Growth of Output & Productivity of the Indian Organized Manufacturing Industries: A Comparative Study of Fifteen Major States

Prasanta Kumar Roy

This paper attempts to estimate growth of output and productivity of the organized manufacturing industries in India during 1981-82 to 2010-2011, the pre- and post-reform period (1981-82 to 1990-91 and 1991-92 to 2010-11 respectively) as well as over the decades during the period. So far as the industrial growth is concerned, annual growth rates, average annual growth rates as well as trend growth rates of output are estimated for the organized manufacturing industries in India and in its fifteen major industrialized states. The study further estimates partial as well as total factor productivity growth (TFPG) of the organized manufacturing industries in India and in states in India.

Prasanta Kumar Roy is Associate Professor, Dept. of Economics, Midnapore College (Autonomous), Paschim Medinipur (W.B.) 721101.Email: prasanta.agnik@gmail.com

Introduction

Before liberalization, particularly towards the end of the 1970s and during the early 1980s, there emerged a growing consensus that the Indian economy was exhibiting a slowdown in industrial growth due to low productivity, high costs, low quality of production and obsolete technology (Ahluwalia, 1985). But the reorientation of industrial and trade policies evoked a better productivity response in the mid-1980s and that led to substantially higher industrial growth during this period. The situation has, however, become quite different during the post-liberalization period. The growth rate of output has been slowed and there has been a parallel slowdown in the rate of growth of productivity in the organized manufacturing sector in India during the post-liberalization period. The most likely reason behind the decline in output and productivity growth in the organized manufacturing sector in India is that after the liberalization of the economy, the flow of foreign capital and foreign entrepreneurship was largely responsible for dampening Indian market

resulting in fall in demand. Moreover, the lack of demand for domestic goods, rising costs of production, inefficient management etc. forced many firms to shut down.

Review of Literature

As far as the growth of industrial output is concerned, Nagraj (1997, 2003) and Chaudhuri (2000) found that the growth rate in the organized manufacturing sector has been lower in the post-reform period than in the pre-reform period. Ahluwalia (2006) also found a deceleration in the growth of value added of the manufacturing industry at the aggregate level. Though the results are quite similar, the reasons are different. While Nagraj attributes it to the decline in the role of the government, Ahluwalia explains the deceleration in terms of a slowdown in reforms. However, studies by Rodrik and Subramanian (2004), Nayar (2008) and Singh (2009) showed that after the acceleration of growth in the 1980s, the industrial sector did not witness any such break thereafter, not even after the massive reforms of the early 1990s. Balakrishnan (2010) and Nagraj (2012) are of the opinion that acceleration in agricultural growth and the increase in rural incomes makes a significant contribution to the expansion in manufacturing output.

Further, over the past three decades, several studies have been made to assess the performance of the Indian manufacturing sector based on productivity growth (Brahmananda, 1982; Goldar, 1986; Ahluwalia, 1991; Balakrishnan & Pushpangadan, 1994; Dholakia & Dholakia, 1994; Rao, 1996a; Shrivastava, 1996; Balakrishnan, Pushpangadan & Suresh Babu, 2000; Goldar, 2002; Pal, 2002; Goldar & Kumari, 2003; Goldar, 2004). Most of the studies on productivity growth of the Indian manufacturing sector have focused on the growth of total factor productivity (TFP). A number of studies (Brahmananda, 1982; Ahluwalia, 1991; Dholakia & Dholakia, 1994; Majumdar, 1996; Rao, 1996a; Pradhan & Barik, 1999; Trivedi et al, 2000) have observed a decline in the TFPG during 1970s and up to mid-1980s with a turnaround taking place in the post mid-1980s, perhaps owing to the more openness of trade and industrial policies. However, Balakrishnan and Pushpangadan (1994) argue that the TFPG of the Indian manufacturing industries in the 1980s was higher because real value added (used as output) has been obtained using a single deflation method. This turnaround (in the 1980s) will disappear if the double deflation method is applied.

In the post-reform period also two different results are found from different studies. Studies by Krishna and Mitra (1998), Patnayak et al (2003), Unel (2003) and Tata Services Ltd. (2003) found an acceleration in TFPG, whereas studies by Trivedi et al (2000), Balakrishnan, Pushpangadan and Suresh Babu (2000), Goldar (2000), Srivastava (2001), Ray (2002), Goldar (2002), Pal (2002), Goldar & Kumari (2003), Goldar (2004; 2006), Das (2004), Kumar (2004), Trivedi (2004), Rodrik & Subramanian (2004) and RBI (2004) found a decel-

The relaxation of the restrictive protection policies in respect of industries appears to be the main reason for the acceleration in TFPG.

eration in TFPG. The relaxation of the restrictive protection policies in respect of industries appears to be the main reason for the acceleration in TFPG as mentioned by the former group whereas the slowdown in the growth of agriculture as well as the under-utilization of capacities is the main reason behind the deceleration in TFPG in the organized manufacturing during the post-reform period as mentioned by the latter group.

Research Gap

All of us know that production is a function of a myriad of factors like labor, capital and technology. It is the technology that pushes the production function upwards. After globalization, i.e., the opening up of the economies of the countries in the world, there has been a free flow of production technology among the countries. Many researchers have estimated the effect of technology on the production in the pre-and post-reform periods, mostly, at the all India level. Very few studies have been done at the state level. Because of various factors like the rates of adoption of technology and the levels of achievement, productivity growth has been different among the states in India. In some states, rate of adoption may be quite high whereas in some other states it may not be satisfactory. Perhaps no study has yet been done focusing on this aspect of the growth of technology, its adoption and its effect on the total production in the manufacturing sector at the state level. Beside this, most of the studies that have been done till date have used the growth accounting approach or the index number approach for the estimation of the effect technological progress on the production in the manufacturing sector. The method has, no doubt, some merits, but it also suffers from several pitfalls. Very few studies have adopted a parametric approach, concentrating on the production function estimation technique to obtain the technological effects on manufacturing production.

Objectives

The objectives of this study are stated as follows:

1) To estimate the growth rates of output, partial factor productivities and total factor productivity (TFP) of the organized manufacturing industries in fifteen major industrialized states in India as well as in all India throughout the entire study period (1981-82 to 2010-11), pre-reform period (1981-82 to 1990-91), post-reform periods (1991-92 to 2010-11) and also during two different decades of the post-reform period (1991-92 to 2000-01 and 2001-02 to 2010-11).
2) To compare the growth rates of output and factor productivities (partial as well as total) among the states in India and in all India and the role of the factors like labor and capital and

technology in the output growth of these states and in all-India as well.

3) To decompose the output growth rates into input (labor and capital) growth rates and the growth rates of technological change or TFP.

4) To identify the factors leading to different TFPG in different states during the periods of study.

Hypotheses

1) The growth rates of output, partial factor productivities and total factor productivities of the states under study and in all India as well are not different from one another.

2) The contributions of the total factor productivity growth (TFPG) to output growth in the states under study and also in all India have not been significantly different from one another.

3) Growth rates of output, partial factor productivities and TFPs in India and in its fifteen states under study are different during the pre-and post-reform period.

4) Contribution of TFPG to output growth is greater than the contribution of primary inputs of labor and capital taken together.

Data & Variables

The study considered one output, two-input technology for the industries into account; the two inputs being: (a) labor and (b) capital. The variables used for the analysis are real gross value added (output) and real capital stock at 1980–81 prices (capital) and number of persons employed (labor). Real value added is obtained by deflating nominal value added using the wholesale price index (WPI) for manufactured products. Labor is measured as the total number of persons engaged within the production activity, which include production workers additionally as other employers. Real capital stock series are constructed by using perpetual inventory accumulation method (PIAM) [Goldsmith, 1951]. The speed of depreciation of fixed assets has been taken as five per cent every year.

The Annual Survey of Industries (ASI) data for the factory sector of total manufacturing industries in India and in its fifteen major industrialized states is utilized for the analysis. The period of study covered 30 years from 1981-82 to 2010-11. For analyzing the impact of economic reforms on output and TFP growth and their numerous elements of the manufacturing industries of the identical, the whole study period is split into various sub-periods: 1981–82 to 2010-11 (total study period), 1981–82 to 1990-91 (pre-economic reforms period), 1991-92 to 2010–11 (post-economic reforms period) and also twenty years of the post-reforms period (1991-92 to 1999-2000 and 2000-01 to 2010-11).

Research Methodology

To measure growth performance of output and productivity annual growth rates, average annual growth rates as well as the trend growth rates have been

calculated for the above-mentioned time periods. The annual growth rates were calculated on a year-to-year basis using the formula $g_t = (y_t - y_{t-1})/y_{t-1,}$ where y denotes the variable for which growth rate was measured. To compute average annual growth rates, a simple average of annual growth rates were taken. Regarding the methodology for estimating the trend growth rates, we have fitted a separate semi-logarithmic trend, logy=a+bt, using ordinary least square method.

The productivity performances of the manufacturing industries can be analyzed in different ways. Productivity, defined as the ratio of output to input(s), is of two types:

1) Partial or single factor productivity; and

2) Total factor Productivity

The partial or single factor productivity is defined as the ratio of output to the quantity of factor input for which productivity is measured (e.g., labor productivity and capital productivity). The partial or single factor productivity of labor or capital is indicated by the ratio y/L (output/employment) or y/K (output/capital), i.e., output per unit of input(s) or the average product of the factor concerned. Partial factor productivity is considered to be one of the oldest and widely used measures of productivity (Trivedi et al, 2000). Partial factor productivity can be changed by substituting one factor of production by another (Majumdar, 2004). Improvements in partial factor productivity could be achieved by changing the economies of scale too (Mahadevan, 2004). Partial factor productivity, though easy to compute, has certain limitations also. Output is actually produced by a combination of factor inputs. Hence, partial factor productivity gives us only a partial view of productivity.

Growth in output can, therefore, be decomposed into two parts-one contributed by the changes in the factor-inputs like labor and capital, and the other contributed by the changes in all the residual factors.

Total factor productivity (TFP), on the other hand, is defined as the ratio of output to a weighted sum of factor inputs used in the production process. Total factor productivity growth (TFPG) measures the growth in output that is not accounted for by the growth of primary factor inputs. In other words, TFPG is the residual growth of output, which is not explained by the growth of primary factor inputs. Growth in output can, therefore, be decomposed into two parts-one contributed by the changes in the factor-inputs like labor and capital, and the other contributed by the changes in all the residual factors such as changes in technology, economies of scale, capacity utilization, quality of factors of production, learning by doing etc. (Trivedi et al , 2000). The second part indicates the state of dynamism in the economy and is treated as TFPG.

