Cobb Douglas Production Function Analysis of Total Factor Productivity in Indian Textile Industry in the Post Multi-fiber Agreement (MFA) Period

Greeshma Manoj,
Assistant Professor, Department of Economics,
Christ (Deemed to be University),
Bangalore, Karnataka, India

S. Muraleedharan,
Associate Professor (Retired), Department of Economics,
Maharajas College,
Cochin, Kerala, India

ABSTRACT

International trade in textiles and clothing was governed by the system of bilateral quotas under the Multi Fibre Agreement (MFA) since 1973 and this agreement has been replaced by the Agreement on Textiles and Clothing (ATC) from January 1, 2005. The dismantling of quota restrictions had brought about a significant change in the structure of worldwide trade in textiles as there are no quota barriers for the export of textiles and apparels and the hitherto protected textile industry would be exposed to international competition. It was widely believed and highlighted in most of the studies that developing economies, especially India and China would be the major gainers in the new policy regime. In view of the changed trading environment for textile trade, it was considered important to analyze the impact of quota removal on Indian textile industry, especially with respect to the productivity on this sector. The study has considered four sub sectors of Indian textile industry as given in the Annual Survey of Industries, viz, Spinning, Weaving and Finishing of Textiles, Manufacture of Other Textiles, Manufacture of Wearing Apparels and Manufacture of Crocheted and Knitted Fabrics. Estimates of Cobb Douglas production function shows that the removal of textile quota had impacted all the four sub sectors considered in the study. The impact of quota removal on productivity is positive and significant in the case of spinning, weaving and finishing of textiles as well as in the manufacture of wearing apparels. In the case of manufacture of other textiles and the manufacture of knitted and crocheted fabrics, the quota dummy coefficient is negative and significant at one percent level. This shows that the removal of quota restrictions have adversely impacted the output of these sectors.

Keywords: MFA, Textiles, Total Factor Productivity, Cobb Douglas Production Function, Quota removal

1. Introduction

The textiles and clothing sector occupies an important place in India's economic development. This has been visible in terms of its contribution to GDP, industrial output, and employment and foreign exchange earnings. The textile industry contributes to 7% of industry output in value terms, 2% of India's GDP and to 15% of the country's export earnings. The textile industry is one of the largest sources of employment generation in the country with over 45 million people employed directly, and another 6 core people in allied sectors, including a large number of women and rural population. The Indian textile industry is one of the largest in the world with an unmatched raw material base and manufacturing strength across the value chain. Indian textiles also has the credit of being the second largest manufacturer and exporter of textiles in the world, next to China. India's share in the global textile and apparel trade is around 5%. The share of textile and clothing in India's total exports stands at a significant 13 % (Ministry of Textiles, 2018-19).

Textiles and clothing trade in India was governed by Multi Fibre Agreement (MFA) till 2005 which imposed quantitative restrictions on the amount of exports to developing countries. It provided a framework under which developed countries including the United States, the European Union and Canada imposed quotas on exports of yarn, textiles and apparels from developing countries. This was regarded as an umbrella under which developed countries tried to provide protection to the textiles and clothing sector in their country. Under the MFA, the United States, one of the largest importers of textiles and apparels, had quotas on textiles and apparel from 46 countries including six non-WTO members. The EU maintained quotas on textile and clothing from 21 countries including five non-WTO members. The quota system has led to the diversion of textiles trade from developing countries to preferential trading partners.

With the implementation of the Agreement on Textiles and Clothing (ATC) in 2005, MFA was fully phased out and the textile trade is no longer subject to any quantitative restrictions. Removal of quota was regarded as an opportunity as well as a threat for the developing countries. Threat in the sense that there is a possibility that the developing countries have to face severe competition from other competitors in the global market as the market is no longer protected. MFA phasing out is considered as an opportunity for developing countries to fully utilize their comparative advantages in this sector under a freer trading regime. It was believed that in the changed scenario India would be one of the biggest gainers in terms of the global textile trade. However, except in the first few years, India could not take advantage of the changed trade situation (Manoj & Muraleedharan, 2019). In the changed trade paradigm, even though India is enjoying the opportunity to gain access into unrestricted markets, there are so many unforeseen threats that hinder the development of Indian textiles. Sharp increase in the input prices especially in raw cotton and cotton yarn, low capacity utilization and declining exports to US due to competition have adversely affected Indian textiles. Along with this, technological obsolescence is pervading almost all the segments of the textile industry. This has placed Indian textiles far behind its major competitors in the world textile economy and is threatening its very existence. Even though India is one of the major producers of cotton yarn and fabrics, the productivity of cotton is extremely low compared to the competitors and also confronting problems in the supply chain. The supply chain is not only fragmented but also beset with bottlenecks in the form of lag in the delivery time (Manoj & Muraleedharan, 2019). With the phasing out of quota and opening up of markets, Indian textile industry, especially the unorganized sector is facing severe competition from the domestic power loom, mill made fabrics as

