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Panel Data Analysis of Indian Textiles Exports in the Post Quota Period[♣]

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The system of bilateral quotas which had governed international trade in textiles and clothing under the Multi Fibre Agreement came to an end and has been replaced by the Agreement on Textiles and Clothing (ATC) from January 1, 2005. This study focuses upon the post MFA implications on the exports of textiles from India. Pooled OLS and Dynamic Ordinary Least Square method have been used to analyze the impact of quota removal on Indian textile exports. The study found that quota removal had a significant impact on the export of readymade garments. The significant result of quota dummy indicates that trade liberalisation from the MFA has stimulated the production and export of readymade garments from India. DOLS analysis with regard to manmade textiles indicates a clear and strong relationship between GDP of the importing country and manmade textile exports. In the case of cotton textile exports, estimation result shows that both GDP and REER are statistically significant which shows a cointegrating relationship among exports, GDP and REER.

Key Words: Textiles, Quotas, MFA, ATC, Panel Cointegration, Dynamic OLS; Exports

JEL Classification: F 13, F1

1. Introduction

Indian textile industry is one of the prominent sectors of Indian economy in terms of its contribution to GDP, employment and export earnings. The textile sector is the largest employment provider after agriculture. It contributes around 2 percent to GDP, 10 percent to industrial production and 13 percent to country's export

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earnings. It provides employment to 45 million people directly and 68 million people in allied activities. In the global export of textiles, India is ranked as the third largest exporter after EU-27 and China (Ministry of Textiles [2017]).

Exports of textiles and clothing from developing countries were subject to a series of trade restrictions, especially by the developed countries of the world. Most of them were in the form of special discriminatory and restrictive measures involving quota and tariff. Trade in textiles and garments have been constrained by Quantitative Restrictions (QRs) since 1961-62. The export of cotton products was put under QRs by developed countries in 1961-62 through Short Term Arrangement (STA) in pretext of 'market disruption'. This was followed by Long Term Arrangement (LTA) from 1962 onwards till 1972. This was again followed by Multi Fibre Agreement -I (MFA-I from 1974-77) which had extended the coverage to all textiles and clothing of wools, cotton and synthetic fibers, again followed by MFA-II (1978-82), MFA-III (1982-86), and MFA IV (1986-91). MFA provided the 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. It also provided for selective quantitative restrictions when imports of textiles and apparel products would cause, or likely cause, serious damage to the textile and apparel industries in the importing country (Shui and Beghin [1993]). Thus, MFA was discriminatory by country of origin. The MFA was criticized as a departure from the General Agreement on Trade and Tariff (GATT) rules, in particular, the principle of non-discrimination. Although initially intended as temporary relief measures, these quotas' put severe curbs on the flow of textile exports from developing countries including India. The MFA caused an increase in the textile and apparel prices in importing countries, mainly industrial ones and a decrease in the prices in exporting countries, mainly developing ones. The quota system has led to the diversion of textiles trade from developing countries to preferential trading partners. In 1991, the Uruguay Round of trade negotiations conducted under the framework of World Trade Organisation decided to bring the MFA restricted goods under the GATT discipline. This liberalization process is being undertaken very gradually over a ten year time period with the implementation of the Agreement on Textiles and Clothing (ATC).

The principal objective of the ATC was to integrate the textile sector into the World Trade Organisation (WTO) in four stages over a transition period of 10 years ending January 1, 2005. The ATC allowed importing countries to decide which products would be integrated at each stage, with the condition that the list at each stage would have to include products from each of the four sub groups: tops (unspun fibres) and yarns, fabrics, made up textile products and clothing. This sector has been going through a transitional period after the removal of quota restrictions under the Agreement on Textile and Clothing (ATC). It was widely believed that the removal of quota restrictions under the ATC would open doors of opportunity for the textile trading partners as majority of the non-tariff barriers would disappear after 2005. The removal of quotas had offered the buyers an alternative to source from the most efficient and cost effective suppliers and countries, whereas for the suppliers it had opened the door of rigorous global competition driven by low costs and new legislation.

The removal of MFA had thrown open a plethora of opportunities for Indian textile industry, especially for the cotton textiles. Since India has a natural comparative advantage in cotton, it was expected that the phasing out of quota would improve the competitive position of Indian cotton textile industry. At the same time, Indian textile is facing many challenges in the post MFA scenario both on the production and export front. India is facing tough competition in its two major markets of US and EU from a host of countries. Apart from China, India has to compete with major counties like Mexico, Turkey, Vietnam, Pakistan and Bangladesh. The preferential trading agreements of US and EU with these major competitors are also posing as a threat for India's position. Along with this there are low productivity issues with respect to the productivity of cotton yarn and fabrics. Except spinning, all other segments of supply chain are fragmented and technologically backward. The supply chain is not only fragmented but beset with bottlenecks in the form of lag in delivery time. At the global front, consumer preferences have shifted towards manmade fabric rather than natural fabrics, which may be detrimental for Indian textiles.