TFPG is also being expressed as the difference between the rate of growth of output and the rate of growth of com-

bined inputs. Abramovitz (1956) first observed the growth of output occurring due to factors other than primary factor inputs. Solow (1957) measured TFP as a shift in the production function. There are generally two different approaches to measure TFPG:

1) Growth accounting approach

2) Production function estimation approach

Growth accounting measure estimates TFPG by subtracting the weighted input growth from the output growth. The differences obtained include the effects of technological progress, scale of production, capacity utilization, learning by doing, technical efficiency etc. Christensen and Jorgenson (1973), Denison (1962, 1974, 1979), Jorgenson and Griliches (1967), Kendrick (1961, 1973), Kendrick and Grossman (1980) and Solow (1957) have adopted the conventional growth accounting approach. The growth accounting method of estimating TFPG rests on two restrictive assumptions, namely, existence of perfect competition in the factor market and constant returns to scale (CRS). However, these two assumptions do not hold good for a developing country like India where market structures are imperfectly competitive. Therefore, a direct econometric estimation of production function is an alternative. The production function estimation approach that does not make any restrictive assumption like CRS and exhibits non-unitary or non-constant elasticity of substitution is chosen for the study.

The estimates of the parameters of the production function directly provide us the information about the factor shares.

According to Hulten (2000), the production function estimation approach to productivity measurement can be treated as complementary to the growth accounting approaches. The widely accepted advantage of the production function approach is that the assumptions of CRS and perfect competition need not be imposed. The estimates of the parameters of the production function directly provide us the information about the factor shares. Further, if more flexible forms of production function are applied, returns to scale or homotheticity property of production functions can be directly tested. Christensen, Jorgenson and Lau (1971, 1973) developed a production function that was more flexible than Cobb-Douglas production function (CDPF) and CES. This type of production function is known as Transcendental logarithmic or the translog production function. In this production function, technology need not have to be Hicks-neutral type; it does not have to proceed at a constant rate and the elasticity of substitution need not be unity (as in the case of CDPF) or constant (as in the case of CES function). The Translog production function can be represented as:

$$LnY=\alpha+\beta_L lnL+\beta_K lnK+\beta_T T+1/2\,\beta_{LL}(lnL)^2+1/2\,\beta_{KK}(lnK)^2+1/2\beta_{TT}T^2+\beta_{LK}(lnL)(lnK)+\beta_{LT}(lnL)T+\beta_{KT}(lnK)T$$

In this equation, Y denotes output (i.e., real value added), L, labor, K, capital and T, time (Year).

Using the above Translog production function, we followed backward elimination techniques to get the best-fitted production function for the organized manufacturing sector of fifteen major industrialized states in India as well as of India as a whole. We have applied three criteria to obtain the best-fitted production function:

- The best-fitted production function should contain all the variables, namely, capital input, labor input and time.
- The best-fitted production function should be observationally robust in the sense that all the coefficients should be significant and their estimated values will not change significantly even when one or two observations either from the beginning or from the end of the sample data are excluded or included.
- The chosen form of the production function should have the desired property that the contributions of the inputs to the estimated output are positive.

Our major target is to find out TFPG that is obtained by differentiating the best-fitted production function with respect to time i.e.

$$TFPG = \delta \ln Y / \delta T = \beta_{T+} \beta_{KT} \ln K_{+} \beta_{LT} \ln L_{+} \beta_{TT} T$$

where β_T= the rate of autonomous total factor productivity growth;

β_{TT}= the rate of change of TFPG;

$\beta_{LT,}$ β_{KT}= the bias in TFPG

If both β_{LT} and β_{KT} are zero, then the TFPG is Hicks-neutral type. If β_{LT} is positive, the share of labor increases with time and there is labor using or capital saving bias. Similarly, if β_{KT} is positive, the share of capital increases with time and there is capital using or labor saving bias.

We have further tested whether the excluded coefficients are jointly insignificant. We ignore the result that fails the F-test that is given by-

$$F_{q, n-k} = \{(R_g^2 - R_c^2)/ (1-R_g^2)\} (n-k)/q$$

where n, k and q are respectively the number of observations, the number of coefficients in the general form of production function and the number of independent linear restrictions, that is, the number of coefficients assumed zero in the present case. R^2g and R^2c are respectively the R^2 values for the general case regression and for the final form regression.

Results & Findings

The estimation results (shown in Tables 1 - 4) show that annual growth rates of output, labor productivity (Y/L), capital productivity (Y/K) and factor intensity (K/L) fluctuated widely over the years in the organized manufacturing in-

dustries in all the fifteen states under study as well as in India as a whole. The maximum growth rates of the above components were achieved in different years and again the maximum growth rates of most of the above components occurred during the post-reform period. Annual growth rates of TFP shown in Table 5, however, accelerated steadily in Andhra Pradesh, Assam, Bihar, Haryana, Madhya Pradesh and West Bengal and decelerated continually in Gujarat, Karnataka, Kerala, Maharashtra, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and in India as a whole. However, it has fluctuated widely in Orissa during the entire study period.

The estimation results further show that the average annual growth rates (Table 1) and the trend growth rates of output (Table 6) of the organized manufacturing industries have increased in Gujarat and Karnataka during the post-reform period (1991-92 to 2010-11). While so far as the partial factor productivities as well as the TFP (see Tables 7, 8 & 10) of the same are concerned it is found that they have declined in those two states during that period. Therefore, we may say that the increase in the growth rate of output in the organized manufacturing sector in those two states during the post-reform period is due to the factors other than the growth of partial factor productivities as well as TFP. The average annual growth rates as well as the trend growth rates of output have also been increasing in Haryana and West Bengal during the post-reform period. But the increase in growth rates of TFP and a mild increase in the growth rates of labor productivity was the main cause of the increase in output growth rate in West Bengal while the increase in partial factor productivity of labor along with an increase in TFP, though at a smaller rate, is the main cause of the increase in output in Haryana. The average annual growth rate as well as the trend growth rates of output of the organized manufacturing sector in Assam, Madhya Pradesh, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and all-India have, however, declined during the same period of time and the decline in the growth rate of the partial factor productivities of labor or capital or both along with the decline in the growth rate of TFP was the main cause of the decline in output growth in India as a whole as well as in most of the above mentioned states under study.

The lower portion of Tables 1 – 5 show the average annual growth rates of output (GVA), labor productivity (Y/L), capital productivity (Y/K), capital intensity (K/L) and TFP during the entire study period (1981-82 to 2010-11), pre-reform period (1981-82 to 1990-91), post-reform period (1991-92 to 2010-11) and also during two sub-periods (decades) of the post-reform period (1991-92 to2000-01 and 2000-01 to 2010-11). The trend growth rates of the aforesaid components in different states in India as well as in all-India are shown in Tables 6 -10.

The trend growth rates of output (GVA) have fallen from 7%, 11.32%, 5.74%, 7.78%, 7.35%, 13.55%, 10.61%, 7.79%, 8.28% and 8.4% in All-India, Assam, Kerala, Madhya Pradesh,

