TOTAL FACTOR PRODUCTIVITY TRENDS: AN ANALYSIS OF TRANSPORT EQUIPMENT AND PARTS INDUSTRY

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Abstract

The present study is confined to manufacture of transport equipments and parts industry of organised manufacturing sectors of Punjab for the period of 1980-81 to 2002-03, at three digit level. Major source of data for the study is Annual Survey of Industries (ASI). Growth rate of total factor productivity is positive and significant for the transport equipment and parts industry in pre-reform period ; however, this momentum could not be maintained in post-reform period, where growth rate turned to negative. Growth rate of total factor productivity of transport equipment and parts industry and at its disaggregate level [manufacture of motor vehicle industry (NIC-341), manufacture of railways and tramway locomotives and rolling stock industry (NIC-352) and manufacture of transport n.e.c. industry (NIC-359)] is higher in pre-reform period as compared to the post-reform period.

Transport equipment and parts is the largest manufacturing industry as measured by output. The transport equipment industry group accounts for almost one fourth of Indian's value added from manufacturing (Sharma,2012). The industry provides extensive forward and backward linkages with other key segments of the economy. The turnover of fast growing auto components industry, comprising around 500 firms in organised sector and more than 10,000 firms in small and unorganised sector, grew from US $ 3.1 billion to US $ 15 billion between 1997-1998 and 2006-07 (Economic Survey 2007-08). The industry exported passenger cars, commercial vehicles, two-wheeler and three-wheeler. No doubt, in 2007 there is decline in production of motorcycles and auto-rickshaw but at the same time production of passenger cars, scooters and moped grew.

In the current liberalized duty regime, the challenge faced by the industry is to innovate and upgrade continuously to remain competitive in international market. The initiative taken by government in 2006-07 to boost the industry included reduction in duty of raw material, setting up of the 'National Automotive Testing Research and Development Infrastructure Project' (NATRIP) for enabling the industry to usher in global standard of vehicular safety, emission and performance. Efforts should be made for making India a preferred destination for design and manufacture of automobile and automotive components.

Structural Composition of Transport Equipment and Parts Industry

(i) NIC- 341 - Manufacture of motor vehicle

(ii) NIC- 352 - Manufacture of railways and tramway locomotive and rolling stock

(iii) NIC –359 - Manufacture of transport n.e.c.

Scope, Data sources and Prices and Period of study

The scope of study is confined to manufacture of food products industry of organised manufacturing sectors of Punjab at three digit level. Major source of data for the study is Annual Survey of Industries (ASI). Various issues of annual survey of industries, www.circonindia.com and statistical abstract of Punjab are used. For making price corrections in the reported data on value of output, gross value added, wholesale price index of manufacture of food industry has been used. Wholesale price index for transport and machinery has been used to adjust the data on fixed capital. Consumer price index has been used to deflate the emoluments. Every deflator has 1993-94 as a base year. This study covers the period of 1980-81 to 2002-03; it has also been divided into two phases, pre-reform period (1980-81 to 1990-91) and post-reform period (1991-92 to 2002-03) to capture the impact of change in policy regimes.

The industrial classification has been changed in 1998 and it is impossible to make the discrete series directly. For this purpose a vigorous exercise has been done by going to three-digit level to make the matching series by either clubbing or splitting the existing classification. Present study has been divided into three sections. In the first section methodology is discussed. In the second section growth rate of total factor productivities are explored. In the last section concluding remarks and policy implications are given.

SECTION I

Methodology

We are fully aware of limitations of partial factor productivities, so a more comprehensive measure of productivity is the total factor productivity, which takes into account all factors of production is calculated with the help of translog index.

Translog Index can be calculated as under.

$$\frac{\Delta V_t}{V_t} = \log V_{t+1} - \text{Log}V_t = \Delta \log V_t$$

$$\frac{\Delta L_t}{L_t} = \log L_{t+1} - \text{Log}L_t = \Delta \log L_t$$

$\frac{\Delta K_t}{K_t}$ = log K_{t+1}- LogK_t = Δlog K_t

Where V is value added, L- labour employed K – capital

$$\overline{W} = \frac{1}{2}(W_{t+1} + W_t)$$

Where W = Wage = $\frac{Emoluments}{GrossValueAdded}$

$$\overline{r_t} = (1 - \overline{w_t}),$$

$$\overline{r_t} = \frac{1}{2}(r_{t+1} + r_t)$$

Now

$$\frac{\Delta A}{A} = \frac{\Delta V_t}{V_t} - \left(\overline{w_t} \frac{\Delta L_t}{L_t} + \overline{r_t} \frac{\Delta K_t}{K_t} \right)$$

Translog Index of total factor productivity

The index for base year, A (0) is taken as 1 then the index for subsequent years is computed using the following equation

$A_{t+1} = A_t (1 + \frac{\Delta A_t}{A_t})$

SECTION II

Translog Index and Total Factor Productivity Growth

Economic growth depends upon an increase in output. The output increase depends upon either the increase in accumulation of varying quantities of factor inputs or an increase in productive efficiency of factor inputs or both. The development experience of developing economies like India suggests that growth in output has been achieved mainly due to the accumulation of factor inputs and not from efficient use of factor inputs. The total factor productivity of this sector has increased at the rate of less than one per cent per annum. This shows that the output growth of the industrial sector was facilitated mainly by the accumulation of factor inputs and the contribution of total factor productivity growth was meagre.

The notion of efficiency and productivity lies at the core of economics and improvement in such variable is considered an important source of growth in output

(Leibenstein, 1966). Higher productivity growth has significant role in accelerating the pace of industrialisation, for these help to reduce the cost of production and help the industrial concerns to earn reasonable profit, which motivate them to invest more in subsequent rounds. Increased productivity growth enables the industrial sector to reduce its dependence on scarce resources and thereby help the industry to mitigate supply constraints and avail the products at reduced prices. These days competition is a global phenomenon and to stay for long in the market, manufacturing sector is supposed to improve its productivity and technical efficiency and make some continues research to experience technical change through creation of new processes and products and so on (Schumpeter, 1934).