The present paper is an attempt to analyse the export performance of Indian textile exports in the wake of removal of quota restrictions. Export performance analysis would be done with the help of panel data in terms of specific subsectors which

constitute a major share of Indian textile exports. The study considered three sub sectors, viz, readymade garments, cotton textiles and manmade textiles. These three sub sectors together contribute to around 87 percent of Indian textile exports (DGCIS, 2017).Understanding the sector specific performance of the Indian textiles would help both the manufactures and policy makers to frame suitable policy measures to improve the competitiveness of this sector.

The paper is organised as follows: Section 2 provides an overview about the existing theoretical framework related to export performance as well as empirical reviews related to the impact of quota removal on Indian textile exports. Section 3 deals with the data and description of variables and Section 4 deals with the Model. Section 5 deals with empirical analysis and Section 6 deals with conclusion.

2. Review of Literature

This literature review section will be divided into two segments: 1) Empirical Literature on Export Performance Models and 2) Literature related to the impact of removal of quota restrictions on Indian textiles**.**

2.1 Empirical Literature on Export Performance Models

This section throws light upon the various export performance frame work models which have been used in the existing literature. Various performance indicators have been used for the measurement of export performance.

Cavusgil and Zou (1994) identified one export performance factor based on four indicators, viz, the extent to which strategic goals are achieved[1]; perceived success of the venture[2]; average sales growth over the first five years; [3]and average profitability over the first five years. Zou et al. (1998) proposed an export performance scale

[1] Strategic goals include: a) gain a foothold in the export market, b) Increase the awareness of our product/company c) Respond to competitive pressure, d) Improve our company's market share position e) Expand strategically into foreign markets f) Increase the profitability of the company and g) Just respond to the enquiries from abroad. The respondents have to allocate points to each of these goals on a 100 point scale the total of which adds up to 100.

[2] Perceived success of the venture is analyzed in terms of the achievement of the strategic objectives in the first five years of the venture

[3] Average sales growth of the firm in the first five years of this venture.

composed of three dimensions: financial export performance, strategic export performance and satisfaction with export performance. Financial export performance appraisal has been done in terms of indicators such as export sales, export sales growth, export profits and export intensity (exports/sales ratio). Strategic export performance has been calculated in terms of the attainment of strategic goals such as improved market share, strategic presence in the export market or competitive position. The main argument behind using attitudinal measures of export performance in terms of the satisfaction with exports is that being satisfied with exporting operations is a strong indication of success in exporting. Shoham (1998) analyzed fourteen items and uncovered three factors: sales (export sales, satisfaction with export sales, export intensity, satisfaction with export intensity), profits (export profit margin and satisfaction with export profit margin) and change (five year change in market share, five year change in sales, five year change in export profit margin, five year change in export intensity, satisfaction with five year change in market share, satisfaction with five year change in sales, satisfaction with five year change in export profit margin and satisfaction with five year change in export intensity). Soham's framework has been criticized because it considered an all exports unit of analysis, which should be recommended only when the determinant factors in a large explanatory model include firm-wide variables, which was not his case. Shoham's (1999) measurement model considered two dimensions: export performance (satisfaction with export sales, satisfaction with export profitability ratio and satisfaction with the ratio of exports to total sales) and five-year change in export performance (change in ratio of exports to total sales, satisfaction with change in export sales and satisfaction with change in export sales profitability ratio). Even though it was a well-developed model, criticisms have been leveled against the model for the exclusion of any market indicator and relative frame of reference[4]. There are studies which have provided more meaningful indicators to study export performance in the form of a single indicator. Most of the studies used export intensity which is defined as export sales as a percent of total sales[5], export profitability[6], and export growth rate[7]as measures of export performance. The export intensity and export growth indicators are preferred to the more direct profit

[4] Time period with reference to which the indicator performance is evaluated.
[5] See Boughhanmi, Al-Mandheri Al-Oufi and Omezzine (2007), Garnier (1982), Fenwick & Amine (1979).
[6] See Christensen, da Rocha and Gertner (1987), Bilkey (1982, 1978).
[7] See Edmunds and Khoury (1986), Kirpalani and MacIntosh (1980).

intensity, because most firms are reluctant to reveal the profit data (Boughhanmi et. al. [2007]).

The framework used in the present study incorporate the real foreign income or GDP (of trading partners) and real exchange rate (proxy for relative prices) as explanatory variables in the estimations of the export supply functions in general[8]. Real foreign income, by increasing the demand for imports of the destination country, has positive effect on exports and therefore supposed to improve the export performance and a strong domestic currency discourages its exports.