TABLE - 1

ANNUAL GROWTH RATE OF OUTPUT (GVA) OF ORGANIZED MANUFACTURING IN INDIA AND IN DIFFERENT INDIAN STATES

YEAR	INDIA	A.P.	ASSAM	BIHAR	GUJ	HAR	KAR	KERALA	MAHA	M.P.	ODISSA	PUNJAB	RAJ	T.N.	U.P.	W.B.
1981-82	9.53	9.33	5.8	22.3	1.24	-2.14	1.4	3.26	4.85	18.4	-4.77	2.98	2.64	6.93	82.1	-2.42
1982-83	9.53	31.5	2.68	26.4	14.7	9.37	13.5	3.53	0.89	12.3	22.1	0.83	2.73	11.2	-1.9	6.64
1983-84	13	25.1	46.2	14.6	43.4	31.6	9.52	3.19	16.1	5.08	-3.92	13.5	47.3	4.59	-15.1	-2.86
1984-85	-0.01	3.1	31.2	-24.3	-12.9	-21.6	5.81	20.5	4.53	3.98	-21.3	5.85	-14.2	18.5	3.29	4.53
1985-86	0.14	-14	23.2	0	-4.39	6.62	1.53	-6.7	0.99	16.5	35	11.6	6.49	-2.57	-6.05	-1.66
1986-87	7.7	3.68	1.41	0.3	13.3	5.72	6.76	1.68	9.7	-16.2	18.4	0.28	21.6	6.23	50.2	-4.02
1987-88	6.67	-8.8	-9.55	26	6.24	3.29	0.54	16.5	-1	30.5	13.3	27.3	-12.1	2.45	6.29	19
1988-89	16.5	28.3	-11.6	20.6	49.7	13.8	12.3	0.57	20.2	-0.63	68.9	-3.49	12	20.8	7.89	-15.1
1989-90	9.2	9.1	56.7	-6.33	-27.5	4.83	20.1	30.7	11.2	23.5	9.35	67.1	15.1	13.9	29.9	-3.57
1990-91	8.39	27.2	-9.56	-5.74	9.05	23.2	15.4	-20.8	10.2	15.6	-6.73	-17.5	21.1	10.6	0.74	22.1
1991-92	-3.54	1.83	-4.45	10.5	-14.4	-2.22	8.88	23.8	-17	-18.6	1.96	-0.8	0.22	-4.14	13.5	5.12
1992-93	16.7	16.2	-0.48	-3.82	69.8	-13.7	7.85	-2.21	32.7	34.7	3.05	24.6	17.8	7.29	-0.02	1.53
1993-94	15.7	4.38	-7	66.1	7.36	21.8	-4.24	-7.32	21.3	15.8	3.85	-3	-0.57	23.3	15.3	17.4
1994-95	8.83	34.2	4.06	-37.7	16.8	29.5	25.2	12.5	2.79	6.79	9.73	8.1	33.5	9.37	14	-4.97
1995-96	18.8	19	23.9	16.2	36.2	40.1	7.96	25.3	25.2	40.6	17.6	5.32	7.15	10.4	1.41	10.2
1996-97	8.89	-0.7	-7.35	6.65	6.09	3.82	16.5	1.76	2.89	6.64	22.3	13.9	29.5	8.63	12.4	14.4
1997-98	-1.57	12.7	0.74	41.6	-22.4	-6.12	5.88	-0.05	-3.8	-19	10.5	-2.17	-5.94	-12.5	6.75	20.8
1998-99	-11.8	-33	6.94	-11.2	19.2	6.03	4.08	17.6	-14	-14	-42.4	-4.07	-34.8	-5.29	-25.1	-34.9
1999-00	6	10.1	8.52	-2.45	5.42	17.6	-14	-12.7	10.4	4.46	12.7	13	47.1	7.6	-3.64	-9.82
2000-01	-11.4	-7.2	-21.5	-42.1	-15.2	-14.8	-4.16	-5.57	-14	-3.01	-12.8	-27	-11.1	3.93	-6.61	-4.93
2001-02	0.19	13.4	-25.7	-12.2	4.31	12.7	17.4	-5.89	-6.6	-3.49	-11.6	19.1	-7.31	-12.4	-0.99	10.2
2002-03	14.1	8.09	172	66.9	23.5	11.8	15.5	3.67	13.7	1.25	19.8	1.56	-3.32	3.59	12.1	10.8
2003-04	10	10.7	17.7	6.71	12.9	13.1	11.5	5.95	11.9	12.1	22.7	-8.72	3.91	17.4	4.99	3.89
2004-05	15.7	9.66	-7.06	72.3	11.9	15.1	30.7	-6.35	12.9	20.4	54.9	0.96	12.3	4.53	6.01	17.8
2005-06	11.6	0.85	-7.93	-27	22.5	7.14	-3.77	2.7	31.9	-4.17	-0.71	7.72	12.9	18.9	12.5	-12.4
2006-07	18.6	40	0.19	-16.9	-1.27	5.99	38.1	-21.5	19.4	49	29.8	42.5	38.1	25.9	28.7	11.1
2007-08	14.2	17.6	-13.4	74.4	18.1	14.5	4.78	48.5	9.16	17.3	37.9	26.5	-1.69	-1.47	17.3	15.3
2008-09	2.76	4.66	-11.7	-22.2	-7.65	5.23	14.6	20.1	-3.3	2.18	15	-13.8	24.1	-3.17	38.5	7.42
2009-10	14.2	22.3	52.5	0.08	45	34.2	-10.6	-5.95	5.92	-6.92	-6.36	16	21.7	47.4	-4.28	17.8
2010-11	10.9	29	24.4	28.8	-5.12	-13.4	5.34	13.6	17	0.9	12	26.8	-13.6	11.4	32.6	3.09
Average: 1981-82 to 2010-11 (Total period)	7.99	10.90	11.40	9.62	10.90	8.77	8.81	5.35	7.87	8.40	11.00	8.49	9.09	8.44	11.10	4.08
Average: 1981-82 to 1990-91 (Pre-reform period)	8.07	11.40	13.70	7.40	9.29	7.47	8.69	5.25	7.75	10.90	13.00	10.80	10.30	9.26	15.70	2.26
Average: 1991-92 to 2010-11 (Post-reform period)	7.95	10.70	10.20	10.70	11.70	9.42	8.87	5.40	7.93	7.14	9.99	7.32	8.50	8.03	8.77	4.99
Average: 1991-92 to 2000-01 (Post-reform period-Decade 1)	4.67	5.72	0.34	4.39	10.90	8.21	5.40	5.31	4.65	5.43	2.64	2.79	8.29	4.86	2.81	1.48
Average: 2001-02 to 2010-11 (Post-reform period-Decade 2)	11.2	15.6	20.10	17.10	12.40	10.60	12.3	5.48	11.2	8.86	17.30	11.90	8.71	11.20	14.70	8.50

Source: Authors' own estimation

TABLE 2

ANNUAL GROWTH RATE OF LABOUR PRODUCTIVITY(Y/L) OF ORGANIZED MANUFACTURING IN INDIA AND IN DIFFERENT INDIAN STATES

YEAR	INDIA	A.P.	ASSAM	BIHAR	GUJ	HAR	KAR	KERALA	MAHA	M.P.	ODISSA	PUNJAB	RAJ	T.N.	U.P.	W.B.
1981-82	14.5	4.2	8.8	26.2	17.6	-9.71	11.1	-2.22	24.6	13.6	-6.74	-6.5	-1.35	4.64	61.9	5.55
1982-83	5.84	25	8.57	25.2	0.81	-0.15	3.73	15.3	2.59	5.01	20.1	0.31	-5.55	10.6	-7.1	3.93
1983-84	12.9	31.3	39.9	18.3	40.9	28.3	10.5	9.18	17.6	6.46	-2.52	3.22	40.8	5.29	-4.6	-14.1
1984-85	2.03	9.24	38.2	-21.9	-1.24	-21.3	5.07	22.1	6.21	-5.39	-22.6	-0.49	-11.9	9.38	-0.2	22
1985-86	5.39	-10.2	19	1.75	-1.65	1.23	6.67	-0.92	5.68	32.4	25.5	10.2	8.16	0.53	1.89	11.8
1986-87	8.2	1.21	9.72	-2.08	11.5	9.81	3.57	4.01	9.56	-18.7	23.6	1.77	24.3	7.14	49.1	1.42
1987-88	1.88	-13.6	-4.72	14.9	6.98	-0.53	0.36	7.64	-2.6	23.1	2.02	2.99	-20.3	-2.51	-1.8	23.5
1988-89	17.2	26.3	-21.9	22.2	49.7	18.1	8.72	5.28	20.8	17.9	75.8	-1.98	13.4	20	7.29	-18.2
1989-90	3.93	-3.1	49.5	-1.69	-31.2	-1.36	16.1	18.8	10.3	-4.99	6.61	56.5	2.41	8.82	23.1	-0.27
1990-91	8.09	24.8	1.21	-4.89	14.3	17.9	14.3	-24.6	8.86	14.7	-3.08	-17.4	30.1	7.93	1.68	21.5
1991-92	-4	0	-14.5	11.1	-16.4	-6.64	6.6	20.8	-14.1	-14.5	-8.12	3.67	-5.34	-7.19	18.9	1.84
1992-93	9.89	2.62	-8.14	-5.3	62.6	-13.7	5.68	-15.2	23.4	17.9	-1.91	14.1	15.7	-0.19	-3.9	2.57
1993-94	15.7	15	8.18	77.4	2.57	13	-7.98	-3.12	17	16.6	0.97	-6.11	2.35	18.6	16.6	20.7
1994-95	4.24	10.8	-4.71	-38.1	15.1	21.8	21.9	-2.26	3.91	5.98	4.25	7.13	24.3	5.7	15.9	-6.13
1995-96	7.26	5.7	4.13	18.5	10.3	26.8	-1.39	36.6	4.19	21.8	16	-1.66	-0.85	2.63	-2.5	-0.13
1996-97	16.7	17.9	3.68	10.4	23.8	3.89	13.2	5.35	15.8	18.9	32.6	12.8	28.1	9.68	10.7	28.3
1997-98	-6.15	-5.27	-13.6	68.7	-26.9	1.09	-10.1	-12.3	-7.33	-17.6	11.8	3.26	-3.43	-15.4	13	6.96
1998-99	2.75	-6.92	47.2	-8.97	28.6	-10.9	16.9	48.7	-8.46	0.36	-27	36.5	-19.3	8.22	-13	-20.7
1999-00	11.4	4.72	7.22	-3.68	4.54	48.3	-2.25	-18	26.3	13.1	21.2	7.57	48.9	9.58	6.13	4.9
2000-01	-9.39	-6.84	-20.5	-33.4	-7.2	-15.5	-0.6	-8.61	-10.7	2.39	-10.5	-31.1	-10.2	0.98	-2.9	-1.73
2001-02	3.26	14.6	-24.6	-5.26	10	18.1	14.1	-3.37	-5.73	11.5	-1.63	22.4	-7.19	-9.19	4.15	15.1
2002-03	11.4	-3.68	172	73.5	22.7	7.13	16	16.9	12.9	1.3	17.2	0.86	-8.22	0.87	6.39	12.2
2003-04	11	29.1	14.5	11.3	11	6.57	6.74	-9.46	17.6	8.04	16	-4.73	3.48	13.7	0.26	8.64
2004-05	7.7	1.51	-11.4	62.4	0.91	3.2	19.6	-6.71	8.24	17	32.6	-13.2	2.57	-4.19	1.31	17.2
2005-06	3.58	-3.21	-14.5	-27.5	11.6	-4.02	-17	-3.14	23.2	-6.22	0.1	-4.09	4.17	11.2	-0	-12.1
2006-07	4.65	35.1	-5.61	-16.1	-10.9	-1.6	24.4	-23.3	6.02	30.7	15.5	23.4	31.6	-10.2	17.2	12.3
2007-08	12.9	13.7	-11.9	64.7	11.1	-4.16	3.07	43.8	13	7.36	21.2	16.6	-18.9	20.8	5.26	14.2
2008-09	-5.18	-0.35	-20.6	-25.8	-14.2	-11.7	7.76	12.1	-12.2	-5.68	-0.27	-13	30.8	-15.4	26	0.8
2009-10	9.7	18.2	53	4.13	40.8	39.4	-22.4	-1.89	4.38	-4.57	-12.3	11.3	8.91	38.4	-7.4	13.2
2010-11	3.02	12.1	11	-0.17	-15.1	-7.25	19.5	8.92	4.28	-10.5	-9.95	17.4	-21.4	8.34	21.1	-7.23
Average: 1981-82 to 2010-11 (Total period)	6.35	8.34	10.60	10.5	9.09	5.20	6.47	4.68	7.52	6.60	7.83	5.07	6.20	5.29	9.47	5.60
Average: 1981-82 to 1990-91 (Pre-reform period)	8.00	9.52	14.80	7.80	10.80	4.23	8.02	5.46	10.40	8.41	11.70	4.87	8.00	7.18	15.10	5.72
Average: 1991-92 to 2010-11 (Post-reform period)	5.52	7.75	8.55	11.90	8.25	5.69	5.70	4.29	6.09	5.69	5.90	5.16	5.30	4.35	6.64	5.54
Average: 1991-92 to 2000-01 (Post-reform period-Decade 1)	4.84	3.77	0.89	9.67	9.69	6.81	4.20	5.20	5.01	6.48	3.93	4.63	8.03	3.26	5.87	3.65
Average: 2001-02 to 2010-11 (Post-reform period-Decade 2)	6.20	11.70	16.20	14.10	6.80	4.56	7.20	3.39	7.17	4.9	7.87	5.70	2.57	5.43	7.42	7.43