well as cheap imports (Kothari & Gupta, 2009). Government of India has already implemented so many measures to restructure the industry to make it more competitive as well as to enhance the investment climate. In the changed scenario, the future of the Indian textile industry depends upon its ability to improve productivity and efficiency to make the industry globally competitive. The present study tries to throw light upon the productivity performance of Indian textiles in the changed trade policy regime.

2. Literature Review

The literature is replete with various studies concerning the productivity of Indian textiles as well as the impact of trade liberalization and productivity. There are different arguments which are contradictory with respect to the impact of trade liberalization of productivity. The general argument is that the removal of trade barriers would lead to an improvement in the efficiency as it intensifies the competition in the post liberalized era. Studies have empirically established the positive relationship between trade opening and total productivity growth (Nishimizu and Page (1991); Dongsuk 1992; Weiss, 1992; Urata and Yokota, 1994; Harrison, 1994; Tybout and Westbrook, 1995; Weiss and Jayanthakumaran, 1995; Kristiono, 1997; Sjoholm, 1997; Krishna and Mitra, 1998 Iscan, 1998; Kim, 2000). Their findings were based on Verdoorn's laws hypothesize that expansion of output results in a higher level of productivity. The argument behind this hypothesis is that expansion of output creates economies of scale, specialization and a favorable environment for innovation, and these factors eventually result in higher levels of growth and of productivity. On the contrary, studies have also established a negative relationship between trade liberalization and total factor productivity {Jenkins (1995); Das (2004); Gustafsson and Segerstrom (2006)}

In the Indian context, many studies {Das (1998); Krishna and Mitra (1998); Unel (2003); Banga and Goldar (2007)} have proved the positive relationship between trade liberalization and productivity. While the studies of {Trivedi *et al.,* (2000), Goldar (2000), Balakrishnan *et al.,* (2000), Goldar (2002), Goldar and Kumari (2003), Goldar (2004) and Prakash (2006)} indicated a fall in the growth rate of TFP in Indian manufacturing in the post-reform period.

Few studies have tried to analyze the effect of trade liberalization on Indian textile industry { Joshi and Singh (2010); Murugeshwari and Linga (2011); Hashim (2004)} where they found a positive relationship between trade liberalization and productivity.

It is very clear from the above discussion that there is no consensus on the gains from trade/trade policy and the mechanism through which these gains are accomplished. Most of the reviewed studies are pertaining to the productivity analysis in the manufacturing sector and no attempt has been made to analyze the effect of quota removal under MFA on the productivity of Indian textile industry. This study tries to fill this research gap by comparing the productivity analysis during the pre and post quota period.

Research Hypotheses[1]

The study has the following hypotheses for the productivity analysis:

H_{01}: Removal of MFA has a positive impact on the productivity of spinning, weaving and finishing of textiles.

H_{02}: Removal of MFA has a positive impact on the productivity of manufacture of other textiles.

---

[1] Here the hypotheses have been stated in the alternate form. However, the decision to accept or reject the hypothesis is explained in terms of the null hypotheses.

$H_{03:}$ Removal of MFA has a positive impact on the productivity of manufacture of wearing apparels.

$H_{04:}$ Removal of MFA has a positive impact on the productivity of manufacture of knitted and crocheted fabrics.

3. Data and Description of Variables

The data for the analysis has been obtained from the Annual Survey of Industries (ASI). The ASI covers all factories which are registered under section 2m (i) and 2m (ii) of the Factories Act, 1948, employing 10 or more workers using power and those employing 20 or more workers but not using power on any day of the preceding 12 months. The reference year for the study is the accounting year of the factory as recorded in the ASI data.

