EFFECTS OF PHASING OUT OF MFA QUOTAS ON INDIAN GARMENT EXPORTS, 1992-2003

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Abstract

We examine the impact of phasing out of MFA quotas on Indian garment exports as an example of competitive labour-intensive sector in an emerging market economy that has been recently facing removal of export restraints. We employ three different methodologies using a monthly data from 1992:11 to 2003:9: Perron's (1989) methodology of testing for unit roots in the presence of trend break, split-sample test of trend-break hypothesis and intervention analysis. The major conclusion is that the WTO's decision to phase out the MFA quotas has had a positive impact on the Indian Garment Exports. Perron's trend break hypothesis does support this as a cause for change in intercept, while the split-sample analysis shows that there has been a structural transformation in terms of introduction of trend-stationarity in place of difference–stationarity. Intervention analysis shows that this effect has been positive, significant and long-lasting. This analysis implies that Indian apparel sector may benefit from the phasing out of MFA quotas.

JEL Keywords: Country and Industry Studies of Trade, Economic Integration, Time Series Models

JEL Code: C3,F1

1. Introduction and Motivation

Developing countries have a comparative advantage in labour-intensive sectors, which are, hence, the backbones of the economies of such countries in general. This is particularly true of the countries in South Asia, most of which have abundant cheap labour. Though it appears that freer trade would promote these sectors *ceterus paribus*, the question of whether global integration of these sectors would really benefit or harm them in reality is an interesting one.

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This question could be further fine-tuned into a more interesting and important one, if we look at the impact of global integration on exports of the export-oriented and labour-intensive sectors, because of two facts: Firstly, labour-intensive sectors are the ones in which developing economies are relatively more competitive (with a few exceptions) and are quite dependent on; secondly, export-orientation of a sector usually reflects its competitiveness and crucial role within the economy. Usually in developing countries, labour-intensive sectors are export-oriented as well, due to their competitiveness in the international market arising from their low labour costs that stem from huge labour supply. However, the most relevant sector of interest would be one of the most labour-intensive as well as most export-oriented sectors in the economy, because this is significant from different viewpoints: employment, foreign exchange reserves and economic growth. Analysis of impacts of global integration on such a sector could illustrate various effects of free trade on various dimensions.

Narayanan (2006) examines the importance of technology in determining the effects of trade liberalisation on social welfare and profits, in a theoretical framework, which involves two economies that produce a commodity using two different technologies: capital-intensive and labour-intensive. Assuming that these two countries export their entire production, this theoretical framework represents the extreme form of export-oriented sector. When they export to a country that restricts these exports, the impacts of reduced trade restrictions, *i.e.*, trade liberalisation, depend on whether the exporting economy's technology is labour-intensive or capital-intensive. Thus, theory suggests that effects of global integration would typically depend on the mix of effects on capital-intensive, labour-intensive, export-oriented and domestic-oriented sectors. It is imperative, therefore, to examine such diverse sectors in isolation. This is how we justify the importance of analysis of impacts of global integration on a sector that is export-oriented and labour-intensive.

India's garment sector has been chosen as a typical case to be examined in order to analyse this important issue. The reasons are three-fold: India is one of the most rapidly growing economies in the world today, as its GDP has been growing at an average rate of about 8% for the past 10 years; the garment sector in India is extremely labour-intensive (employing around 90 persons per million US dollars of gross output in 2004-05) and immensely export-oriented (exporting more than 25% of gross production, on average, in 2004-05, despite huge domestic demand potential), justifying its suitability to represent the thrust sector of this paper; Global integration of this sector is a very hotly debated issue today, as the restraining quotas have been fully phased out in the textile and apparel sectors throughout the world and its impacts are expected to be more conspicuous in the Indian garment sector owing to its significance in Indian economy, in terms of employment, output and exports. We examine only one side of global integration, *viz,* removal export restraints by the importing countries.

In this paper, the time series of monthly garment exports data from 1992:11 to 2003:9 has been identified, and estimated. Three different methodologies have been used to examine the question posed.

Firstly, after testing for unit roots, Perron's (1989) methodology of testing for unit roots in the presence of trend break was applied. The result of this exercise show that there is trend stationarity, but no trend breaks in the series.

Secondly, the sample period is divided into two, based on the month of initiation of the phasing out of quotas (January 1995), and the series has been tested for trend-break hypothesis. The results show that the post-phasing-out series is trend-stationary with a positive coefficient on trend term, while the pre-phasing-out series is difference-stationary. Thus, based on the data available till 2003:9, phasing out of MFA quotas has been instrumental in introducing a huge positive trend in the exports. Here it should be noted that although January 1995 did not see removal of all important quotas, it is certainly true that it was an earnest first step towards removal of all quotas and it is arguably correct to assume that this resulted in a break in the trend of garment exports from India, as suggested by figures.

Thirdly, an intervention analysis was carried out, in which the dummy for the years the WTO had implemented initiation of phasing out of quotas has been used as an explanatory variable in the best ARMA model identified initially. The forecasts from this exercise have lower standard deviation and the BIC is lower than the ordinary

ARMA method. The correlations between this variable and the exports series are significant for many lags, showing a significant positive impact of this intervention of the WTO. The series is also forecasted till 2005, using an ARIMA specification after testing for seasonality.