Source: Authors' own estimation

TABLE 3: **ANNUAL GROWTH RATE OF CAPITAL PRODUCTIVITY(Y/K) OF ORGANIZED MANUFACTURING IN INDIA AND IN DIFFERENT INDIAN STATES**

YEAR	INDIA	A.P.	ASSAM	BIHAR	GUJ	HAR	KAR	KERALA	MAHA	M.P.	ODISSA	PUNJAB	RAJ	T.N.	U.P.	W.B.
1981-82	8.54	16.4	28.7	28	9.12	7.51	7.11	3.68	-0.55	6.49	-3.02	4.22	1.53	2.53	65.6	-9.15
1982-83	9.17	21.7	18.4	20.9	1.57	6.64	5.58	-0.4	1.35	0.36	13.6	-5.77	-0.98	8.08	72.6	2.3
1983-84	-3.43	8.34	33.9	14.9	17	10.8	1.98	-2.2	2.52	-9.3	-14.8	1.2	34.7	-7.1	-59.1	-6.24
1984-85	-6.59	-0.45	-10.1	-26	-11.7	-27	4.13	23.4	-3.74	-10	-27.3	-0.02	-22.8	7.7	13.2	-1.7
1985-86	-1.71	-19.3	28	4.4	-5.02	-2	-0.01	-18	2.47	15.5	30.2	8.45	-1.73	-19.3	-12.1	-13.9
1986-87	5.09	-1.3	-26.3	3.31	3.49	5.42	3.71	5.11	4.34	-18	3.12	-0.42	21.4	4.5	28	25.9
1987-88	-4.86	-13.1	10.4	24.5	-8.25	-2.8	-12.9	10.9	-9.23	19	-35.5	3.15	-12.7	-7.41	-1.22	-4.49
1988-89	11.9	6.27	-46.4	29.2	52.3	3.6	1.2	-1.9	8.99	52.9	44.7	-3.96	1.11	2.5	3.25	-25.7
1989-90	0.9	-3.22	98.2	-5.84	-30.2	3.85	21.9	29.1	-3.66	-22	13.3	56.2	22.1	12.4	17.6	-8.35
1990-91	-3.93	-30.7	-4.73	-1.18	-11	17.6	5.89	-25	2.89	5.26	8.11	-19.2	7.46	1.81	-9.99	17.2
1991-92	-7.07	-0.03	-17.8	4.18	-10	-6.9	18.5	16.3	-18.2	-7.7	-12.5	-19	11	-7.03	0.18	-13.8
1992-93	4.45	13.6	-6.2	-4.78	33.9	-14	-10.5	-2.1	16.3	0.79	-5.54	24.3	-10	0.88	-2.52	-15.6
1993-94	8.55	3.29	9.4	51.1	-3.88	6.47	-5.03	-6.6	9.86	20.7	-0.51	-5.29	30.8	6.94	3.71	2.63
1994-95	-7.22	24.3	-14.3	-48.2	4.65	18.5	-2.34	5.04	-5.26	-14	-17.9	1.54	-22.2	-18.1	0.97	-9.65
1995-96	1.52	28	-4.76	10.5	-26.6	19.7	-7.65	-8.8	1.15	23.8	4.56	-9.18	4.04	8.12	2.06	8.5
1996-97	7	6.28	27.3	8.47	25.1	-5.1	-2.13	38	-9	19.6	1.42	11.2	26.8	3.99	-0.8	9.34
1997-98	-7.68	-8.95	-47.5	76.2	-35.8	-9.5	-27.9	-37	-6.68	-5.9	45.4	-3.84	-11.8	-11.8	-0.24	26.4
1998-99	-2.66	-15.3	105	-21.8	13	5.25	-26.4	66.8	18	-21	-19.1	79.6	-12.9	-4.19	-35.1	64.1
1999-00	5.86	8.17	1.97	10.6	11.8	1.91	21.8	-14	-8.68	0.18	34.2	-4.56	-13.2	4.07	35.1	-45
2000-01	-9.36	-3.05	-63	-48.8	-19.6	-18	-1.93	-11	-8.26	22.6	-25.9	-11.1	32	5.76	-0.58	-1.74
2001-02	-2.25	4.92	20	-10.4	-9.07	15	2.68	-6.8	-3.36	-16	-9.74	26.7	-5.79	-3.3	18.7	-18.6
2002-03	14.5	4.73	67.4	64.3	34.6	17.6	13.8	16.4	5.77	24.8	38.8	-20.8	5.17	-11.7	21.6	16.3
2003-04	4.21	4.19	6.82	5.3	9.57	5.15	4.68	4.2	4.57	6.53	-19.7	11.9	0.26	11	0.31	6.13
2004-05	10.3	8.88	-8.6	79.4	13.3	8.89	24.7	-9.7	1.36	-4.5	60.2	-9.38	10.7	-1.7	1.83	19
2005-06	3.14	0.14	-6.49	-30.5	-1.62	5.69	-7.53	7.31	34.5	-12	-25.2	-9.2	11.6	9.68	1.77	-11.7
2006-07	5.74	13.8	-2.99	-19.4	-6.77	-7	26.4	-26	5.69	29.5	9.73	14.6	23.2	6.29	4.7	11.7
2007-08	1.53	-1.97	-17.4	69.8	12.6	-7.6	-8.32	46.3	1.65	8.69	-1.45	11.6	-13.4	-1.83	-6.76	3.86
2008-09	-16.4	-8.15	-15.7	-40.3	-20.9	-17	-19.1	-7.2	-24.7	-13	-7.15	-28.4	-16.1	-20.8	18.8	-14.1
2009-10	-6.68	-27.9	54.4	-9.14	9.32	28.6	-15.8	-6.7	0.16	-14	-41.7	22.2	12.2	13	-16.4	-14
2010-11	-2.39	11.1	16.1	-23.1	-12.3	-29	-2.91	-2.7	3.96	-17	-11.2	2.35	-30.9	4.94	25.5	7.11
Average: 1981-82 to 2010-11 (Total period)	0.67	1.69	7.78	7.19	1.28	1.41	0.46	2.95	0.80	2.45	0.96	4.30	2.72	-0.01	6.35	0.22
Average: 1981-82 to 1990-91 (Pre-reform period)	1.51	-1.55	13.00	9.22	1.73	2.38	3.86	2.58	0.54	4.03	3.23	4.38	5.01	0.57	11.80	-2.42
Average: 1991-92 to 2010-11 (Post-reform period)	0.25	3.30	5.17	6.18	1.06	0.92	-1.24	3.14	0.94	1.66	-0.17	4.27	1.57	-0.29	3.64	1.54
Average: 1991-92 to 2000-01 (Post-reform period-Decade 1)	-0.66	5.62	-1.02	3.75	-0.76	-0.20	-4.35	4.72	-1.08	3.94	0.39	6.36	3.45	-1.14	0.28	2.52
Average: 2001-02 to 2010-11 (Post-reform period-Decade 2)	1.17	0.98	11.40	8.61	2.87	2.09	1.86	1.56	2.95	-0.60	-0.74	2.17	-0.31	0.57	7.00	0.57