2.2 Empirical Literature on Quota Removal and Indian Textiles

There are various studies which have tried to analyse the probable post MFA implications on Indian textile exports. But there is no consensus among the researchers regarding the effect of quota removal on the export front. Studies such as Mehta (1997), Chadha and Pohit (1999), Exim Bank (2005), Abraham and Sasikumar (2010)[9] and Chaudhary (2011) predicts a higher potential gain for the developing countries, especially India in the post MFA period[10]. Chaudhary (2016) argues that even though Indian textile exports show an improved position in the post MFA period, there is a need to strengthen the policy measures to meet the global challenges in the changed scenario. Gupta and Khan (2017) analyzes the export competitiveness of Indian textile industry in comparison to the twelve major players of world textile trade by using the Balassa Revealed Comparative Advantage Index and international market share[11]. While studies of Verma (2002), Landes et al. (2005), and Collins (2008)) have probed into the sector specific outcomes associated with quota removal. Cotton textiles as well as manmade fibres were expected to benefit in the post MFA phase. Except made ups, all other subsectors have no future

[8] See Ogun (1998), Klaassen (1999), Whitley (1994), Ndung'u and Ngugi (1999), Alemayehu (1999), Balassa et al. (1989), Branchi et al. (1999), Mckay et al. (1998).

[9] Improved share of Indian textile exports are attributed to the cost advantages which India enjoys in terms of labour.

[10] Exim Bank predicted a potential gain for Indian textiles to the extent of 13.5 percent in textiles and 8 percent in garments in the US market. In the EU market India's textile share was predicted around 8 percent.

[11] Countries include China, US, Turkey, Korea, Pakistan, Japan, Hong Kong China SAR, China Taiwan Province, Brazil, Italy and EU,

in the new trading regime.[12] Dikshit et al. (2015) found that export of yarn, fabric and garments have increased substantially after the abolition of MFA.

Contradictory viewpoints also exist in the literature which predicts a gloomy picture for Indian textiles in the changed policy regime. Kathuria, Martin and Bharadwaj (2001) and Singh and Kundu (2005) opine that the removal of MFA is both an opportunity as well as a challenge as the market are no longer protected by quotas. The competitive advantage position of Indian textiles would be thwarted by the weak links in the production chain.[13]. Whether India would be able to take advantage of the changed trade scenario depends on a number of factors like the ability to enhance overall international competitiveness with productivity and efficiency improvements, quality controls, ability to respond to changes in consumer preferences quickly and the ability to move up in the value chain by building brand names. A strong and diversified mix of apparel and textile products with an effective marketing strategy, production of high quality value added products and strong government support is considered to be essential for the industry to survive in the post quota regime (Kumar, 2001). Nanda and Raikhy (2000) and Singh (2008) analyzed the strategies essential for the survival in the new trade scenario. Strategies like technology up gradation through imports, up gradation of labour skill, extension of off shore production facilities to selected clothing in special areas like Andaman Nicobar as well as diversification into a high range and classic garments are considered as relevant for the firms to survive in the post quota period.

Most of the reviewed studies predict bright prospects for Indian textile exports in the post quota scenario especially to cotton textile exports and is also considered as the result of cost advantage which India enjoys compared to competitors. These studies also emphasise the relevance of policy interventions to make the industry more competitive in the post MFA period. Studies which have predicted a gloomy picture for Indian textiles regards stiff competition from the major textile producing countries as well as weak links in the production structure as a major hurdle for Indian textiles in the post quota period.

[12] Verma (2002).

[13] Weak links like the inability of Indian producers to supply an adequate amount of cloth, particularly manmade; the lack of availability of textile machinery; and the lack of downstream capacity in weaving and processing are detrimental for Indian textiles.

Most of the reviewed literature is in the form of predictability studies which have tried to predict the future prospects of Indian textile exports in the post MFA period.[14] These studies which have focused on the export performance in the post MFA period have either used the Compound Annual Growth Rate (CAGR) as well as the Revealed Comparative Advantage (RCA)[15] to substantiate the issue. The present study tries to contribute to the existing literature by focusing upon the export performance related to the major subsectors of Indian textile industry by using the panel data analysis. Panel data combines the time series of cross section observations and considers the heterogeneity of the subjects[16]. It is a better method to study the dynamics of change.

