 2.48 pcpa respectively. In contrast, manufacture of wood products and textiles, largest employment providers in the sector, registered the largest decline in TFP.

Table 8 Growth in Technical Efficiency, Technical Change and Total Factor Productivity

Industry Group	Efficiency Change	Technical Change	TFP Change
Food	4.04	-0.82	2.48
Beverages	3.15	-2.5	-1.08
Cotton	1.32	-1.58	-0.72
Textiles	0.64	-1.6	-1.19
Wood	-0.83	-2.14	-2.57
Paper	-0.87	1.54	0.37
Leather	6.85	-1.04	4.24
Chemicals	-0.84	-0.28	-1.07
Rubber	-1.17	1.36	-0.16
Minerals	4.1	-1.73	0.82
Basic Metal	0	1.32	1.32
Metal Products	-0.59	-0.52	-1.05
Machinery	0	1.77	1.77
Transport	0.08	1.15	1.25
Others	2.79	-1.06	1.08
All Industries	0.85	-0.65	0.07

Source: Computed using NSSO survey data.

It would be useful to find out sources of TFPG which can come about due to improvement in technical efficiency (catch-up) and/or by improvement in production technology (boundary shift). Using Malmquist index, total factor productivity growth is decomposed in components namely, technical efficiency change and technical change. Our analysis shows that efficiency has been the main contributor to the growth in total factor productivity during the period under study (Table 8). Notably, most of the industries have registered a positive change in technical efficiency and in those industries where TFP has declined, the decline is mostly attributed to technical regress. Only 5 out of 15 industries namely, paper, rubber, basic metal, machinery and transport have registered technical progress between 1978-79 and 2000-01. Interestingly, these are the industries with highest capital intensity in the sector in 2000-01 (Table 6). Further, paper, machinery and transport industries have made considerable investment in the fixed capital stock in 2000-01 over 1978-79 (Table 4). This suggests that, in the achievement of high rate of output growth in the unorganized manufacturing sector, the principal difficulty is technology, improvement in which can lead to change or shift in the production frontier. As a result, there is a need for sustained improvement in and adoption of better technology as growth in output depends on technological progress.



8. Summary and Conclusion

This study has examined the size, growth and performance of unorganized manufacturing sector in India at the two-digit industry level. Our analysis shows evidence of increase in size with a slowdown or decline in the reforms period. The growth of value added has declined from 9.4 percent in the pre-reforms period to 4.4 percent in the reforms period, implying that the unorganized manufacturing sector failed to sustain the growth momentum during the period after 1990. This has been primarily on account of slow growth of employment and investment during the said period. Compared to the pre-reforms period, growth of the sector was 'employment declining' in the reforms period.

'Food and related' industry group improved its position in relation to other industry groups and emerged as a major contributor to employment (from 23.6 percent in 1978-79 to 27.6 percent in 2000-01) and value added (from 17.6 percent in 1978-79 to 20.1 percent in 2000-01) in the sector, during the two decades under study. On the other hand, textile and allied industries witnessed erosion in their shares in employment (from 35.8 percent to 29.1 percent between 1978-79 and 2000-01) and value added (from 33.1 percent in 1978-79 to 28.7 percent in 2000-01); but they continue to be the largest source of employment generation and value addition in the sector. Manufacture of machinery goods and minerals registered high rates of value added growth in both pre-reforms and reforms period. Their share in employment has considerably increased while share in investment improved in the reforms period. In contrast, basic metal and cotton industries, each of which had low rate of value added growth in the reforms period, reported a considerable decline in employment and had relatively very low share in investment during the said period.

The fast growth in the manufacture of textiles in the reforms period is probably a reflection of the recent boom in demand for textile garments. A large share of investment (7.5 percent) has moved into the production of machinery goods during the said period. These two industries were the fastest growing segments of Indian unorganized manufacturing sector in the reforms period. Both significantly added to total employment in the sector (72 percent of the total jobs generated), and the performance of the textile industry (68 percent) in this respect is noteworthy. In contrast, the performance of some of the major employment providers in the sector, particularly the manufacture of wood products, cotton products and beverages, was quite disappointing. Their growth rates fell considerably in the reforms period from their impressive performance of the previous decade.

The analysis of productivity in the unorganized manufacturing sector points to a different picture. Both the partial factor productivity approach and total factor

productivity approach reflect that productivity of the sector has improved during the period under study. However, in productivity growth, a wide variation is noticed across the industries. The low growth performance of wood products, cotton products and beverages was also got reflected in their productivity performance. These industries registered the largest decline in total factor productivity during the period under study. Another worrisome phenomenon is the decline in total factor productivity (-1.19) reported by the textiles industry despite its impressive performance in terms of gross value added, employment and investment. This implies that the textile industry has the potential to increase the output much beyond the present level.