Source: Authors' own estimation

TABLE 4

ANNUAL GROWTH RATE OF CAPITAL INTENSITY (K/L) OF ORGANIZED MANUFACTURING IN INDIA AND IN DIFFERENT INDIAN STATES

YEAR	INDIA	A.P.	ASSAM	BIHAR	GUJ	HAR	KAR	KERALA	MAHA	M.P.	ODISSA	PUNJAB	RAJ	T.N.	U.P.	W.B.
1981-82	5.52	-10.5	-15.5	-1.46	7.98	-16	3.75	-5.69	25.4	6.7	-5.9	-10	-2.84	2.06	9.81	16.2
1982-83	-3.05	2.76	-8.34	3.58	-0.76	-6.37	-1.75	15.7	1.22	4.63	5.77	6.46	-4.62	2.35	-46.2	1.59
1983-84	17	21.2	4.46	2.96	20.4	15.7	8.37	11.6	14.7	17.3	14.4	1.99	4.49	13.3	133	-8.4
1984-85	9.22	9.74	53.8	5.49	11.9	7.36	0.9	-1.1	10.3	5.69	6.59	-0.5	14.1	1.56	-11.8	24.2
1985-86	7.22	11.2	-7	-2.53	3.55	3.35	6.68	20.2	3.13	14.7	-3.59	1.64	10.1	24.6	15.9	29.8
1986-87	2.96	2.54	49	-5.22	7.78	4.17	-0.14	-1.04	5.01	-0.96	19.8	2.19	2.41	2.52	16.4	-19
1987-88	7.08	-0.52	-13.7	-7.66	16.6	2.38	15.2	-2.92	7.3	3.47	58.2	-0.2	-8.73	5.29	-0.62	29.4
1988-89	4.74	18.8	45.9	-5.44	-1.69	14	7.43	7.29	10.9	-22.9	21.5	2.06	12.2	17.1	3.91	10.1
1989-90	3	0.13	-24.6	4.4	-1.48	-5.02	-4.78	-7.98	14.5	21.1	-5.92	0.22	-16.1	-3.2	4.73	8.82
1990-91	12.5	80.1	6.24	-3.75	28.3	0.31	7.99	-0.07	5.8	8.95	-10.3	2.26	21	6.01	13	3.68
1991-92	3.3	0.03	4.11	6.66	-7.13	0.3	-10.1	3.89	4.96	-7.37	5.04	28	-14.7	-0.2	18.7	18.2
1992-93	5.21	-9.63	-2.07	-0.55	21.5	0.65	18	-13.5	6.15	17	3.84	-8.2	28.6	-1.1	-1.38	21.5
1993-94	6.6	11.4	-1.11	17.4	6.71	6.11	-3.11	3.73	6.5	-3.45	1.48	-0.9	-21.7	10.9	12.4	17.6
1994-95	12.4	-10.8	11.2	19.6	9.94	2.84	24.9	-6.95	9.68	22.9	27.1	5.51	59.7	29.1	14.8	3.9
1995-96	5.65	-17.4	9.33	7.26	50.3	5.9	6.78	49.8	3.01	-1.66	11	8.27	-4.7	-5.1	-4.46	-8
1996-97	9.09	10.9	-18.6	1.77	-1.03	9.46	15.6	-23.6	27.2	-0.66	30.7	1.48	1.03	5.47	11.6	17.4
1997-98	1.66	4.04	64.6	-4.25	13.9	11.7	24.8	38.8	-0.7	-12.5	-23.1	7.39	9.51	-4	13.3	-15
1998-99	5.56	9.95	-28.1	16.3	13.9	-15.4	58.7	-10.9	-22	27	-9.71	-24	-7.45	13	33.6	-52
1999-00	5.23	-3.19	5.14	-12.9	-6.49	45.5	-19.7	-5	38.4	12.9	-9.68	12.7	71.7	5.3	-21.4	90.7
2000-01	-0.04	-3.9	115	30	15.5	3.64	1.36	2.66	-2.7	-16.5	20.8	-22	-32	-4.5	-2.32	0.01
2001-02	5.63	9.21	-37.2	5.68	21	2.65	11.1	3.66	-2.5	32.5	8.98	-3.4	-1.49	-6.1	-12.2	41.5
2002-03	-2.72	-8.03	62.5	5.56	-8.84	-8.93	1.92	0.47	6.78	-18.8	-15.5	27.4	-12.7	14.2	-12.5	-3.6
2003-04	6.47	23.9	7.2	5.73	1.31	1.35	1.96	-13.1	12.5	1.42	44.6	-15	3.21	2.38	-0.05	2.37
2004-05	-2.34	-6.77	-3.04	-9.48	-10.9	-5.23	-3.96	3.31	6.79	22.5	-17.1	-4.2	-7.31	-2.5	-0.51	-1.5
2005-06	0.42	-3.35	-8.51	4.28	13.5	-9.19	-10.3	-9.74	-8.4	6.11	33.8	5.63	-6.63	1.38	-1.78	-0.4
2006-07	-1.03	18.7	-2.69	4.07	-4.48	5.76	-1.53	3.12	0.31	0.93	5.22	7.61	6.84	-15	11.9	0.51
2007-08	11.2	16	6.7	-3.02	-1.27	3.68	12.4	-1.72	11.2	-1.22	23	4.48	-6.42	23	12.9	9.91
2008-09	13.5	8.49	-5.76	24.4	8.41	5.75	33.2	20.8	16.7	8.29	7.41	21.5	55.9	6.76	6.05	17.4
2009-10	17.6	63.9	-0.93	14.6	28.8	8.43	-7.84	5.14	4.21	11.4	50.5	-9	-2.95	22.4	10.8	31.6
2010-11	5.55	0.92	-4.39	29.7	-3.2	30.8	23.1	11.9	0.31	7.29	1.37	14.7	13.7	3.23	-3.55	-13
Average: 1981-82 to 2010-11 (Total period)	5.83	8.33	8.79	5.11	8.46	4.19	7.37	3.29	7.21	5.56	10.00	2.12	5.47	5.66	7.47	9.15
Average: 1981-82 to 1990-91 (Pre-reform period)	6.62	13.60	9.03	-0.96	9.26	1.99	4.37	3.60	9.83	5.87	10.10	0.59	3.20	7.16	13.80	9.59
Average: 1991-92 to 2010-11 (Post-reform period)	5.44	5.72	8.67	8.16	8.06	5.29	8.87	3.14	5.90	5.40	9.99	2.89	6.60	4.91	4.29	8.93
Average: 1991-92 to 2000-01 (Post-reform period-Decade 1)	5.46	-0.87	16.00	8.13	11.70	7.07	11.70	3.89	7.01	3.77	5.75	0.79	9.00	4.89	7.48	9.42
Average: 2001-02 to 2010-11 (Post-reform period-Decade 2)	5.42	12.30	1.39	8.16	4.43	3.50	6.01	2.39	4.79	7.04	14.20	4.99	4.20	4.93	1.10	8.44
Source::Authors' own estimation																

TABLE 5

ANNUAL GROWTH RATE OF TOTAL FACTOR PRODUCTIVITY OF ORGANIZED MANUFACTURING IN INDIA AND IN DIFFERENT INDIAN STATES

YEAR	INDIA	A.P.	ASSAM	BIHAR	GUJ	HAR	KAR	KERALA	MAHA	M.P.	ODISSA	PUNJAB	RAJ	T.N.	U.P.	W.B.
1981-82	7.11	4.82	2.27	6.09	8.94	7.02	8.96	4.59	7.43	6.38	-1.69	6.83	7.47	1.44	10.61	3.98
1982-83	6.94	4.85	2.26	6.11	8.76	7.04	8.84	4.41	7.25	6.44	-1.16	6.67	7.20	1.35	9.72	4.00
1983-84	6.84	4.90	2.27	6.11	8.63	7.14	8.71	4.25	7.16	6.51	-0.84	6.53	6.97	1.27	9.95	4.01
1984-85	6.70	4.92	2.26	6.12	8.35	7.18	8.54	4.05	7.03	6.59	-0.35	6.36	6.75	1.19	9.47	4.03
1985-86	6.54	4.94	2.27	6.10	8.09	7.23	8.36	3.91	6.86	6.59	0.36	6.17	6.52	1.12	9.13	4.07
1986-87	6.37	4.96	2.25	6.08	7.88	7.24	8.20	3.71	6.72	6.61	0.58	5.97	6.23	1.03	8.87	3.98
1987-88	6.26	4.98	2.24	6.09	7.72	7.27	8.13	3.54	6.60	6.65	-1.18	5.89	5.94	0.95	8.54	4.05
1988-89	6.10	5.06	2.27	6.06	7.44	7.33	8.03	3.36	6.48	6.43	-1.03	5.68	5.72	0.88	8.17	4.10
1989-90	5.96	5.10	2.28	6.06	7.19	7.34	7.83	3.18	6.40	6.66	0.01	5.52	5.40	0.79	7.86	4.11
1990-91	5.85	5.34	2.25	6.03	7.07	7.36	7.72	3.01	6.27	6.71	1.57	5.32	5.19	0.71	7.56	4.13
1991-92	5.69	5.35	2.28	6.06	6.76	7.39	7.47	2.85	6.11	6.65	1.73	5.24	4.83	0.62	7.27	4.19
1992-93	5.57	5.36	2.29	6.07	6.67	7.40	7.43	2.66	6.01	6.80	2.19	5.03	4.72	0.54	6.89	4.25
1993-94	5.43	5.36	2.26	6.11	6.48	7.48	7.25	2.47	5.90	6.77	2.87	4.84	4.25	0.46	6.58	4.29
1994-95	5.33	5.39	2.28	6.20	6.29	7.53	7.26	2.31	5.78	6.88	2.38	4.67	4.31	0.41	6.29	4.31
1995-96	5.23	5.37	2.31	6.22	6.47	7.63	7.20	2.25	5.73	6.95	2.70	4.56	4.05	0.32	5.89	4.31
1996-97	5.07	5.34	2.29	6.21	6.08	7.68	7.15	1.93	5.63	6.89	2.70	4.36	3.77	0.23	5.59	4.33
1997-98	4.92	5.42	2.32	6.11	5.94	7.71	7.26	1.94	5.48	6.81	4.86	4.17	3.52	0.14	5.25	4.31
1998-99	4.70	5.33	2.26	6.17	5.71	7.71	7.34	1.60	5.13	6.86	7.31	3.59	3.05	0.04	4.98	4.02
1999-00	4.53	5.34	2.26	6.11	5.40	7.80	6.89	1.42	5.07	6.88	9.00	3.49	3.10	-0.04	4.29	4.18
2000-01	4.34	5.32	2.26	6.17	5.17	7.83	6.69	1.25	4.87	6.76	9.11	3.17	2.56	-0.14	3.84	4.16
2001-02	4.18	5.35	2.26	6.16	5.00	7.81	6.61	1.07	4.68	6.83	10.08	2.92	2.26	-0.24	3.28	4.26
2002-03	4.00	5.36	2.26	6.17	4.66	7.78	6.44	0.83	4.55	6.72	11.64	2.87	1.92	-0.31	2.82	4.25
2003-04	3.86	5.39	2.26	6.17	4.41	7.83	6.30	0.65	4.42	6.75	10.52	2.54	1.65	-0.40	2.46	4.24
2004-05	3.70	5.39	2.27	6.15	4.13	7.86	6.16	0.48	4.31	6.87	11.56	2.40	1.37	-0.48	2.09	4.24
2005-06	3.57	5.39	2.28	6.18	4.02	7.87	6.00	0.27	4.14	6.91	11.11	2.29	1.09	-0.56	1.78	4.23
2006-07	3.45	5.47	2.30	6.19	3.79	7.95	5.89	0.10	4.04	6.98	11.19	2.22	0.88	-0.64	1.56	4.23
2007-08	3.33	5.55	2.29	6.20	3.56	8.08	5.81	-0.08	3.91	7.02	10.50	2.08	0.67	-0.73	1.36	4.27
2008-09	3.26	5.60	2.31	6.33	3.40	8.22	5.89	-0.16	3.88	7.10	10.37	1.99	0.64	-0.79	1.09	4.34
2009-10	3.18	5.81	2.31	6.38	3.34	8.25	5.76	-0.35	3.75	7.14	9.03	1.75	0.40	-0.85	0.81	4.44
2010-11	3.07	5.86	2.34	6.62	3.12	8.37	5.64	-0.47	3.64	7.24	8.82	1.67	0.26	-0.94	0.46	4.43
Average: 1981-82 to 2010-11 (Total period)	5.04	5.29	2.28	6.16	6.02	7.61	7.19	2.03	5.51	6.78	4.86	4.23	3.76	0.24	5.48	4.19
Average: 1981-82 to 1990-91 (Pre-reform period)	6.47	4.99	2.26	6.08	8.01	7.21	8.33	3.80	6.82	6.56	-0.37	6.09	6.34	1.07	8.99	4.05
Average: 1991-92 to 2010-11 (Post-reform period)	4.32	5.44	2.28	6.20	5.02	7.81	6.62	1.16	4.86	6.89	7.48	3.29	2.47	-0.17	3.73	4.26
Average: 1991-92 to 2000-01 (Post-reform period-Decade 1)	5.08	5.36	2.28	6.14	6.10	7.62	7.19	2.07	5.57	6.82	4.49	4.31	3.82	0.26	5.69	4.23
Average: 2001-02 to 2010-11 (Post-reform period-Decade 2)	3.56	5.52	2.29	6.26	3.94	8.00	6.05	0.23	4.13	6.95	10.48	2.27	1.11	-0.59	1.77	4.29

