TOTAL FACTOR PRODUCTIVITY OF INDIAN CAPITAL GOODS INDUSTRIES AND THE IMPACT OF ECONOMIC REFORMS

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ABSTRACT

The paper includes the most debatable issue to examine the impact of economic reforms of 1991 on Indian capital goods sector. It deals with the effect of growth and productivity on sub-sectors of capital goods industries- electronics industries, electrical machinery industries, non-electrical machinery industries and transport equipment industries. For this purpose, ASI database has been used for period 1980-81 to 2013-14 which is further classified into pre-reform (1980-81 to 1990-912) and post-reform (1991-92 to 2013-14) period. The study yielded limited evidence of increase in productivity growth and n evidence of increase in capital productivity. The decline of growth and shares of sub-sectors also suggests that trade liberalisation cannot interpret as important factor to affect the productivity in long-run.

Key-words: *Total Factor Productivity, Economic Reforms, Capital Goods Industries.*

INTRODUCTION

In today's globalised world, increase in productivity is an important prerequisite to play significant role in industrial development of developing countries. The productivity enhancement further helps to reduce the use of scarce resources. This process initiates to lower the cost of production and price of related industrial products.

In India, capital goods sector was a core sector during second plan period under Nehru-Mahalanobis model (Mundle & Mukhopadhyay, 1992 and Sharma, 2013). The weak position of external payments which was generated by hike of oil price, caused by the Gulf war forced the Indian government to approach the IMF. The loans of IMF came with the strong conditionality that, the government had to undertake major economic reforms. This was not the only reason, due to high BOP deficit and reduction in growth, New Economic policy of

1991 was adopted for stabilization and structural adjustment (Uppal 1993, Parameswaran 2004). It was said that the crisis was triggered with the increase in oil prices sharply, on August 1990. The economic policy of 1991 was also targeted to enhance productivity of Indian capital goods sector. These reforms include increased competition and liberal access to import foreign technology. The paper tries to investigate the effect of trade liberalisation on productivity of Indian capital goods industries. The paper based on the hypothesis that there is positive link between trade liberalisation and productivity of capital goods sector. The paper is organised as section 2 explains the review of literature and section 3 described methodology of the paper. In section 4, empirical estimation has been given and in the end section 5 describes the conclusion of the study.

REVIEW OF LITERATURE

There are various studies (Chaudhuri, 1995; Malik 2012; Sharma 2010; Bowonder & Mani 1991; Balakrishnan & Babu 2003; Keshari 2012) that deals with issues and concern of different sectors of capital goods industries.

Goldar (2004) & Unni et al (2001) are of the view that there is a deceleration of trend growth after economic reforms. But some economist (Balakrishnan & Babu, 2003; Rodrik & Subramanian 2004; Singh 2009; Pattanayak & Thangavelu, 2005 and Rodrik, 2013) found acceleration of the trend growth rate after liberalisation period. However, various studies discussed the growth and structure of capital goods industries in India, with special influence of economic liberalisation. Since independence, the main industrial policies were aimed to import- substitution of capital goods to protect domestic industries (Bhagwati & Srinivasan, 1975). These policies tried to fulfil the objective to achieve self-sufficiency or self reliance. With introduction of liberalisation in 1980s at initial level, the number of reforms took place in capital goods sector (Uppal 1993). Under this new policy of abolition of licenses from capital goods, exports were allowed for free trade (Pattnayak & Thangavelu, 2004).

There are number of studies that examined trend rate of growth and overall manufacturing industries which also include the Indian capital goods sector. The few studies (Parameswaran, 2004; Malik, 2012 and Sharma, 2010) were also deals specifically with

Indian capital goods industries. Parameswaran (2004) had explored the growth and pattern of sub-sectors (electronics, electrical machinery, non-electrical machinery and transport equipment industries) of capital goods industries. Further, Mazumdar (2010) also found a sharp decline in growth of electronics industries during the post liberalization period, from 34.1 1985-90 to 9.9 percent in 2000-04. Keshari (2012) explained that the trend rate of growth for non-electrical and electrical machinery sector, was declined from 6.7 percent to 6.5 percent and 25.7 percent to 18 percent in the post- reform period. In study of Suresh (2004) trend growth was found a decline in non-electrical machinery sector from 11.3 percent in 1980's to 8.43 percent 1990's. The various studies, (Unni et al, 2001; Nagaraj, 2003; Goldar, 2004; Rodrik & Subramanian, 2004; Singh, 2009 and Bhat, 2014) examined the impact of economic liberalisation on manufacturing industries of India which also explained the impact of liberalisation on capital goods sector. However, not any study particularly examines the growth and pattern of Indian capital goods sector in the recent past. So to fulfil the gap of literature, the present study is based on the objectives:

- To find the impact of economic liberalisation on growth rate of Indian capital goods sector.
- To find the extent of increase or decrease in total factor productivity of sub-sectors in capital goods sector of India.