3. Data and Description of Variables

The present study uses panel data pertaining to 3 major subsectors [17]of Indian textiles, viz, readymade garments, cotton textiles and manmade textiles over the period 1990-2013. In order to examine the impact of quota removal (MFA), the study has considered major trading partners [18] of exports of readymade garments[19], cotton textiles[20] and manmade textiles[21] from India. For readymade garments, the study has considered 5 major trading partners. For cotton textiles, eleven major trading partners are considered and for manmade textiles nine major trading partners have been considered. These trading partners account for more than 75 percent of the total textile exports with respect to the specific sector. Export performance has been measured in terms of three explanatory variables, viz, GDP of the importing country, Real Effective Exchange Rate (REER) and dummy variable which takes the value 0 during pre MFA and 1 during post MFA. The necessary information for the empirical analysis has been obtained from the Handbook of Statistics on Indian Economy, RBI and World Bank. The annual time series data for the volume of

[14] Except Chaudhary (2016) and Gupta and Khan (2017).
[15] This study has considered SITC two digit level of disaggregation of textile data of the UN.
[16] Subject in this context refers to the countries under consideration.
[17] The rationale for selecting these sectors are already being mentioned.
[18] These countries together account for more than 75% of the total exports of the considered sector.
[19] Major importers of readymade garments from India include USA, UK, UAE, Germany and France.
[20] Major importers are USA, Bangladesh, Germany, Japan, UK, Egypt, UK, Saudi Arabia, Italy, Egypt and UAE.
[21] Major trading partners are UAE, Turkey, USA, Brazil, Pakistan, UK, Hong Kong, Turkey and South Korea.

textile exports (US $ in Million) for the period 1992-93 to 2012-13 have been collected from Handbook of Statistics on Indian Economy, RBI. In order to remove the effect of price fluctuation, the export data in current prices have been converted into constant 1999-2000 prices by using the WPI deflator. Export data for different subsectors have been deflated with the corresponding price deflators. With respect to readymade garments corresponding price deflator was not available. The export data for readymade garments have been deflated by using the deflator of textiles with 1999-2000 as the base year. GDP of the trading partners at constant price (US $) has been collected from World Bank with 2010 as the base year. REER has been calculated as Nominal Effective Exchange Rate x CPI_F/ CPI_D x 100. [22] Data on REER data has been collected from Hand Book of Statistics on Indian Economy of RBI. The index of REER is 36 currency bilateral trade based weights with 2004-05 = 100 as base. It is also to be noted that, since all variables are converted to natural logarithms, the estimated coefficients can be interpreted as elasticities.

4. Model Specification

The empirical analysis has been done with the help of panel data technique. One of the advantages of panel data technique is that it allows for the heterogeneity of the variables. By combining the time series of cross section observations, panel data gives more informative data, more variability, less collinearity among variables, more degrees of freedom and more efficient (Gujarati, 2003). Before proceeding with the analysis, it is important to understand the nature of the unobserved effects and certain features of the observed explanatory variables in panel data estimation.

The basic Unobserved Effects Model (UEM)[23] can be written, for a randomly drawn cross section observation i, as:

$$Y_{it} = \beta X_{it} + c_i + u_{it} \quad (i = 1, 2, \ldots., n \text{ and } t = 1, 2, \ldots, T) \qquad (1)$$

where, X_{it} is 1 x K and can contain observable variables that change across *t* but not *i*, variables that change across *i* but not *t*, and variables that change across *i* and *t*. If *i*

[22] CPI_F and CPI_D represents Consumer Price Index of the foreign country as well as Consumer Price Index of the domestic country.
[23] This section owes to Wooldridge (2002, Ch. 11).

indexes individuals, then c_i is sometimes called an individual effect or individual heterogeneity. The u_{it} are called the idiosyncratic errors as these change across *t* as well as across *i.*

The Pooled Ordinary Least Square estimator (Pooled OLS) can be used to obtain a consistent estimator of β in model (1). The model in such case would be:

$$Y_{it} = c + \beta X_{it} + u_{it} \quad (i = 1, 2, \ldots\ldots N \text{ and } t = 1, 2, \ldots, T) \qquad (2)$$

where, Y_{it} is the dependent variable pooling N cross sectional observations and T time series observations; Vector X_{it} contains K explanatory variable for country i in year t; Vector β contains K regression coefficients or parameters to be estimated; u_{it} is the error term or disturbance term.

The regression model for this study can be expressed as follows:

$$\ln EXP_{it} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln REER_{it} + \beta_3 DUMMY_{it} + u_{it} \qquad (3)$$

where, $\ln EXP_{it}$ represents the log of exports of specified categories of textiles item from India to major export destinations. The explanatory variables, viz, lnGDP, lnREER and Dummy represents the log of GDP of the importing country, log of REER and quota dummy respectively. In equation (3), exports are expected to have a positive association with respect to GDP of the importing country, ie, β_1 is the income elasticity of demand for exports and the coefficient of β_1 is expected to be positive ie, $\beta_1 > 0$. The positive income elasticity of demand for exports indicates that an increase in income in the importing country would stimulate the demand for exports from the originating country. β_2 is the price elasticity of demand for exports and the coefficient of β_2 is expected to be negative, i.e., β_2 is less than 0. The negative elasticity of real effective exchange rate with regard to exports indicates that a real depreciation of the rupee would favourably affect the textile exports. β_3 is the liberalization dummy variable that takes the value of 1 for the period in which significant liberalization took place and zero otherwise. Coefficient of β_3 is expected to be positive ($\beta_3 > 0$).