Source: Authors" own estimation

Table 6

Trend Growth Rate of Output (GVA) of Organized Manufacturing Industries in India and in different Indian states

YEAR	INDIA	A.P.	ASSAM	BIHAR	GUJ	HAR	KAR	KERALA	MAHA	M.P.	ORISSA	PUNJAB	RAJ	T.N.	U.P.	W.B.
1981-82 TO 2010-11 (Total Period)	6.72 (sig*)	7.64 (sig*)	5.13 (sig*)	3.93 (sig*)	8.32 (sig*)	8.25 (sig*)	8.32 (sig*)	3.55 (sig*)	6.47 (sig*)	6.43 (sig*)	7.81 (sig*)	5.67 (sig*)	6.84 (sig*)	6.32 (sig*)	6.30 (sig*)	2.82 (sig*)
1981-82 TO 1990-91 (Pre-reform Period)	7.00 (sig*)	6.39 (sig*)	11.32 (sig*)	3.90 (sig*)	7.10 (sig*)	5.64 (sig*)	7.61 (sig*)	5.74 (sig*)	7.35 (sig*)	7.78 (sig*)	13.55 (sig*)	10.61 (sig*)	7.79 (sig*)	8.28 (sig*)	8.40 (sig*)	0.95 (Not sig)
1991-92 TO 2010-11 (Post-reform Period)	6.40 (sig*)	7.08 (sig*)	5.51 (sig*)	3.80 (sig*)	8.29 (sig*)	8.91 (sig*)	8.30 (sig*)	2.30 (sig*)	6.14 (sig*)	5.37 (sig*)	7.49 (sig*)	4.23 (sig*)	5.62 (sig*)	5.68 (sig*)	5.26 (sig*)	2.72 (sig*)
1991-92 TO 2000-01 (Decade-1)	5.22 (sig**)	4.51 (sig***)	2.17 (sig****)	2.18 (Not sig)	9.11 (sig*)	10.40 (sig*)	5.93 (sig*)	4.61 (sig*)	5.17 (sig**)	5.08 (sig*)	1.96 (Not sig)	3.24 (sig***)	6.21 (sig***)	4.53 (sig*)	1.56 (Not sig)	0.46 (Not sig)
2001-02 TO 2010-11 (Decade-2)	11.82 (sig*)	14.08 (sig*)	6.54 (Not sig)	9.23 (sig**)	11.24 (sig*)	10.16 (sig*)	11.18 (sig*)	4.82 (sig***)	12.33 (sig*)	10.91 (sig*)	18.82 (sig*)	10.03 (sig*)	11.92 (sig*)	12.04 (sig*)	14.96 (sig*)	7.42 (sig*)

Source: Authors" own estimation

(sig*, sig** & sig*** indicate 1%, 5% and 10% levels of significance respectively.)

Table 7

Trend Growth Rate of Labour Productivity(Y/L) of Organized Manufacturing Industries in India and in different Indian states

YEAR	INDIA	A.P.	ASSAM	BIHAR	GUJ	HAR	KAR	KERALA	MAHA	M.P.	ORISSA	PUNJAB	RAJ	T.N.	U.P.	W.B.
1981-82 TO 2010-11 (Total Period)	5.66 (sig*)	6.08 (sig*)	4.45 (sig*)	6.18 (sig*)	6.85 (sig*)	5.18 (sig*)	5.84 (sig*)	2.21 (sig*)	6.14 (sig*)	6.27 (sig*)	7.11 (sig*)	3.96 (sig*)	5.24 (sig*)	3.69 (sig*)	6.11 (sig*)	4.97 (sig*)
1981-82 TO 1990-91 (Pre-reform Period)	6.79 (sig*)	5.35 (sig**)	11.89 (sig**)	3.78 (sig**)	7.84 (sig*)	3.76 (sig*)	6.56 (sig*)	6.49 (sig*)	8.10 (sig*)	6.48 (sig*)	11.93 (sig*)	5.42 (sig*)	5.78 (sig*)	6.50 (sig*)	8.17 (sig*)	4.66 (sig*)
1991-92 TO 2010-11 (Post-reform Period)	5.18 (sig*)	6.38 (sig*)	4.79 (sig*)	6.50 (sig*)	6.19 (sig*)	5.30 (sig*)	5.29 (sig*)	1.44 (sig**)	5.74 (sig*)	6.14 (sig*)	6.88 (sig*)	2.89 (sig*)	3.78 (sig*)	2.83 (sig*)	4.35 (sig*)	5.09 (sig*)
1991-92 TO 2000-01 (Decade-1)	5.75 (sig*)	4.46 (sig*)	3.03 (sig***)	6.96 (sig**)	8.00 (sig*)	8.51 (sig*)	3.88 (sig*)	4.55 (sig**)	5.39 (sig*)	7.15 (sig*)	5.84 (sig***)	5.68 (sig*)	7.46 (sig*)	3.64 (sig*)	4.71 (sig*)	3.31 (sig**)
2001-02 TO 2010-11 (Decade-2)	5.89 (sig*)	10.63 (sig*)	2.01 (Not sig)	6.72 (sig***)	4.10 (sig*)	1.16 (Not sig)	4.24 (sig**)	1.54 (Not sig)	7.93 (sig*)	5.18 (sig*)	9.04 (sig*)	2.74 (sig***)	4.82 (sig*)	4.87 (sig*)	6.91 (sig*)	6.15 (sig*)

Source: Authors" own estimation

(sig*, sig** & sig*** indicate 1%, 5% and 10% levels of significance respectively.)

Table 8

Trend Growth Rate of Capital Productivity(Y/K) of Organized Manufacturing Industries in India and in different Indian states

YEAR	INDIA	A.P.	ASSAM	BIHAR	GUJ	HAR	KAR	KERALA	MAHA	M.P.	ORISSA	PUNJAB	RAJ	TAMIL	U.P.	W.B.
1981-82 TO 2010-11 (Total Period)	0.55 (sig*)	0.78 (sig***)	-1.70 (sig*)	2.01 (sig*)	-1.04 (sig*)	1.57 (sig*)	-0.84 (sig***)	0.91 (sig*)	0.29 (Not sig)	2.33 (sig*)	0.17 (Not sig)	2.95 (sig*)	2.31 (sig*)	-0.79 (sig**)	1.49 (sig*)	-0.86 (sig***)
1981-82 TO 1990-91 (Pre-reform Period)	0.35 (Not sig)	-5.12 (sig**)	1.22 (Not sig)	5.47 (sig*)	-0.22 (Not sig)	-0.83 (Not sig)	1.93 (sig**)	2.60 (sig***)	0.31 (Not sig)	2.63 (Not sig)	-0.66 (Not sig)	4.00 (sig**)	2.71 (sig***)	-1.37 (Not sig)	-1.02 (Not sig)	-0.38 (sig**)
1991-92 TO 2010-11 (Post-reform Period)	0.92 (sig**)	2.41 (sig*)	-1.46 (Not sig)	0.77 (Not sig)	-0.29 (Not sig)	1.78 (sig*)	-1.69 (sig***)	0.32 (Not sig)	0.98 (sig***)	1.90 (sig*)	0.25 (Not sig)	3.07 (sig**)	1.38 (sig**)	-0.55 (sig***)	2.73 (sig*)	1.08 (Not sig)
1991-92 TO 2000-01 (Decade-1)	-0.17 (Not sig)	5.4 (sig**)	-3.99 (Not sig)	0.48 (Not sig)	-4.33 (sig**)	2.03 (Not sig)	-9.74 (sig*)	1.16 (Not sig)	-0.47 (Not sig)	3.06 (sig**)	1.93 (Not sig)	6.85 (sig**)	-0.43 (Not sig)	-1.80 (sig**)	-2.14 (Not sig)	4.40 (Not sig)
2001-02 TO 2010-11 (Decade-2)	0.81 (Not sig)	-0.25 (Not sig)	0.94 (Not sig)	0.86 (Not sig)	1.69 (Not sig)	-0.71 (Not sig)	0.58 (Not sig)	0.24 (Not sig)	2.91 (Not sig)	0.38 (Not sig)	-4.19 (Not sig)	-1.34 (Not sig)	1.12 (Not sig)	0.61 (Not sig)	2.95 (sig*)	1.01 (Not sig)

Source: Authors" own estimation

(sig*, sig** & sig*** indicate 1%, 5% and 10% levels of significance respectively.)

Table 9

Trend Growth Rate of Capital Intensity (K/L) of Organized Manufacturing Industries in India and in different Indian states

YEAR	INDIA	A.P.	ASSAM	BIHAR	GUJ	HAR	KAR	KERALA	MAHA	M.P.	ORISSA	PUNJAB	RAJ	TAMIL	U.P.	W.B.
1981-82 TO 2010-11 (Total Period)	5.12 (sig*)	5.10 (sig*)	6.15 (sig*)	4.17 (sig*)	7.89 (sig*)	3.61 (sig*)	6.68 (sig*)	1.30 (sig*)	5.85 (sig*)	3.94 (sig*)	6.94 (sig*)	1.00 (sig*)	2.93 (sig*)	4.48 (sig*)	4.63 (sig*)	5.83 (sig*)
1981-82 TO 1990-91 (Pre-reform Period)	6.44 (sig*)	10.47 (sig*)	10.67 (sig*)	-1.69 (sig**)	8.06 (sig*)	4.59 (sig*)	4.63 (sig*)	3.89 (sig*)	7.79 (sig*)	3.85 (sig**)	12.60 (sig*)	1.42 (sig*)	3.07 (sig**)	7.87 (sig*)	9.19 (sig**)	8.49 (sig*)
1991-92 TO 2010-11 (Post-reform Period)	4.26 (sig*)	3.98 (sig*)	6.25 (sig*)	5.73 (sig*)	6.49 (sig*)	3.52 (sig*)	6.98 (sig*)	1.12 (sig*)	4.75 (sig*)	4.25 (sig*)	6.63 (sig*)	-0.18 (Not sig)	2.40 (sig*)	3.39 (sig*)	1.62 (sig**)	4.01 (sig*)
1991-92 TO 2000-01 (Phase-1)	5.92 (sig*)	-0.93 (Not sig)	7.02 (sig**)	6.48 (sig*)	12.34 (sig*)	6.49 (sig*)	13.62 (sig*)	3.39 (sig**)	5.86 (sig**)	4.10 (sig*)	3.9 (sig***)	-1.17 (Not sig)	7.89 (sig*)	5.45 (sig*)	6.84 (sig*)	-1.09 (Not sig)
2001-02 TO 2010-11 (Phase-2)	5.07 (sig*)	10.87 (sig*)	1.07 (Not sig)	5.86 (sig*)	2.41 (sig***)	1.87 (Not sig)	3.66 (sig**)	1.31 (Not sig)	5.03 (sig*)	4.85 (sig*)	13.25 (sig*)	4.08 (sig*)	3.69 (sig**)	4.26 (sig*)	3.95 (sig*)	5.14 (sig*)

Source: Authors" own estimation

(sig*, sig** & sig*** indicate 1%, 5% and 10% levels of significance respectively.)