The decomposition of productivity growth into technical change and efficiency change reveals that the latter has been the major contributor to TFPG during the period under study. This suggests that technological upgradation needs to be prioritized so as to improve growth in output of the unorganized sector. It is also found that capital intensity and wage rate are essential factors for augmenting labour productivity levels in the sector.

Policy Suggestions

The industry level analysis showed wide variation across industries in productivity growth and efficiency change. In order to bridge the gap in performance of industries, industry specific or product specific policies may be developed. The vibrant industry groups should be treated with certain push policies aimed at strengthening their linkage with the organized sector, assisting them with marketing support, and encouraging their commercial operation. On the other hand, efforts may be made to improve the productivity and efficiency levels in the low performing industries. A two pronged policy regime that addresses application of proper technology would fulfill the resource needs for productivity improvement and promote formal-informal linkages which seem to be the need of the hour.

According to this study, technical efficiency change is a significant determinant of productivity and growth of the unorganized manufacturing sector and it outweighs the effect of technological progress. In fact, results indicate technical regress in all industries and a turnaround in select industries like paper, rubber, basic metal, machinery and transport. Appropriate and better technology deserves priority to improve the growth of output in the unorganized sector. Additionally, there should be emphasis on the evolution of indigenous techniques so that existing resources can be used in a more efficient manner. Efforts should also be made to enhance technical efficiency in the sector especially for the industry groups that show evidence of decline in efficiency. This can perhaps be achieved by improvement in managerial input, organization and skill of the workforce. Consolidation of tiny firms may also help in

raising the efficiency level of the industry as a whole.

Another policy-relevant lesson from the empirical analysis of the unorganized manufacturing sector in India relates to the need of making more investment in capital stock. But it is widely known that the firms in the sector are facing constraints on the financial side. In other words, credit non-availability is considered as one of the major problems faced by firms in the sector. Therefore, policies that promote a business environment in which unorganized manufacturing enterprises can have easy access to credit at affordable rate are needed. Similar view is expressed by De Soto (1989), according to whom excessive transaction costs and bureaucracies keep informal sector firms out of the formal economy. Further, low cost access to markets may also help in increasing efficiency. Strengthening the link between organized and unorganized sector is also important in view of the fact that subcontracting play an important role in enhancing the growth performance of the sector.

Major Data Sources

1. Handbook of Statistics on Indian Economy, Reserve Bank of India, Mumbai (Various Issues).
2. National Account Statistics, 1950-51 to 2002-03, Economic and Political Weekly Research Foundation, Mumbai, December 2004.
3. Survey on the Unorganized Manufacturing Sector, National Sample Survey Organization, Ministry of Statistics and Programme Implementation, Government of India (Various Issues).

References

Ahluwalia, I. J. *Productivity Growth in Indian Manufacturing*, Oxford University Press, New Delhi, 1991.

Balakrishnan, P. (2004) Measuring productivity in manufacturing sector, *Economic and Political Weekly*, **39**, 1465-71.

Balakrishnan, P. and Pushpangadan, K. (1998), What do we know about productivity growth in Indian industry? *Economic and Political Weekly*, **33**, 2241–46.

Balakrishnan, P. and Pushpangadan, K. (1994) Total factor productivity growth in manufacturing industry: a fresh look, *Economic and Political Weekly*, **29**, 2028-2035.

Bhalla, S. (2001) Assessing the quality of employment growth using National Sample Survey Data, *Conference Proceedings*, Understanding Human Development through National Surveys, Pune, India.

Breman, J. (1999) The study of industrial labour in post-colonial India—The informal sector: A concluding review, *Contributions to Indian Sociology*, **33**, 407-431.

Coelli, T (1996) A guide to DEAP version 2.1: A data envelopment analysis (Computer) program, *Working Paper No. 96/08*, Centre for Efficiency and Productivity Analysis (CEPA), University of New England, Australia.

De Soto, H. *The other Path: The Invisible Revolution in the Third World*, Harper Row, New York, 1989.

Duraisamy, M. (2000) Growth and productivity in the unorganised manufacturing sector in India, 1984-1990, paper presented to a conference at New Delhi.

Fare, R., Grosskopf, S., Norris, M. and Zhang, Z. (1994) Productivity growth, technical progress and efficiency change in industrialized countries, *American Economic Review*, **84**, 66-83.

Goldar, B. *Productivity Growth in Indian Industry*, Allied Publishers, New Delhi, 1986.