5. Empirical Analysis and Results

Panel regression analysis in this paper consists of two approaches: The first approach includes the Pooled Ordinary Least Square (Pooled OLS) Method. Panel regression analysis is composed of panel unit root test and panel cointegration test. Panel cointegration test by Pedroni (2004) has been used to test for cointegration in the panel data. In the second approach, if there is a panel cointegration relationship, the long run equilibrium relationship is estimated using the Panel Dynamic Ordinary Least Square (DOLS) model.

5.1 Panel Unit Root Test

First step in the panel regression analysis is to check the stationarity of the variables used in the study. Regression run on non stationary time series variables can lead to spurious regression. Hence, it is important to ensure that the variables are stationary. A stationary time series has three properties, namely, finite mean, variance and auto-covariance over time (Wooldridge, 2009). Most of the time series analysis method for panel data assumes that there is no cross unit correlation present in the panel. To examine the stationarity properties of each variable, four different panel unit root tests have been used, viz, Levin Lin and Chu (2002), Im, Pesaran and Shin (2003), Fisher ADF and PP test. Levin, Lin and Chu's test assumes a common unit root process whereas Im, Pesaran and Shin (IPS), Fisher type ADF and PP test considers an individual unit root process. Levin et al. (2002) unit root test with heterogeneous dynamics, fixed effects and an individual deterministic trend. In contrast, Im et al. (2003) proposed the between group panel unit root that permits heterogeneity of the auto regressive root under the alternative hypothesis (Hassan and Holmes [2013]).

Table 1 shows the result of the unit root test of the variables of interest with respect to readymade garments. According to the results of the above four tests, all variables follow I (1) process. Here the null of a unit root is rejected at 99 percent level of confidence in each case. It is therefore, concluded that all variables are I (1).

Table 1: Panel Unit Root Test Statistic for Readymade Garments

Variable	LLC	IPS	ADF	PP
D Exports	-5.48569	-4.71100	40.2056	48.0028
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
D GDP	-4.24432	-3.57422	29.6684	47.2017
	(0.0000)	(0.0002)	(0.0010)	(0.0000)
D REER	-5.68946	-5.00851	41.7855	43.7443
	(0.0000)	(0.0000)	(0.0000)	(0.0000)

The p values of the test statistics are presented in parantheses. All tests include individual effects. Lag length were determined using Schwarts Information Criterion. The null hypothesis for all tests is "Panels contain unit roots"

5.2 Panel Cointegation Test

The notion of cointegration makes regressions involving I (1) variables potentially meaningful. If $\{y_t: t = 0, 1, \ldots\}$ and $\{x_t: t = 0, 1, \ldots\}$ are two I(1) processes, then, in general, $y_t - \beta_{xt}$ is an I(1) process for any number β. Nevertheless, it is possible that for some β not equal to 0, $y_t - \beta_{xt}$ is an I(0) process, which means it has constant mean, constant variance, and autocorrelation that depend only on the time distance between any two variables in the series, and it is asymptotically uncorrelated. If such a β exists, we say that y and x are cointegrated, and we call β the cointegration parameter. In the present study, for testing the cointegration of exports and explanatory variables, Pedroni's (2004) panel cointegration test has been used. Perdoni's panel cointegration test is based on the model:

$$Y_{it} = \alpha_i + \delta_{it} + \beta_i X_{it} + \varepsilon_{it} \qquad (4)$$

where, α_i and δ_i's allow for member specific fixed effects and deterministic trends, X_{it} is m dimensional column vector of explanatory variables for each country i and β_i is a m dimensional row vector for each country *i*. The variables Y_{it} and X_{it} are

assumed to be integrated of order one. Under the null of no cointegration, the residual e_{it} also will be I (1).

Pedroni (2004) derives the asymptotic distributions and computes critical values for seven panel cointegration test statistics. Among the seven panel cointegration statistics, first part is based on the within dimension approach, including the panel *v*-statisic, the Panel *rho*- Statistic, the Panel *PP*- Statistic and the Panel *ADF*- Statistic; the second part is based on the between-dimension approach, including the Group *rho* -Statistic, the Group *PP*- Statistic and the Group *ADF*- Statistic. For the within-dimension statistics, if the null hypothesis is rejected, then the dependent variable is cointegrated with the independent variables. Table 2 depicts the results of the panel cointegration test of the variables for readymade garments under consideration.