Table 10

Trend Growth Rate of TFP of Organized Manufacturing Industries in India and in different Indian states

YEAR	INDIA	A.P.	ASSAM	BIHAR	GUJ	HAR	KAR	KERALA	MAHA	M.P.	ORISSA	PUNJAB	RAJ	T.N.	U.P.	W.B.
1981-82 TO 2010-11 (Total Period)	4.84 (sig*)	5.17 (sig*)	2.25 (sig*)	5.96 (sig*)	5.75 (sig*)	7.35 (sig*)	6.88 (sig*)	1.86 (sig*)	5.30 (sig*)	6.57 (sig*)	4.97 (sig*)	4.05 (sig*)	3.55 (sig*)	0.20 (sig*)	5.18 (sig*)	4.12 (sig*)
1981-82 TO 1990-91 (Pre-reform Period)	6.20 (sig*)	4.87 (sig*)	2.24 (sig*)	5.91 (sig*)	7.60 (sig*)	6.99 (sig*)	7.93 (sig*)	3.41 (sig*)	6.53 (sig*)	6.37 (sig*)	-0.27 (sig**)	5.84 (sig*)	6.03 (sig*)	1.03 (sig*)	8.46 (sig*)	3.97 (sig*)
1991-92 TO 2010-11 (Post-reform Period)	4.14 (sig*)	5.27 (sig*)	2.25 (sig*)	6.01 (sig*)	4.81 (sig*)	7.53 (sig*)	6.38 (sig*)	1.07 (sig*)	4.66 (sig*)	6.65 (sig*)	8.02 (sig*)	3.09 (sig*)	3.28 (sig*)	-0.22 (sig*)	3.42 (sig*)	4.16 (sig*)
1991-92 TO 2000-01 (Decade-1)	4.91 (sig*)	5.22 (sig*)	2.26 (sig*)	5.98 (sig*)	5.87 (sig*)	7.37 (sig*)	6.94 (sig*)	1.86 (sig*)	5.38 (sig*)	6.63 (sig*)	4.38 (sig*)	4.15 (sig*)	3.65 (sig*)	0.22 (sig*)	5.39 (sig*)	4.16 (sig*)
2001-02 TO 2010-11 (Decade-2)	3.42 (sig*)	5.37 (sig*)	2.27 (sig*)	6.06 (sig*)	3.74 (sig*)	7.70 (sig*)	5.80 (sig*)	0.28 (sig*)	3.98 (sig*)	6.74 (sig*)	10.11 (sig*)	2.17 (sig*)	0.96 (sig*)	-0.64 (sig*)	1.58 (sig*)	4.19 (sig*)

Source: Authors" own estimation

(sig* , sig** & sig*** indicate 1%, 5% and 10% levels of significance respectively.)

Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu and Uttar Pradesh during the pre-reform period to 6.4%, 5.51%, 2.3%, 5.37%, 6.14%, 7.49%, 4.23%, 5.62%, 5.68%, and 5.26% respectively during the post-reform period. The same have however been increased in Andhra Pradesh, Gujarat, Haryana, Karnataka, and West Bengal from 6.39%, 7.1%, 5.54%, 7.61% and 0.95% in the pre-reform period to 7.08%, 8.29%, 8.91%, 8.3% and 2.72% respectively during the post-reform period. The trend in the growth rate of output in Bihar has however been remaining more or less the same during the pre- and post-reform period (3.9% in the pre- and 3.8% in the post-reform period).

A positive relationship has also been found in between the growth rates of labor productivity and the growth rates of capital intensity in almost all the states.

However, the trend growth rates of partial factor productivity of labor that were 6.79% (all-India), 11.89% (Assam), 7.84% (Gujarat), 6.56% (Karnataka), 6.49% (Kerala), 6.48% (Madhya Pradesh), 8.1% (Maharashtra), 11.93%(Orissa), 5.42% (Punjab), 5.78% (Rajasthan), 6.5% (Tamil Nadu) and 8.17% (Uttar Pradesh) during the pre-reform period, declined to 5.18%, 4.79%, 6.19%, 5.29%, 1.44%, 6.14%, 5.74%, 6.88%, 2.89%, 3.78%, 2.83% and 4.35% respectively during the post-reform period. Whereas the growth rates of the same were 3.78%, 3.76% and 4.66% in Bihar, Haryana and West Bengal respectively during the pre-reform period and they have increased to 6.5%, 5.3% and 5.09% during the post-reform period. A positive relationship has also been found in between the growth rates of labor productivity and the growth rates of capital intensity in almost all the states. On the other hand, the trend growth rates of the partial productivity of capital have increased in all India, Andhra Pradesh, Haryana, Maharashtra and Uttar Pradesh but they have declined in Karnataka, Madhya Pradesh, Punjab and Rajasthan during the post-reform period and the growth rates are statistically significant too. The trend growth rates of capital productivity in all other states under study are not statistically significant; either they have increased or decreased.

Further, the trend growth rates of TFP that were 6.2% (All-India), 7.6% (Gujarat), 7.93% (Karnataka), 3.41% (Kerala), 6.53% (Maharashtra), 5.84% (Punjab), 6.03% (Rajasthan), 1.03% (Tamil Nadu) and 8.46% (Uttar Pradesh) during the pre-reform period reduced to 4.14% , 4.81%, 1.07%, 4.66%, 3.09%, 3.28%, -0.22% and 3.42% during the post-reform period. Although the trend growth rates of TFP in Andhra Pradesh, Assam, Bihar, Haryana, Madhya Pradesh and West Bengal which were 4.87%, 2.24%, 5.91%, 6.99%, 6.37% and 3.97% respectively during the pre-reform period have increased marginally to 5.27%, 2.25%, 6.01%, 7.53%, 6.65% and 4.16% during the pre-reform period whereas it was found negative (-0.27%) in Orissa which rose to a massive 8.02% during that period. So, the reduction in the growth rates of output in All-India, Kerala, Maharashtra, Punjab, Rajasthan,

Tamil Nadu and Uttar Pradesh during the post-reform period was mainly responsible for the reduction in growth rates of labor productivity as well as TFP while the increase in the growth rates of output in Andhra Pradesh, Haryana and W.B. during the post-reform period was mainly because of the increase in the growth rate of labor productivity and TFP as capital productivity grew only at a slower rate and the growth rate of capital productivity was not found to be statistically significant either. However, in Assam the decline in the growth rate of output during the post-reform period was mainly due to the decline in the growth rate of labor productivity as the growth rate of TFP remained more or less same during both the pre-and post-reform periods (2.24% in pre-reform & 2.25% during the post-reform period). Further, the trend growth rate of output declined in Orissa too during the post-reform period even if TFP growth rate increased as the growth rates of labor productivity declined at the same time more or less at the same rate and the growth rate of capital productivity was not statistically significant during that period. Moreover, the trend in the growth rate of output remains almost the same in Bihar during the pre-and post-reform period as TFP growth rate remains almost constant during these two periods and the increase in the growth rate of labor productivity as well as the decline in the growth rate of capital productivity (though it is not statistically significant) happened at the same time more or less at the same rate.

As far as the contribution of TFP growth and input growth in the growth of total output is concerned, it was observed that the contribution of TFP growth to output growth was significantly high while the contributions of inputs growth were found to be negligible or even negative during the entire study period, pre-and post-reform period as well as in three different decades of the study. It may be mentioned here that despite the declining contribution of the primary inputs, the higher growth in industrial production, in the states under study, during the study periods have been achieved through the growth in TFP in the form of efficient utilization of better technology and skill. This implies that better quality inputs and modern improved technology were the major contributors to the industrial growth in those states during the periods.

The contribution of TFP growth to output growth was significantly high while the contributions of inputs growth were found to be negligible or even negative.

Conclusion

Output and productivity growth of the organized manufacturing sector in India as a whole as well as in the major industrialized states have deteriorated during the post-reform period implying that in India and in those states, the industrial sector failed to achieve sustained growth momentum even after 1991. Further, the deterioration in the growth rates of output and productivity in the organized manufacturing sector in India during the

1990s did not seem to have been caused by import liberalization policies. Rather, the relaxation of the restrictive protection policies in respect of industries appears to have had a favorable impact on productivity growth in those industries.

But the growth rate of output and productivity of the organized manufacturing sector as a whole in all-other states under study have been accelerated during the post-reform period, specifically during the latter half of the post-reform period (2001-02 to 2010-11), which was probably due to the increase in the inflow of foreign capital and foreign entrepreneurship in these states. The explanation for the deterioration in the growth rates of output and productivity in the organized manufacturing sector in these states during the post-reform period seems to be because of the adverse impact of certain factors that more than offset the favorable influence of the reforms. Two factors that seem to have had an adverse effect on industrial productivity in the post-reform period were: a) decline in the growth rate of agriculture and b) deterioration in capacity utilization (Goldar & Kumari, 2003). The deterioration in productivity growth in the Indian manufacturing sector during the post-reform period may in part be attributable to a slowdown in the growth of agriculture during this period. Again, the slower agricultural growth may have led to a slow growth in demand for industrial goods, which in turn may have caused under-utilization of capacities with adverse effects on productivity. But from the general trend as observed during 2000-01 to 2010-11, we can expect that productivity growth would improve in the coming years. Once productivity growth increases, the issue of capacity utilization would be eased and we will get a larger expansionary effect.