METHODOLOGY

The study used 22 three-digit industries of capital goods sector which are classified into four sub-sectors- Electronics, Electrical machinery, Non-electrical machinery and transport equipments. The study is based on classification of NIC 2008 with ASI database for period 1980- 81 to 2013-14. Suitable deflators have been constructed for gross value added and capital stock on basis of WPI, 2012. The period chosen for analysis consisted with implementation and recommendation of liberalisation policy and period after liberalisation selected to analyse the direction of change in productivity and growth rates of capital goods sector. The study used semi-logarithmic method to compute trend growth rates and growth accounting method was used for estimation of TFP (total factor productivity) index. To compute growth rates of TFP, single kinked model was used for two sub-periods to avoid

asymmetry in growth results. The analysis of partial productivities was also taken to capture the effects of liberalisation on labour productivity, capital productivity and capital intensity. Labour productivity (V/L) was obtained from gross value added divided by total persons engaged and for capital productivity (V/K) gross value added was divided by gross fixed capital. Further, Capital intensity (K/L) was a ratio of gross fixed capital to total person engaged.

Following Goldar & Kumari (2003), two input and one output framework has been used for industry level productivity analysis of capital goods sector. Under the two-input framework, Translog index was used as following equation

$$\Delta In\,TFP(t) = \Delta In\,Y(t) - \frac{[sl(t)+sl(t-1)]}{2} * \Delta In\,L(t)] - \frac{[sk(t)-sk(t-1)]}{2} * \Delta In\,K(t) \,...(7)$$

In the equation Y, L and K are value added, total persons engaged and capital respectively. *Sl* and *Sk* are averages of labour and capital shares equal to unity. Share of labour was constructed from gross emoluments which were deflated with CPI (consumer price index) 2004-05 prices.

EMPIRICAL ESTIMATION

The empirical analysis has been done on theoretical basis to find the relationship between economic liberalisation and performance of capital goods industries in India. In Table 1 share and trend growth rate of capital goods sector has been presented for period 1980-81 to 2013-14 which is further divided into pre-reform period (from 1980-81 to 1990-91) and post-reform period (from 1991-92 to 2013-14).

Table 1: Share and Growth of Indian Capital Goods Sector and Sub-sectors

Industries	GVA	Employment	Trend Growth
Electronics	14.85	13.74	4.63
Electrical	21.47	15.25	3.90
Non-electrical	27.43	31.09	3.77
Transport	36.26	29.91	4.71
Capital goods			4.29

Pre-reform period from 1980-81 to 1990-91			
Electronics	14.48	13.56	8.40
Electrical	23.02	12.88	5.37
Non-electrical	29.43	32.48	5.34
Transport	33.27	41.08	5.23
Capital goods			5.65
Post reform period from 1991-92 to 2013-14			
Electronics	15.04	13.84	4.17
Electrical	20.61	16.55	4.12
Non-electrical	26.45	30.33	4.19
Transport	37.89	39.28	5.23
Capital goods			4.50

Source: Author's own calculations based on ASI database

In table 1, transport equipment sector found impressive growth 4.29 percent along with impressive share of gross value added and employment. The second largest share was found for non-electrical machinery industries but growth of this sector was found lowest at 3.77 per cent. As compared to electrical machinery industries, share in terms of gross value added and employment was found largest from electronics industries but its growth rate was found 3.90 per cent for period 1980-81 to 2013-14. In comparison of share and growth rate of pre-reform and post-reform period, the share of electronics and transport industries increased in later period. However, the growth rate of all sub-sectors found a major decline in post-reform period. The overall growth rate of capital goods sector was 4.29 per cent during period 1980- 81 to 2013-14 which declined from 5.65 per cent in pre-reform period to 4.50 per cent in post-reform period.

Table 2 Growth of Partial Productivities and Capital Intensity of Capital Goods Sector

Industries	Labour Productivity	Capital Productivity	Capital intensity
Electronics	4.22	1.96	4.29
Electrical machinery industries	2.41	0.39	3.05
Non-electrical machinery	3.05	-0.46	3.56
Transport equipment industries	4.49	0.32	4.08
Capital goods	3.46	0.12	3.84