Table 2: Pedroni's Panel Cointegration Test Statistic for lnGDP, lnREER and lnExports of Readymade Garments

Alternative hypothesis: common AR coefs. (within-dimension)				
			Weighted	
	Statistic	Prob.	Statistic	Prob.
Panel v-Statistic	-0.585656	0.7209	-0.577116	0.7181
Panel rho-Statistic	0.813404	0.7920	0.969737	0.8339
Panel PP-Statistic	0.311399	0.6223	0.570534	0.7158
Panel ADF-Statistic	-0.363043	0.3583	-0.792840	0.2139
Alternative hypothesis: individual AR coefficients. (between-dimension)				
	Statistic	Prob.		
Group rho-Statistic	2.096803	0.9820		
Group PP-Statistic	1.572816	0.9421		
Group ADF-Statistic	-0.836432	0.2015		

Null Hypothesis: No cointegration. Within-dimension tests presuppose common AR coefficients among cross sections. Between dimensions pre supposes individual AR coefficients. Lag length were determined with Schwarz information criterion.

According to the results of Table 2, all the estimates of the Pedroni's test indicate that the null of no cointegration cannot be rejected as none of these tests are significant. This leads us to the inference that there is no cointegration between the lnexport of readymade garments and the explanatory variables, viz, lnGDP and lnREER. Hence, a Pooled OLS approach has been used in this context to understand the impact of the removal of quota restrictions on readymade garment exports.

Table 3: Pooled OLS Result for Readymade Garment Exports from India

Explanatory Variables	**Pooled OLS**
Constant	-1.433 (0.124)
lnGDP	0.3787*** (0.00)
lnREER	-0.6192*** (0.00)
Quota Dummy	0.6188*** (0.00)
R Squared	0.6865
F Statistic	66.43 (0.00)
Durbin Watson Stat	0.209
*** denotes confidence level at 99 percent. Figures in parenthesis are *p* values	

Source: Researcher's Calculation based on RBI and World Bank Data

The Pooled OLS in Table 3 represents the coefficient values and the significance level of the explanatory variables, viz, lnGDP, lnREER and quota dummy in the determination of export of readymade garments from India. The result reveals that lnGDP of the importing nation, lnREER and quota dummy are statistically significant at 99 percent confidence level. Further, it shows the expected positive sign for GDP as well as quota dummy and negative sign for REER. LnGDP coefficient value is 0.378 which means a one percent change in lnGDP would lead to 0.378 percent increase in the export of readymade garments from India. This result points to the fact that the foreign demand for readymade garment exports from India

is relatively inelastic. The coefficient of lnREER shows that the depreciation of the domestic currency would increase the demand for readymade garment exports. Likewise, the coefficient of dummy also shows significant during the post MFA period. This implies that the removal of quota has positively influenced the performance of readymade garment exports during the post MFA period. This result is in conformity with the findings of (Chadha and Pohit [1999]) who analyzed the potential gains from abolition of MFA for developing countries, particularly India. Their study found that trade liberalization in textile and apparel sectors, resulting from MFA phase out, would stimulate production of these labour intensive sectors in India. Value addition in terms of embroidery, printed and bead work followed by appliqué can be regarded as the factors which could have provided growth opportunity in the post-MFA period for apparel trade (Ishtiaque [2005]).

5.3 Dynamic Ordinary Least Square Method

This section gives the panel data analysis related to the export of Manmade Textiles and Cotton textiles. Before proceeding with the analysis, it is necessary to check the order of integration of the variables under consideration with the help of panel unit root test. Four different panel unit root tests have been used to analyse the stationary of the data, viz, Levin Lin and Chu (2002), Im, Pesaran and Shin (IPS) (2003), Fisher ADF and PP test. Table 4 shows the result of the panel unit root test for the variables under study for the manmade textiles.

Table 4: Panel Unit Root Test Statistic for Manmade Textiles

Variable	LLC	IPS	ADF	PP
D Exports	-4.03745	-4.43896	65.74601	39.744
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
D GDP	-5.58424	-4.28779	49.3146	47.4202
	(0.0000)	(0.0002)	(0.0001)	(0.0002)
D REER	-6.91915	-6.56724	75.1212	75.5382
	(0.0000)	(0.0000)	(0.0000)	(0.0000)

The p values of the test statistics are presented in parantheses. All tests include individual effects. Lag length were determined using Schwarts Information Criterion. The null hypothesis for all tests is "Panels contain unit roots".

Summary of the results of the four panel unit root tests for manmade textiles given in Table 4 indicates that all variables are stationary at 99 percent confidence level at the first difference. However, it is likely that at least some of the tested series are cross-sectionally correlated or cointegrated. This would violate the assumption of uncorrelated residuals among cross-sections. This has been tested with the help of Panel cointegration test.

5.4 Panel Cointegration Test

According to the results of Table 4, we confirm all variables are I (1), and then we use the panel cointegration test for examining the long run relationship among the four variables. Pedroni's cointegration test has been employed to analyse the cointegration. Table 5 gives the results of the Pedroni's cointegration test for the determinants of manmade textile exports.