TABLE - 4.13

Translog Index and Growth Rate of Total Factor Productivity of Sub Groups of Transport Equipment and Parts Industries

Year	Transport equipment and Parts industry	Manufacture of motor Vehicles	Manufacture of railway and tramway locomotive and rolling stock	Manufacture of transport equipment n.e.c.
1980-81	1	1	1	1
1981-82	1.040	1.049	1.189	1.053
1982-83	1.183	1.135	1.131	1.1030
1983-84	1.093	1.154	1.118	1.002
1984-85	1.015	1.139	1.179	1.110
1985-86	1.027	1.143	1.181	1.1515
1986-87	1.196	1.139	1.281	1.1657
1987-88	1.140	1.176	1.283	1.138
1988-89	1.199	1.108	1.319	1.167
1989-90	1.201	1.117	1.348	1.204
1990-91	1.250	1.169	1.1922	1.248
1991-92	1.280	1.154	0.897	1.275
1992-93	1.308	1.214	0.914	1.301
1993-94	1.341	1.210	1.071	1.339
1994-95	1.331	1.229	1.012	1.327
1995-96	1.374	1.331	1.013	1.328

1996-97	1.413	1.427	1.002	1.406
1997-98	1.120	1.299	0.985	1.119
1998-99	1.682	1.297	1.1392	1.083
1999-2000	1.042	1.295	1.1016	1.042
2000-01	0.930	1.068	0.944	0.926
2001-02	0.914	1.193	0.775	0.910
2002-03	0.845	1.160	0.798	0.867
Growth rate of total factor productivity percent per annum				
1980-81 to 1990-91	-0.11 (-0.42)	0.91** (2.40)	2.28* (5.27)	1.94* (6.12)
1991-92 to 2002-03	-3.44* (-4.41)	-0.31 (-0.46)	-1 (-1.02)	-4.14 (-0.57)
1980-81 to 2002-03	-0.65 (-1.95)	0.71* (3.36)	-1.18* (-3.11)	-0.24* (-6.02)

Note: Figures within brackets are the t- ratios

* 1% level of significance.

** 5 % level of significance

Translog Index and Total Factor Productivity Growth: Transport Equipment and Parts Industry

It is clear from table 1 that growth rate of total factor productivity of transport equipment and parts industry and at its disaggregate level [manufacture of motor vehicle industry (NIC-341), manufacture of railways and tramway locomotives and rolling stock industry (NIC-352) and manufacture of transport n.e.c. industry (NIC-359)] is higher in pre-reform period as compared to the post-reform period. Highest growth rate (2.28 per cent per annum and statistically significant) of total factor productivity was recorded by manufacture of railway and tramway locomotives and rolling stock industry (NIC-352) followed by manufacture of transport equipment n.e.c. (NIC-359) and manufacture of motor vehicle industry (NIC-341) in pre-reform period. Lowest growth rate of total factor productivity was observed by transport equipment and parts industry (-0.11 per cent per annum and insignificant) in pre-reform period. Transport equipment and parts industry and manufacture of transport equipment n.e.c. industry (NIC- 359) have recorded negative and significant growth rate of total factor productivity (TFP) in post- reform period. However, growth rate of total factor productivity (TFP) was found to be negative and insignificant for manufacture of

motor vehicle industry (NIC-341) and manufacture of railways and tramway locomotives and rolling stock industry (NIC-352) in the post-reform period.

It is clear from the table that growth rate of total factor productivity is positive and significant for transport equipment and parts industry in pre-reform period, However, this momentum has not been maintained in post-reform period, where same growth rates have turned to negative. Growth rate of total factor productivity was higher in pre-reform period but declined in post-reform period, on the pattern of state level (Kumar, 2005) and national level studies [Srivastava (2000), Balakrishna et. al. (2000) , Trivedi et. al (2000) ,Goldar (2000,2002), Goldar and Kumari (2003), Das (2003), Banga (2003)]. So, either the market did not favour the manufacturing sector of Punjab or in the globalised competitive scenario it failed to fetch higher prices, or could not keep its costs low. Punjab had to depend on other states for raw material and other intermediate products for its chemical based and metal-based industries. This forces it to bear additional transportation costs. The question of why the total factor productivity growth in the manufacturing industries declined in 1990s, assumes significance, as it was an important objective of reforms. To make Indian industries competitive in international markets and enhancing the productivity growth constituted a means to that end. There could be several possible inferences. First, the failure of total factor productivity growth to accelerate with economic liberalisation is perhaps indicative of harmful lag effects of previous interventionist regime. Second, since there was a spurt in investment activity in 1990s in response to economic reforms, there could be an immediate adverse effect due to gestatation lags. Another possible reason is that the discretionary controls on domestic and foreign dimensions of manufacturing sector are largely responsible for the lower growth rate of total factor productivity.

SECTION III

Concluding Remarks and policy implications

Growth rate of total factor productivity is positive and significant for the transport equipment and parts industry in pre-reform period ; however, this momentum could not be maintained in post-reform period, where growth rate turned to negative. Transport equipment and parts industry has lowest growth rate of total factor productivity as compared to other industries during post-reform period. Growth rate of total factor productivity of transport equipment and parts industry and at its disaggregate level is higher in pre-reform period as compared to the post-reform period. Government expenditure should be increased in the research and development of total factor productivity. Large sized units, which must based on local raw mateial and must have local market, must be set up with latest technological

know-how's. There should be special economic zone for the industry to meet the export quality level.

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