Gong, B. H. and Sickles, R. C. (1992) Finite sample evidence on the performance of stochastic frontiers and data envelopment analysis using panel data, *Journal of Econometrics*, **51**, 84-258.

Grifell-Tatje, E. and C.A.K. Lovell (1995) A Note on the Malmquist productivity index, *Economic Letters*, **47**, 169-175.

Hahn, F. H. and Mathews, R. C. O (1964) The theory of economic growth: a survey, *The Economic Journal*, **74**, 779-902.

Hossain, M. A. and Karunaratne N. D. (2004) Trade liberalization and technical efficiency: evidence from Bangladesh manufacturing industries, *The Journal of Development Studies*, **40**, 87-114.

Kabra, K. N. (2003) The unorganised sector in India: some issues bearing on the search for alternatives, *Social Scientist*, **31**, 23-46.

Kalirajan, K. and Bhide, S. (2004) The post-reform performance of the manufacturing sector in India, *Asian Economic Papers*, **3**, 126-157.

Kulashreshta, A. C. and Singh, G. (1998) Contribution of unorganised sector in the Indian economy, *Manpower Journal*, **34**, 1-10.

Kulshreshta, A. C. and Singh, G. *Informal sector in India: its coverage and contributions*, pp. 48-82. In **Kundu, A. and Sharma, A. N.** (eds.) Informal Sector in India: Perspectives and Policies, IHD, New Delhi, 2001.

Kundu, A. (1998) Introduction, *The Indian Journal of Labour Economics*, **41**, 439-440.

Kundu, A., Lalitha, N. and Arora, S. L. *Growth dynamics of informal manufacturing sector in urban India: an analysis of interdependence* pp. 93-123. In **Kundu, A. and Sharma, A. N.** (eds.) Informal Sector in India: Perspectives and Policies, IHD, New Delhi, 2001.

Mitra, A. *Employment in the informal sector*, pp. 85-92. In **Kundu, A. and Sharma, A. N.** (eds.) Informal Sector in India: Perspectives and Policies, IHD, New Delhi, 2001.

Raj, R. and Duraisamy, M. (2005) Structure, employment and productivity growth: evidence from the unorganized manufacturing sector in India, 1984/5-1994/5, *Journal of International Business and Entrepreneurship*, **11**, 68-84.

Raj, R. and Mahapatra, M. K. (2006)

Economic reforms and productivity growth: evidence from Indian industrial sector with focus on selected states, Journal of International Business and Entrepreneurship, **12**, 35-53.

Rani, U. and Unni, J. (2004) Unorganized and organized manufacturing in India: potential for employment generating growth, *Economic and Political Weekly*, **39**, 4568-4580.

Salim, R. A. and Kalirajan, K. P. (1999) Sources of output growth in Bangladesh food processing industries: A decomposition analysis, *The Developing Economies*, **37**, 247-269.

Salter, W. *Productivity and Technical Change*, Cambridge University Press, Cambridge, 1960.

Thomas, J. J. *A review of Indian manufacturing*, pp. 84-101. In **Kirit, P. and Radhakrishna, R.** (eds.) *India Development Repor*t, Oxford University Press, New Delhi, 2002.

Unni J, Lalitha, N. and Rani U. *Economic reforms and productivity trends in Indian manufacturing, Working Paper No.119,* Gujarat Institute of Development Research (GIDR), Ahmedabad, 2000.

Unni, J., Lalitha, N. and Rani, U. (2001) Economic reforms and productivity trends in Indian manufacturing', *Economic and PoliticalWeekly,* **36**, 3915-22.

Visaria, P. and Jacob, P. *The informal sector in India: estimates of its size, needs and problems of data collection*, pp. 138-160. **Herman, B. and Stoffers, W.** (eds.) Unveiling the Informal Sector: More than Counting Heads, Aldershot, Avebury, 1996.

End Note

1. The survey organized for gathering information on unorganized activities have often lacked temporal comparability due to non-standardization of concepts, changes in the format of tabulation, etc. Sometimes, paucity of staff and other resources, made available for this purpose, have also become important hindrances (Kundu, 1998: 439-440).
2. The choice of cut off year was based on the availability of data. Nonetheless, the year 1989-90 can be considered as the terminal year of the pre-reforms period.
3. According to Salter (1960), factor substitution – along with economies of scale and technical progress – accounted for differences in productivity growth across British industries. For Hahn and Mathews (1964), productivity per man depends on capital intensity of all the machines in use and on their average age.
4. For estimation, we have used DEAP 2.1, a program for data envelopment analysis developed by Coelli (1996).