Table 5 shows the result of the panel cointegration tests for the lnexport of manmade textiles with respect to the explanatory variables of lnGDP and lnREER. Out of the 11 test statistics[24] presented, 6 statistics results reject the null hypothesis of no cointegration. Among the relevant test statistics Panel PP-Statistic, Group PP-statistic and Group ADF statistic are significant at 95 percent level of confidence and Panel ADF statistic at 99 percent level of confidence. This result leads us to the conclusion that there is a long run equilibrium relationship among lnexports, lnGDP and ln REER. Since there is a cointegration among the variables, it seems appropriate to estimate the long-run relationship between these variables. In this case, Dynamic Ordinary Least Square (DOLS) procedure is employed to estimate the single cointegrating vector that the long run relationship among the variables in the export demand function for manmade textiles. DOLS considers serial correlation and endogeneity of the regressors into the conventional OLS estimator.

[24] Eight statistics with within AR coefficients

Table 5: Pedroni's Panel Cointegration Test Statistic for lnGDP, lnREER and lnExports of Manmade Textiles

Alternative hypothesis: common AR coefs. (within-dimension)				
			Weighted	
	Statistic	Prob.	Statistic	Prob.
Panel v-Statistic	0.959690	0.1686	0.552952	0.2901
Panel rho-Statistic	0.330177	0.6294	-0.534933	0.2963
Panel PP-Statistic	-2.073564	0.0191	-2.324635	0.0100
Panel ADF-Statistic	-5.566554	0.0000	-3.170222	0.0008
Alternative hypothesis: individual AR coefficients. (between-dimension)				
	Statistic	Prob.		
Group rho-Statistic	0.810849	0.7913		
Group PP-Statistic	-1.947678	0.0257		
Group ADF-Statistic	-2.270047	0.0116		

Null Hypothesis: No cointegration. Within-dimension tests presuppose common AR coefficients among cross sections. Between dimension Pre supposes individual AR coefficients. Lag length were determined with Schwarz information criterion.

The DOLS model can be specified as follows[25]:

$$y_{it} = \alpha_i + \delta_{it} + \beta_i x_{it} + \varepsilon_{it} \quad (5)$$

[25] Adapted from Gutierrez (2010).

In equation (5), y_{it} is the log of export of the specific sector of country *i*, x_{it} is 2x1 vector of log of GDP and log of REER. GDP and REER of country *i* at time *t* and cointegrated with slopes β_i.

Table 6: DOLS Estimation Results for Manmade Textile Exports

Variable	Coefficient	Test Statistic	Prob.
lnGDP	4.978157	12.25439	0.0000***
lnREER	-0.002568	-1.016253	0.3118

*** indicates 99 % confidence level.

Table 6 presents DOLS estimation results for manmade textile exports. The number of leads and lags were selected according to the Schwarz Information Criterion. Estimation results from Table 6 show that lnGDP is statistically significant whereas lnREER, even though it is negative, is not statistically significant. The coefficient of lnGDP 4.978 is significantly positive as expected, which shows a clear and strong relationship between GDP of the importing country and export of manmade textiles from India. This means that the foreign countries import demand for manmade textile exports from India is income elastic, ie, a one percent increase in foreign trade partner's income would cause a 4.978 percent increase in the export of manmade textiles. The reason behind this result could be that the increased income in the importing nation would have lead to increased export of manmade textiles from India. Even though REER sign is negative it is not statistically significant.

Another sector which contributes to the major share of total textile exports from India is cotton textiles. In order to understand the impact of quota removal on this sector, the study has used the same procedure as mentioned for the previous sector. Table 7 presents the panel unit root test statistic for cotton textiles.

Table 7: Panel Unit Root Test Statistic for Cotton Textiles

Variable	LLC	IPF	ADF	PP
D Exports	-10.2720	-10.7850	127.828	226.913
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
D GDP	-3.40334	-5.06984	66.5085	101.882
	(0.0003)	(0.0002)	(0.0001)	(0.0002)
D REER	-7.76159	-7.07999	85.1664	89.7356
	(0.0000)	(0.0000)	(0.0000)	(0.0000)

The p values of the test statistics are presented in parentheses. All tests include individual effects. Lag length were determined using Schwarts Information Criterion. The null hypothesis for all tests is "Panels contain unit roots".

Table 7 shows the unit root test results for cotton textile exports. Since the data is non stationary at level, all the series under study have been tested for the first difference. When the series in first difference are tested, the null hypothesis of unit root process is rejected. All specifications of LLC, IPS, ADF and PP tests reject the null hypothesis at 99 percent confidence level. Therefore, it can be concluded that all variables of study are I (1). Since all the variables are I(1), the study uses the panel cointegration tests to examine the relationship among exports, GDP and REER.

Summary result of Pedroni's panel cointegration test statistic for cotton textile exports has been presented in Table 8. Of the 11 methods [26]used to test integration, 5 tests support for the evidence of cointegration showing significance at 99 percent level of confidence except rho-statistic which is significant at 90 percent confidence level. In short, it is clear that all the explanatory variables are cointegrated with the

[26] Eight tests under within dimension and 3 tests under between dimensions.