For the productivity analysis, the study takes into consideration a composite output and two inputs production technology for textile manufacturing units of India. Output is measured by the gross value of production which is arrived at by adding net value added with depreciation. In order to eliminate the price effect the gross value added figures have been deflated by using wholesale price indices (WPI). The inputs considered in the study are capital and labor. The study uses total number of persons engaged[2] as the measure of labor input. Total number of persons engaged is preferred to number of workers as workers, working proprietors and supervisory/managerial staff can affect productivity. Workers include full time, part time, hired and other workers. Capital stock has been obtained from the capital investment data given in the form of book value from ASI. Perpetual Inventory method has been used to arrive at the capital stock.

All inputs, except labor input (which are measured by total no. of employees) are reported in the ASI in value terms (in Rs. Lakhs). All nominal values are deflated by appropriate wholesale price indices to obtain real values[3]. Single deflator method is adopted to deflate the value of both input as well as output. WPI for Textiles (broad category) has been used as the deflator. In order to arrive at the real capital stock, WPI for machinery and tools has been used. These deflators have been brought into a common base of 2005-06 through the splicing method.

The basis of yearly input- output data has been collected from Annual Survey of Industries (ASI) summary results for the 3-digit textile industry. The National Industrial Classification (NIC) 1989-90 has been used till 1997, but NIC 1998 is being followed from 1998 to 2008; from 2008 onwards NIC 2008 is followed. For comparison, the industry is reclassified by using the concordance table published by the CSO. For this study, four sub sectors at the three-digit level classification[4] are taken into account, viz, NIC 131 (spinning, weaving and finishing of textiles) NIC 139 (Manufacture of other Textiles), NIC 141 (Manufacture of Wearing Apparel except fur apparel) and NIC 143 (Manufacture of Knitted or Crocheted Fabrics and Articles). The Annual Survey of Industries (ASI) data published by Central Statistical Organisation provides time series data on the registered manufacturing segment of the textile and garments sector. The ASI data has been analyzed from 1989-90 to 2016-17. The entire time period is divided into pre-MFA and post MFA period. The former corresponds to the period 1989-90 to 2004-2005 and the latter corresponds to the period 2005-06 to 2016-17

---

[2] Employees include all workers and persons receiving wage/salary and holding supervisory or managerial positions engaged in administrative office, store keeping and welfare sections, sales department as also those engaged in purchase of raw materials, etc or purchase of fixed assets for the factory and watch and ward staff.

[3] Value of output is deflated by WPI of Textiles and capital stock is deflated by the WPI of machinery and machine tools.
[4] Classification based on NIC 2008

4. Model Specification of Cobb Douglas Production Function

The present study has used the theoretical framework given by the Cobb- Douglas Production Function (CDPF) for the analysis of productivity. This helps to analyze the effect of a change in an input on output controlling for the changes in other inputs used in the production process. The coefficients of labor and capital in this case represent output elasticity of labor and capital respectively.

Cobb-Douglas production function that expresses Output (Y) as a function of capital (K) and labor (L) in its stochastic form is written as:

$$Y = AL^{\alpha}K^{\beta} \exp(\varepsilon)$$

Where Y = Output,

L = Labor Input (Total Persons Engaged)
K = Capital Input (Real Capital stock)
ε = stochastic error term

Log Transforming into linear equation the above equation, we obtain

$$\ln Y = lnA + \alpha lnL + \beta \ln K + \varepsilon \qquad (1)$$

To test for a difference in production function before and after Quota removal (i.e., 2005-06), we a use dummy variable D_t where

D_t= 1 if t ≥ 2005
= 0 if t < 2005

The estimating Cobb-Douglas production function in the log linear form is:

$$lnY_t = lnA + \alpha\, lnL_t + \beta\, lnK_t + \delta_1\, D_1\, lnL_t + \delta_2\, D_1\, lnK_t + \delta_3\, D_1 + \varepsilon_t \qquad (2)$$

Where

ln Y_t = Natural log of real value added for time 't'
ln L = Natural log of number of workers
ln K = Natural log of real fixed capital stock
δ_1 = Dummy variable for labor
δ_2 = Dummy variable for capital
δ_3 = Dummy variable for quota removal
A = Efficiency parameter
ε = Normally distributed error term
α, β, δ_1, δ_2 and δ_3 are the parameters to be estimated.