References

Abramovitz, M (1956), "Resources and Output Trends in the U.S. since 1870", *American Economic Review,* 46(2): 5-23

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

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

Balakrishnan, P & Pushpangadan, K. (1994), "Total Factor Productivity Growth in Manufacturing Industry: A Fresh Look", *Economic and Political Weekly*, 30th July, 29: 2028-35

Balakrishnan, P., Pushpangadan, K. & Suresh Babu, M. (2000), "Trade Liberalization and Productivity Growth in Manufacturing: Evidence from firm level Panel Data", *Economic and political Weekly,* 35 (41): 3679-82

Balakrishnan, P. (2010), Economic Growth in India: History and Prospect, Oxford University Press, New Delhi, India

Brahmananda, P. R (1982), Productivity in the Indian Economy: Rising Inputs for Falling Output, Himalaya Publishing House, Mumbai

Chaudhuri, S. (2000), "Economic Growth in the State-Four Decades-I", *Money and Finance,* Oct-Dec: 45-49

Christensen L.R, Jorgensen D.W. & Lau L.I. (1971), "Conjugate Duality and the Transcendental Logarithmic Production Function", *Econometrica,* 39: 225-56

Christensen L.R, Jorgensen D.W & Lau L.I (1973): "Transcendental Logarithmic Production Function", *The Review of Economics and Statistics,* 55: 28-45

Das, D.K. (2004), "Manufacturing Productivity Growth under Varying Trade Regimes, 1980-2000", *Economic and Political Weekly*, 39(5): 423-33

Dash, M. K., Kabra, G.& Ajay Singh (2010). "Productivity Growth of Manufacturing Sector in India an Interstate Analysis", *European Journal of Scientific Research*, 44, (3):387-99

Denison, E.F (1962), The Sources of Economic Growth in the United States, Washington, Committee for Economic Development

Denison, E.F (1974), Accounting for U.S. Economic Growth, 1929-1969, Washington D.C, Brookings Institution

Denison, E.F (1979), Accounting for Slower Economic Growth: The U.S. in the 1970s, Washington D.C, Brookings Institution

Dholakia, R.H & Dholakia, B.H (1994), Total Factor Productivity Growth in Indian Manufacturing, *Economic and Political Weekly,* 31 Dec, 29: 3342-3944

Diewert, W.E. (2000), Productivity Measurement Using Differences Rather than Ratios: A Note, University of New South Wales Working Paper, January

Goldar, B (1986), Productivity Growth in Indian Industry, Allied Publishers, New Delhi

Goldar, B (2000), Productivity Growth in Indian Manufacturing in the 1980s and 1990s, Paper Presented at Conference on Centre for Development Economics, DSE, Industrialization in a Reforming Economy: A Qualitative Assessment, New Delhi, Dec. 20-22

Goldar, B (2002), "Total Factor Productivity Growth in the Indian Manufacturing in 1990s", *Economic and Political Weekly,* 37(49):4966-68

Goldar, B & Anita Kumari (2003), "Import Liberalization and Productivity Growth in Indian Manufacturing Industries in the 1990s", *The Developing Economies,* 41(4): 436-60

Goldar, B (2004), Productivity Trends in Indian Manufacturing in the Pre and post-Reforms Periods, Working Paper No. 137, ICRIER, New Delhi, June

Goldar, B (2006), "Productivity Growth in Indian Manufacturing in the 1980s and 1990s", in Tendulkar, S.D, Mitra, A, Narayan, K & Das, D.K (Eds) India: Industrialization in a Reforming Economy, Academic Publishers, New Delhi

Goldsmith Raymond, W. (1951), A Perpetual Inventory of National Wealth, Studies in Income and Wealth, National Bureau of Economic Research, Volume 14 :. 5-73

Griliches, Z & Ringsted, V (1971), Economics of Scale and Form of the Production Function, North Holland Publishing Company, Amsterdam

Hossain, M.A. & Karunaratne, N.D. (2004) "Trade Liberalization and Technical Efficiency: Evidence from Bangladesh Manufacturing Industries", *The Journal of Development Studies,* 40: 87-114

Hulten, C.R. (2000), Total Factor Productivity: A Short Biography, Working paper No. 7471, Cambridge, M. A: NBER

Jorgenson, D. W & Griliches, Z (1967): "The Explanation of Productivity Change", *The Review of Economic Studies*, 34: 349-83

Kendrick, J. W. (1961), Productivity Trends in the United States, NBER, Princeton University Press, Princeton, U.S.A

Kendrick, J. W (1973), Post-war Productivity Trends in the United States, 1948-1969, New York, NBER, U.S.A

Kendrick, J. W & E.S. Grossman (1980), Productivity in the U.S: Trends and Cycles, Baltimore & London: The John Hopkins university Press

Krishna, P. and Mitra, D (1998), "Trade Liberalization, Market discipline and Productivity growth: New evidence from India", *Journal of Development Economics,* 56, 447-462

Kumar, Surender (2004), A Decomposition of TFP Growth: A Regional analysis of Indian Industrial Manufacturing Growth, Working Paper no. 22, National institute of Public Finance and policy, New Delhi

Mahadevan, R (2003), "To Measure or Not to Measure TFP Growth?" *Oxford Development Studies,* 31(3): 365-78

Mahadevan, R (2004), New Currents in Productivity Analysis: Where to Now, Productivity Series No. 31, Asian Productivity Organization, Tokyo, Japan

Majumdar, S. K (1996) "Fall and Rise in Productivity in Indian Industry: Has Economic Liberalization had any impact?" *Economic and Political Weekly*, 31, M-46-53, Nov.30

Majumdar, R (2004), "Productivity Growth in Small Enterprises: Role of Inputs, Technological Progress and Learning by Doing", *The Indian Journal of labor Economics* 47: 901-11

Mukherjee, K & S. Ray (2004), "Technical Efficiency and Its Dynamics in Indian Manufacturing: An Interstate Analysis", Department of Economics, Working Paper No.2018, University of Connecticut

Nagraj, R. (1997), "What Has Happened Since 1991? Assessment of India's Economic Reforms", *Economic and Political Weekly,* 32 (44-4(Nov.8-14):2869-79

Nagraj, R. (2003) "Industrial Policy and Performance since 1980: Which Way Now?" *Economic and Political Weekly,* 38: 35, August 30: 3707-15

Nagraj, R. (2012), Industrial Growth, in K. Basu & A. Maertens (eds.), The New Oxford Companion to Economics of India, New Delhi, Oxford University Press

Nayar, D. (2008), India's Unfinished Journey Transforming Growth into Development in Liberalization and Development, Oxford University Press, New Delhi

Norsworthy, J.R. & Jang, S.L. (1992), "Empirical Measurement and Analysis of Productivity and Technological Change; Application in High Technology and Service Industries". In Jorgenson D.W. & Laffont, J.J. (eds.), Contribution to Economic Analysis Series, North Holland

OECD (2001), "Productivity and Firm Dynamics: Evidence from Micro data", *Economic Outlook*, 69, 209-33

Pal, Mihir Kumar (2002), "Productivity in the Organized Manufacturing Sector in India", Concept Publishing Company, New Delhi

Patnaik, Prabhat (2003), "On the Economics of 'Open Economy' De-industrialization", V.V. Giri Memorial Lecture at the Annual Conference of the Indian Society of Labor Economics, Kolkata, December

Pradhan, G & Barik. K (1998), "Fluctuating TFP in India: Evidence from Selected Polluting Industries", *Economic and Political Weekly*, 33: M-25-30

Pradhan, G and K. Barik (1999), "TFPG in Developing Economies: A Study of Selected Industries in India", *Economic and Political Weekly,* 34: M-92-105

Rao, I.M (1996a), "Manufacturing Productivity Growth: Method and Measurement", *Economic and Political Weekly,* Nov-2, 31: 2927-36

Rao, I.M (1996b), "Indices of Industrial Productivity Growth: Method and Measurement", *Economic and Political weekly,* 32:3177-88

RBI (2004), "Report on Currency and Finance", 2002-03, Reserve Bank of India

Ray, S. C. (2002), "Did India's Economic Reforms Improve Efficiency and Productivity: A Non-parametric Analysis of the Initial Evidence from Manufacturing", *Indian Economic Review,* 37(1): 23-57

Rodrick, D & A. Subramanian (2004), "From 'Hindu-Growth' to Productivity Surge: The

Mystery of the Indian Growth Transition", NBER Working Paper No.10376, March

Singh, A. (2009), "The Past, Present and Future of Industrial Policy in India: Adapting to the Changing Domestic and International Environment", in Cimoli, M, Dosi, G, & Stiglitz, J.(eds.), Industrial Policy and Development, The Political Economy of Capabilities Accumulations, Oxford University Press, New York

Solow, R. M. (1957), "Technical Change and the Aggregate Production Function", *Review of Economics and Statistics*, 30:123

Srivastava, V. (1996), Liberalization, Productivity and Competition: A Panel Study of Indian Manufacturing, Oxford University Press, New Delhi

Srivastava, V (2000), The Impact of India's Economic Reforms on Industrial Productivity, Efficiency and Competitiveness: A Panel Study of Indian Companies, Report of Project Sponsored by the IDBI, NCAER, New Delhi

Srivastava, V (2001), Measuring TFP Survey Report, Asian Productivity Organization

Star, S. (1974), "Accounting for the Growth of Output", *American Economic Review,* 64:123-35

Tata Services Limited (2003), Reforms and Productivity Trends in Indian Manufacturing Sector, Department of Economics and Statistics, TSL, Mumbai

Trivedi, P, A Prakash & D Sinate (2000), Productivity in Major Manufacturing Industries in India: 1973-74 to 1997-98, Development Research Group Study, No 20, Department of Economic Analysis and Policy, Reserve Bank of India, Mumbai

Trivedi, P (2004), "An Interstate Perspective on Manufacturing Productivity in India: 1980-81 to 2000-01", *Indian Economic Review,* 39(1): 203-37

Unel, Bulent (2003), Productivity Trends in India's Manufacturing Sectors in last two decades, IMF Working Paper No. WP/03/22