Source: Author's own calculations based on ASI database

In Table 2 trend growth of partial productivities has been presented the dominant feature that the capital intensity (capital-labour ratio) has highest growth for industries of capital goods sector. It is noticeable that trend growth rate of capital productivity was negative for non-electrical machinery sector and almost near zero for other sub-sectors also. It indicates the highest ration of capital intensity has not resulted into productivity enhancement. The capital goods sector is still based on labour which has been showed by trend growth rates of labour productivity of capital goods sector in India. In Fig 1, capital intensity and labour productivity showed a sharp increase but capital productivity remains same in whole period.
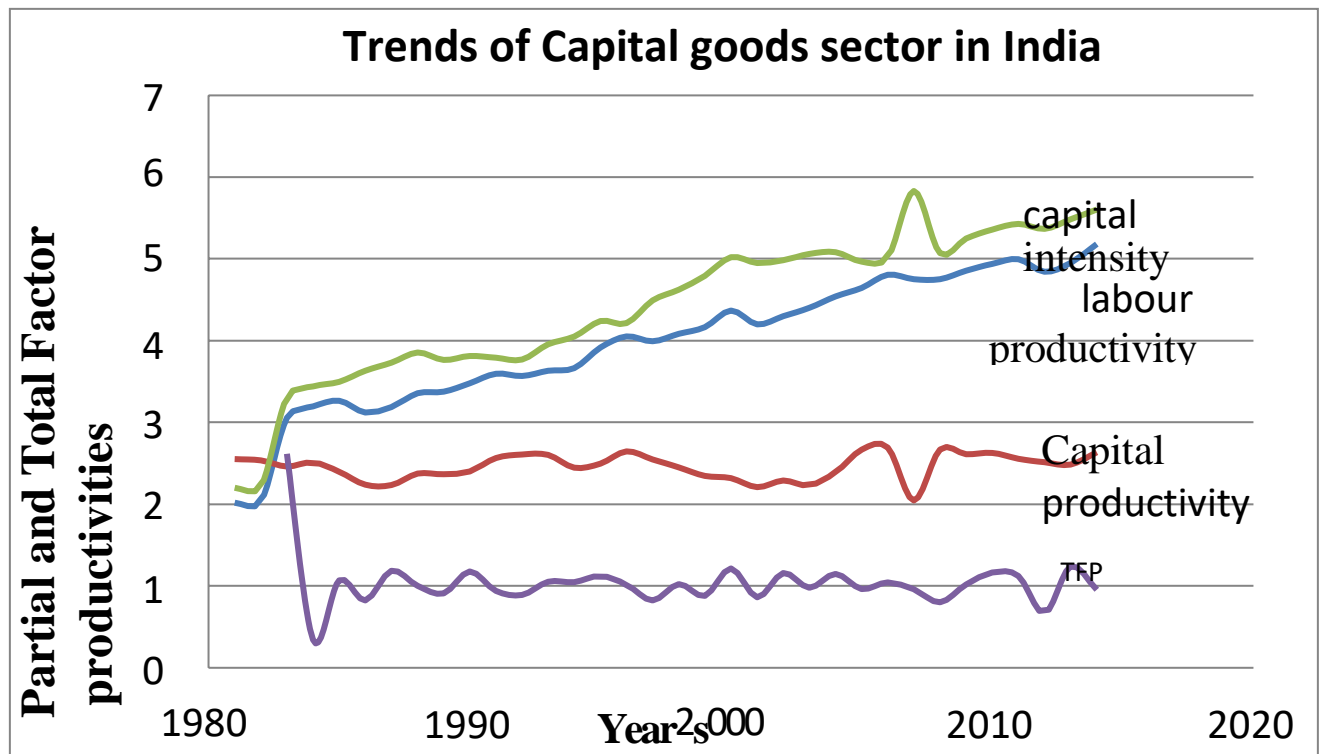
In table 3, total factor productivity of capital goods sector has been given for period 1980-81 to 2013-14, pre-reform (1980-81 to 1990-91) and post-reform (1991-92 to 2013-14) period.

Table 3 Total Factor Productivity Growth of Sub-sectors of Capital Goods Sector

Industries	From 1980-81 to 1990-91	From 1991-92 to 2013-14	From 1980-81 to 2013-14
Electronics industries	0.78	0.35	0.15

Electrical machinery industry	-0.09	-0.02	0.10
Non-electrical machinery industry	-0.91	-0.41	-0.14
Transport equipment industries	-1.39	-0.42	-0.07
Capital goods sector	-1.01	-0.28	-0.03

Source: Author's own calculations based on ASI database

The TFP growth of all sub-sectors remained negative for all sub-sectors except electronics industries. However, it also noticed a slight increase in all sub-sectors except electronics during post-reform period from 1991-92 to 2013-14. Though, TFP growth shows negative trend for most of sub-sectors in both sub-periods from 1980-81 to 1990-91 and from 1991-92 to 2013-14. As per the growth of capital goods sector, TFP shows negative trend of -1.01 per cent for period 1980-81 to 1990-91, -0.28 per cent for period 1991-92 to 2013-14 and -0.03 per cent for overall period of 1980-81 to 2013-14.

CONCLUSION

Before concluding, it is important to discuss the limitation of study. The present study used industrial data to examine growth and productivity trends of capital goods sector. However, firm level data can be used for these analyses which explain more clearly these changes with the help of more advanced techniques. The study used the capital goods sector to analyse the impact of economic liberalisation which is base for growth of Indian manufacturing industries. The results presented the shares of value added and employment was found highest for electrical machinery and non-electrical machinery industries. The share of capital goods sector and sub-sectors declined in post-reform period. Using semi-logarithmic method for analysis of growth trend analysis, it was found that there was a decline in value added of the overall capital goods sector for period 1991-92 to 2013-14. The growth of sub-sector and capital goods sector also found positive which varies from 3 percent to 8 percent for different sub-sectors. The trend growth for employment all sectors were found positive increase in post-reform period only except electronics sector. The close relation was found between capital intensity and productivity of capital where the increased capital intensity also indicates an increase in value added or investment in post-reform period. The reason of decline in labour productivity was the labour- saving nature in newly developed technologies.

But the slight increase for TFP of capital goods sector during post-reform period also remained negative.

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