Here α and β denote the partial elasticity of output with respect to labor (percentage change in the output with respect to a one percent change in the labor input, while holding the capital input fixed or constant) and partial elasticity of output with respect to capital

For the pre- quota period, the equation will be:

$$lnY_t = lnA + \alpha\, lnL_t + \beta\, lnK_t + \varepsilon_t \qquad (3)$$

And for the post quota period, the equation can be written as:

$$lnY_t = (lnA + \delta_3) + (\alpha + \delta_1)\, lnL_t + (\beta + \delta_2)\, lnK_t + \varepsilon_t \qquad (4)$$

5. Empirical Analysis and Results

Table 1 shows the regression results of the spinning, weaving and finishing of textiles. The model as a whole is found to be statistically significant at one percent level. The adjusted R^2 value is 0.59. This indicates that 59 percent of variation of output can be explained by five independent variables consisting of two inputs and three dummy variables.

Table 1. Cobb Douglas Production Estimates for Spinning, Weaving and Finishing of Textiles (NIC 131)

	Coefficient	Std. Error	t-ratio	p-value	Sig.
Constant (A)	1.831	5.278	0.3470	0.732	
Labor (α)	0.814	0.326	2.495	0.021	**
Capital (β)	0.102	0.585	1.740	0.0958	*
L _Dummy (δ_1)	-4.401	0.783	-5.615	1.0002	***
K _Dummy (δ_2)	1.327	0.187	7.090	4.0001	***
Quota _Dummy (δ_3)	39.38	9.267	4.250	0.0003	***
Adjusted R^2 = 0.59, , F(5,22) = 62.40, sig = 0.000 , Durbin –Watson = 2.15					
*** Significant at 1%, ** Significant at 5% and * Significant at 10 % level.					

Source: Author's Calculation based on ASI data

It can be inferred from Table 1 that both the explanatory variables, viz, labor and capital proved to be the significant factor in influencing the level of output during the entire study period. The output elasticity of labor (α) indicates that a one percent increase in labor input would lead to 0.814 percent increase in output. Similarly, the output elasticity capital (β) shows that one percent increase in capital would lead to 0.102 percent increase in output. The coefficient of labor and capital are significant at 5 percent and 10 percent level respectively. The output elasticity of labor is greater compared to capital in the pre MFA period which represents the intense relationship between capital and output. This indicates that the labor inputs are underemployed. It further signifies that output growth cannot be increased just by increasing labor input. Coefficient of labor (δ_1) in the post quota period is negative (4.40) and show significant result at one percent level. This means that there is a decrease in the efficiency of labor in this sector in the post quota period. The coefficient of capital (δ_2) in the post quota period is positive and significant at 1 percent level. This result confirms to be true as this sector is mainly capital intensive in nature. The intercept term (A) in this equation represents the state of technology which is not statistically significant. This means that, apart from the variables in the model, the residual factors cannot explain variation in output. The regression coefficient of quota period (δ_3) is positive (39.38) and statistically significant at one percent level. This indicates that the removal of quota restrictions have increased the productivity level of this sector in the post quota period which is in line with the findings of {Joshi and Singh (2010); Murugeshwari and Linga (2011); Hashim (2004)} where they found a positive relationship between trade liberalization and productivity. Hence we fail to reject H_{01}.

The sum of elasticities of input factors came up as 0.91, which lies between zero and one; this implies that the production function exhibits decreasing returns to scale. It also indicates that, a one percent increase in multiple factors would lead to 0.9 percent increase in production. This indicates that this subsector experiences diseconomies of scale and have to improve its efficiency to achieve better returns.

Table 2 represents the OLS regression estimates for the Manufacture of Other Textiles. For this sector, the study has considered the lagged values up to order one for the dependent as well as independent variables for the OLS estimation because of the autocorrelation problem. Since we have considered the lagged values, this is a short run model.

Table 2: Cobb Douglas Production Estimates for Manufacture of Other Textiles (NIC 139)

	Coefficient	Std. Error	t-ratio	p-value	Sig.
Constant	8.145	2.094	3.891	0.0008	***
Labor (α)	0.832	0.376	2.214	0.0375	**
Capital (β)	-0.387	0.180	-2.157	0.0422	**
L_Dummy (δ_1)	-0.772	0.373	-2.071	0.050	*
K_Dummy (δ_2)	1.363	0.183	7.458	1.0008	***
Quota_Dummy (δ_3)	-9.634	2.147	-4.487	0.0002	***
Adjusted R^2 = 0.95 , F(5,22) = 50.08, sig = 0.000 , Durbin –Watson = 1.63 *** Significant at 1%, ** Significant at 5% and * Significant at 10 % level.					