Table 8: Pedroni's Panel Cointegration Test Statistic for lnGDP, lnREER and lnExports of Cotton Textiles

Alternative hypothesis: common AR coefs. (within-dimension)

			Weighted	
	Statistic	Prob.	Statistic	Prob.
Panel v-Statistic	1.080607	0.1399	0.100370	0.4600
Panel rho-Statistic	0.388154	0.6510	-1.297320	0.0973
Panel PP-Statistic	0.216215	0.5856	-4.519220	0.0000
Panel ADF-Statistic	0.147428	0.5586	-4.893652	0.0000

Alternative hypothesis: individual AR coefficients. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	0.519897	0.6984
Group PP-Statistic	-3.470460	0.0003
Group ADF-Statistic	-3.604844	0.0002

The p values of the test statistics are presented in parentheses. All tests include individual effects. Lag length were determined using Schwarts Information Criterion. The null hypothesis for all tests is "Panels contain unit roots".

dependent variable. Provided that all series are 1 (1) and cointegrated, the DOLS procedure is employed to estimate the single cointegrating vector that characterizes the long run relationship among the variables in the export function. Panel DOLS estimation equation is the same as given in equation (5). Table 9 presents DOLS estimation results for cotton textile exports. The number of leads and lags were selected according to Schwartz criteria.

Table 9: DOLS Estimation Results for Cotton Textile Exports

Variable	Coefficient	Test Statistic	Prob.
lnGDP	1.367510	4.017564	0.0001***
lnREER	0.364499	1.919865	0.0574*

***, ** indicates 99% and 90% confidence level respectively.

DOLS estimation results from Table 9 show that both lnGDP and lnREER are statistically significant. This shows that there is a long run cointegrating relationship between lnGDP, lnREER and lnexport of cotton textiles. The estimated income elasticity of import demand for cotton textile exports is 1.3675, i.e., a 1 percent increase in lnGDP in the importing nation would cause a 1.3675 percent increase in the Indian cotton textile exports. This shows that there is a clear and strong long run relationship between lnGDP of the importing country and lnexport of cotton textiles from India. The coefficient of lnREER is positive as against the theoretical expectation, and the result is significant. This means that an increase in lnREER causes an increase in the demand for cotton textile exports. The result contradicts the theoretical relationship between REER and total exports. The relationship between REER and exports are supposed to be negative, i.e., an exchange rate deprecation having a positive effect on exports and vice versa. However, the result is statistically significant at 90 percent confidence level. Cote (1994) argues that exchange rate volatility does not reduce the amount of trade. This argument is because exchange rate volatility has two effect, viz, substitution effect and income effect, which work in opposite directions. The substitution effect implies that exchange rate volatility negatively affect an agent's trade activity and reduces the total expected utility of the activity. Consequently, income effect takes place in such a way that additional resources might be devoted to the activity in order to compensate for that plunge. Hence, in order to avoid the possibility of a decline in their revenues, the more risk adverse traders are engaged in more export activities as exchange rate increases. This could have been the reason for the positive relationship between REER and export of cotton textiles.

6. Conclusion

The present study analyse the performance of Indian textile exports related to readymade garments, manmade textiles and cotton textiles during the MFA period. The paper considered export demand for Indian textiles as a function of GDP of the importing country, REER and quota dummy. For the readymade garments sector, the study has used the Pooled OLS estimation to analyse the impact of quota removal on the export performance. The result reveals that GDP, REER and quota dummy are statistically significant at 99 percent level of confidence in the case of readymade garment exports. The significant impact of dummy variable in the case of readymade

garments may be due to the strengths, which Indian enjoys, compared to the competitors. The significant result of quota dummy indicates that trade liberalisation from the MFA has stimulated the production and export of readymade garments from India.

The paper has also employed the panel cointegration test and panel DOLS to analyse the long run relationship between export demand, GDP and REER. The result of the panel unit root test indicates that the data is stationary at the first difference for manmade textile exports and cotton textile exports. With regard to manmade textile exports, the results of the DOLS show that a 1 percent increase in foreign trade partner's GDP would cause a 4.978 percent increase in the export of manmade textiles from India in the long run. This result indicates a clear and strong relationship between GDP and exports of manmade textiles. In the case of cotton textile exports, DOLS estimation results show that both GDP and REER are statistically significant which shows a cointegrating relationship among exports, GDP and REER. But the coefficient of REER is positive as against the theoretical explanation. The income elasticity of import demand for manmade textiles is higher than the income elasticity of demand for cotton textiles.

The results of the study reveal that India could take advantage of the new trade environment in the post MFA period. Since readymade garments constitute a major share of India textile exports it can potentially help the performance of this sector.

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