Source: Author's Calculation based on ASI data

Table 2 shows that the model as a whole is statistically significant at one percent level. Output elasticity of labor (α) is 0.832 which indicates that one percent increase in labor would lead to 0.83 percent increase in output. This result is statistically significant at 5 percent. Output elasticity capital (β) is -0.387 which means that one percent increase in capital would lead to 0.387 percent decrease in output. Since this is a capital intensive sector, this is a cause of concern. The intercept term which represents the state of technology is positive (8.14) and significant at 1 percent level. This means that apart from labor and capital this residual factor which represents the occurrence of technical progress also have contributed to the production in this sector. Among the dummy coefficients, all the dummy coefficients are found to be statistically significant. Coefficient of labor (-0.77) in the post quota period (δ_1) is negative and significant at ten percent level. This result indicates that the labor inputs are underemployed. This decreased labor contribution can be attributed to the technological backwardness as well as highly fragmented structure of weaving, processing and garmenting segments (Ministry of Textiles, Strategic Plan 2011-16). It further signifies that output growth in this sector cannot be increased just by increasing labor input. Coefficient of capital

in the post quota period (δ_2) is positive (1.36) and significant at one percent level. This confirms true as this sector is highly capital intensive. The significant effect of capital may be explained with the increased capital intensity in this sector in the post MFA period. The rise in capital intensity indicates the fact that modernization is taking place in the sector, which is ensuring a rise in output to the capital stock ratio (Manoj and Muraleedharn, 2019). The coefficient of quota dummy (δ_3) is negative and statistically significant at one percent level. This point to the fact that the removal of quota restriction has adversely affected the output of this sector which is in conformity with the findings of {Trivedi *et al.,* (2000), Goldar (2000), Balakrishnan *et al.,* (2000), Goldar (2002), Goldar and Kumari (2003), Goldar (2004) and Prakash (2006)} where they indicated a fall in the growth rate of TFP in Indian manufacturing in the post-reform period. Hence, we reject H_{02}.

Table 3 depicts the result of the regression estimates for the Manufacture of Wearing Apparels. The model as a whole is found to be statistically significant and the adjusted R^2 value indicates that 80 percent of the variation in output of this sector can be explained by the explanatory variables.

Table 3: Manufacture of Wearing Apparels (NIC 141)

	Coefficient	Std. Error	t-ratio	p-value	Sig.
Constant (A)	0.137	10.44	0.131	0.989	
Labor (α)	1.308	1.562	0.837	0.412	
Capital (β)	-0.246	0.703	-0.350	0.729	
L _Dummy (δ_1)	-1.531	1.506	-1.017	0.321	
K _Dummy (δ_2)	0.763	0.713	0.107	0.916	
Quota_Dummy (δ_3)	19.26	10.48	1.837	0.080	*
Adjusted R^2 = 0.80 , F(5,21) = 50.08, sig = 0.000 , Durbin –Watson = 1.487 * Significant at 10 % level.					

Source: Author's Calculation based on ASI data

From Table 3, it is clear that the output elasticity of labor (α) is 1.308 which indicates that one percent increase in labor would lead to 1.308 percent increase in output and output elasticity capital (β) is negative which shows that one percent increase in capital would lead to 0.246 percent decrease in the output. However, both these results are not statistically significant. This point to the fact that both labor and capital inputs are underemployed in this sector. Coefficient of labor in the post quota period (δ_1) is found to be negative, but not significant. The coefficient of capital in the post quota period (δ_2) is positive, but not significant. This result is true as it is a labor intensive sector. The coefficient of quota dummy is (δ_3) is positive and significant at 10 percent. In the post quota period, only the quota dummy proved to be significant. This is in conformity with the findings of {Das (1998); Krishna and Mitra (1998); Unel (2003); Banga and Goldar (2007)} where they proved the positive relationship between trade liberalization and productivity This result indicates that as revealed by the chow test, the existence of structural break have influenced the level of output in the post quota period. Hence, we fail to reject H_{03}.

Table 4 shows the regression results of the fourth sub sector, viz, Manufacture of Knitted and Crocheted Fabrics.

Table 4: Manufacture of Knitted and Crocheted Fabrics (NIC 143)

	Coefficient	Std. Error	t-ratio	p-value	Sig.
Constant (A)	5.464	0.872	6.264	0.000	***
Labor (α)	0.355	0.113	3.121	0.005	***
Capital (β)	0.252	0.049	5.074	7.000	***
L _Dummy (δ_1)	1.355	0.128	.50	4.000	***
K _Dummy (δ_2)	-0.369	0.053	-6.932	1.000	***
Quota_Dummy (δ_3)	-12.264	1.172	-10.46	4.000	***
Adjusted R^2 = 0.96 , F(5,18) = 1014.37, sig = 0.000 , Durbin –Watson = 1.738 ***Significant at 1 % level.					

Source: Author's Calculation based on ASI data

The model as a whole found to be statistically significant and the adjusted R2 value indicates that 96 percent of the variation in output can be explained by the

combined effect of labor, capital and three independent variables. Output elasticity of labor (α) is 0.355 which indicates that one percent increase in labor would lead to 0.36 percent increase in output and output elasticity capital (β) shows that one percent increase in capital would lead to 0.25 percent increase in output. Both these results are statistically significant at one percent level. The intercept term which represents the state of technology is positive (5.46) and significant at 1 percent level. This indicates that apart from labor and capital, the residual factor which represents technical progress also would have influenced the level of output. The regression coefficient of labor (δ_1) in the post quota period is positive (1.35) and significant. The regression coefficient of capital (δ_2) is negative (-0.37), but the result is significant in the post quota period. This shows that both labor and capital has influenced the productivity of this sector in the post quota period. The negative coefficient of capital dummy shows that there has to be a reduction in the capital to improve the productivity of this sector. The quota dummy coefficient (δ_3) is negative and significant at one percent level which signifies that the liberalization of trade in this sector has adversely affected the productivity of this sector in the post quota period. Hence, we reject H_{04}.

6. Conclusion

This study has been carried out in the context of trade liberalization in world trade in textiles and clothing. Contradictory viewpoints have been expressed by the researchers with respect to the effect of trade liberalization on textile trade. In the given scenario this study tries to find out the effect of quota removal under Multi Fibre Agreement (MFA) on the productivity of Indian textile industry. The study has considered four sub sectors of Indian textiles, viz, spinning weaving and finishing of textiles, manufacture of other textiles, manufacture of wearing apparels and manufacture of knitted and crocheted fabrics, as given in the ASI data base.

Estimates of Cobb Douglas production function shows that the removal of textile quota had impacted all the four sub sectors considered in the study. The impact of quota removal on productivity is positive and significant in the case of spinning, weaving and finishing of textiles as well as in the manufacture of wearing apparels. In the case of manufacture of other textiles and the manufacture of knitted and crocheted fabrics, the quota dummy coefficient is negative and significant at one percent level. This shows that the removal of quota restrictions have adversely impacted the output of these sectors. From this it can be concluded that the removal of quota restrictions have not improved the output of all the subsectors.

REFERENCES

Balakrishnan, P., Pushpangadan, K., & Babu, M. S. (2000). Trade liberalization and productivity growth in manufacturing: Evidence from firm-level panel data. Economic and Political weekly, 3679-3682.

Banga, R., & Goldar, B. (2007). Contribution of services to output growth and productivity in Indian manufacturing: pre-and post-reforms. Economic and Political weekly, 2769-2777.

Das, D. K. (1998). Trade Liberalisation and Productivity growth: A disaggregated analysis of Indian manufacturing sectors. IEG Working Paper no. E/200/98.

Das, D. K. (2004). Manufacturing productivity under varying trade regimes, 1980-2000. Economic and Political Weekly, 423-433.

Dongsuk, S. (1992). Trade Liberalization and Productive Efficiency in Korean Manufacturing: Evidence from Firm-level Panel Data. A Dissertation submitted to the Faculty of the Graduate School of Georgetown University for the Degree of Doctor of Philosophy. U.M.I, A Bell & Howell Information Company, Michigan.

Goldar, B. (2000). Employment growth in organized manufacturing in India. Economic and political weekly, 1191-1195.

Goldar, B. (2002). Trade liberalization and manufacturing employment: The case of India. Employment Paper No. 2002/34. International Labor Office, Geneva.

Goldar, B., & Kumari, A. (2003). Import liberalization and productivity growth in Indian manufacturing industries in the 1990s. The Developing Economies, 41(4), 436-60.

Goldar, B. (2004). Indian manufacturing: productivity trends in pre-and post-reform periods. Economic and Political Weekly, 5033-5043.

Gustafsson, P., & Segerstrom, P. (2006). Trade liberalization and productivity growth. Stockholm School of Economics. mimeo.

Harrison, A. (1994). Productivity, imperfect competition and trade reform. Journal of international Economics, 36(1-2), 53-73.

Hashim, D. A. (2004). Cost & productivity in Indian textiles: Post MFA implications (No. 147). Working Paper. ICRIER.

İşcan, T. (1998). Trade liberalization and productivity: a panel study of the Mexican manufacturing industry. The Journal of Development Studies, 34(5), 123-148.

Jenkins, R. (1995). Does trade liberalization lead to productivity increases? A case study of Bolivian manufacturing. Journal of International Development, 7(4), 577-597.

Joshi, R. N., & Singh, S. P. (2010). Estimation of total factor productivity in the Indian garment industry. Journal of Fashion Marketing and Management: An International Journal, 14(1),145-160.

Kim, E. (2000). Trade liberalization and productivity growth in Korean manufacturing industries: price protection, market power, and scale efficiency. Journal of Development Economics, 62(1), 55-83.

Krishna, P., & Mitra, D. (1998). Trade liberalization, market discipline and productivity growth: new evidence from India. Journal of Development Economics, 56(2), 447-462.

Kothari Anil and Gupta R. K. (2009). Post MFA Prospects for Indian Textile Industry. The Indian Textile Journal. http://www.indiantextilejournal.com/articles/FAdetails.asp?id=2466

Kristiono, H. (1997). The Effect of Indonesian Trade Liberalisation on Price-Cost Margins and Technical Efficiency. A Dissertation submitted to the Graduate School of Syracuse University for the Degree of Doctor of Philosophy. U.M.I, A Bell & Howell Information Company, Michigan.

Manoj, G., & Muraleedharan, S (2019). Productivity of Indian Textile Industry in the Post Multi Fibre Agreement (MFA) Regime. Asian Review of Social Sciences. 8 (1). 123-131.

Ministry of Textiles (2005). Annual report 2018-19. http://texmin.nic.in/annualrep/ar18_con.htm

Murugeshwari, T. L. (2011). Impact of Policy Shift on Total Factor Productivity in Indian Textile Industry. European Journal of Economics Finance and Administrative Sciences, 29, 145-55.

Nishimizu, M., & Page, J. (1991). Trade policy, market orientation, and productivity change in industry. Jame. De. Melo and Andre Sapir (eds), Trade Theory and Economic Reform, Basil Blackwell, Cambridge.

Prakash, B. S. (2006). Productivity Trends in Manufacturing: Implications for Employment Planning. The Indian Economic Journal, 54(3), 25-50.

Sjöholm, F. (1999). Exports, imports and productivity: results from Indonesian establishment data. World Development, 27(4), 705-715.

Trivedi, P., Prakash, A., & Sinate, D. (2000). Productivity in Major Manufacturing Industries in India, 1973-74 to 1997-98. Department of Economic Analysis and Policy, Reserve Bank of India.

Tybout, J. R., & Westbrook, M. D. (1995). Trade liberalization and the dimensions of efficiency change in Mexican manufacturing industries. Journal of International Economics, 39(1-2), 53-78.

Unel, M. B. (2003). Productivity trends in India's manufacturing sectors in the last two decades (No. 3-22). International Monetary Fund.

Urata, S., & Yokota, K. (1994). Trade liberalization and productivity growth in Thailand. Developing Economies, 32(4), 444-459.

Weiss, J. (1992). Export response to trade reform: recent Mexican experience. Development Policy Review, 10(1), 43-60.

Weiss, J., & Jayanthakumaran, K. (1995). Trade Reform and Manufacturing Performance: Evidence from Sri Lanka, 1978-89. Development Policy Review, 13(1), 65-83. http://orcid.org/0000-0001-6023-7112

JEL Classification: D 24, F 14, L 67 & O1