This paper is organised as follows. Section II offers a description of India's garment exports, drawing on literature, facts and figures. Section III elucidates the data sources and gives and gives an overview of the methodology employed in this study, while more technical aspects concerning the econometric and time-series techniques have been dealt with by the Appendix. Section IV explains the results of the empirical exercise and Section V concludes.

2. India's Garment Exports

To understand the evolution of India's garment exports, it is essential to summarise the recent history of the international textile trade, as done in the paragraphs below.[2]

After World War II, there were many Bilateral Trade Agreements among countries, till 1961, when a regulatory framework named Short-Term Arrangement, was signed by General Agreement on Tariffs and Trade (GATT) member countries. This was replaced by Long-Term Arrangement since 1962, which imposed controls on exports of cotton textiles to the developed countries from the developing ones.

Multi Fibre Arrangement (MFA) came into force in 1974 to exercise controls and restrictions over imports of non-cotton textiles as well.

The first stage of MFA, which was till 1977, promised increase in export earnings for developing countries, with due considerations of market disruption that might occur owing to excessive imports to the developed countries. In such cases, the developed countries were empowered to restrain the levels of exports, based on the past exports, allowing for some positive growth rates as well. These could

[2] Most of this is based on Gokhale and Katti (1995)

be done by bilateral consultations and these did apply for handlooms as well.

The second stage of MFA was from 1978 to 1981, and was more restrictive than the first one, as it allowed reasonable but temporary departures from the general terms of MFA. As the departures were mostly restrictions and were of continuing nature, this was detrimental to the export performance of the developing countries.

The third stage of MFA, which was from 1982 to 1986, was supposed to be less restrictive as it gave more provisions to the developing countries to be compensated for the safeguard measures. Textiles and apparel sectors were treated as two distinct sectors and quotas were worked put accordingly. However, this worsened the situation as regards Indian textile and apparel exports, as most bilateral agreements signed consisted of rigid features on category ceilings, growth rates, carry over, carry forward and swing provisions.

During its last stage, there were increasing resentments across the world against MFA, since it had allowed the developed countries to export among themselves without restrictions and to safeguard themselves against all low-price exports from developing countries. Even the consumers of developed countries were at loss, as they had to pay unnecessarily high prices due to these quotas. Thus, phasing out of MFA quotas was scheduled from 1995 till 2005, based on the Agreement on Textiles and Clothing. The increase in export growth rates of all the categories, as agreed, was 16% from 1995 to 1998, 25% from 1999 to 2002 and 27% from 2003 to 2005. The importing countries could postpone the phasing out of certain sensitive categories, selected at random by them. By 2005, all the quotas were removed and this was expected to increase the exports of textiles and apparel from developing countries such as India. In contrast with all these expectations, there has been an astonishing decline in exports growth in 2006-07 to 10.53% from over 16% in 2005-06 (Ministry of Textiles, 2007).

The history of the Indian garment exports in particular, as elucidated in Kumar (1988), consists of four phases: Importsubstitution phase (1959-1969), export growth phase (1970-1976), MFA quota regime and structural transformation phase (1977-1994) and a less restrained export regime (1995 onwards). While the garment exports had practically started only in the second phase, the domination of the handloom garments had ceased to exist and the exports of garments made of mill-made fabrics started picking up in the third phase. The third phase is very significant in terms of imposition of quota restrictions. Thus, in the current phase, a break of the trend of exports growth could be expected.

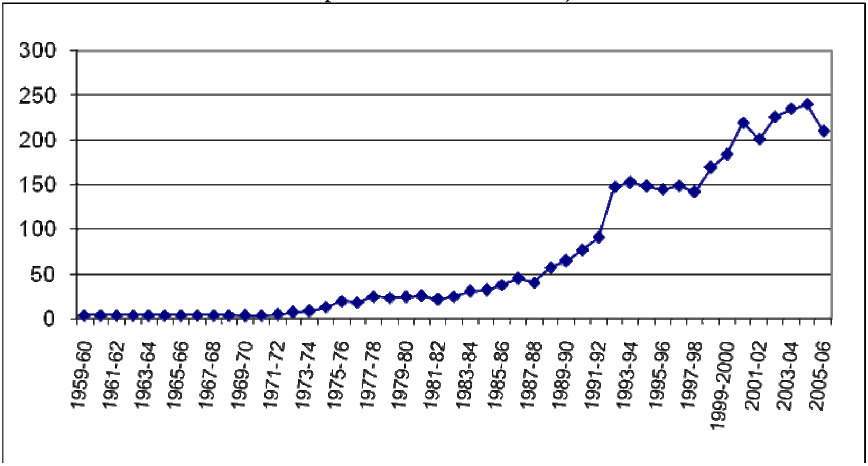
Uchikawa (1998), based on an analytical description of various aspects of Indian garment exports, concludes that removal of quota restrictions would increase the competition in the international market, necessitating Indian textile and garment industry to diversify products and improve labour quality and labour productivity. An empirical analysis is required to state whether the removal of quota restrictions would have any significant impact on the garment exports.

Narayanan (2005a) raises the question of whether the issues such as labour and environmental standards in the world trading system will have an impact on Indian apparel exports in a quota-free regime. Removal of stringent labour regulations could improve efficiency but may act against India in case labour standards are imposed in future.

Indian garment exports have been performing well during the past two decades. In real terms, their growth is evident from Figure 1, which shows India's garment exports in thousands of Indian Rupees. The sharply increasing trend after early 1990's owing to liberalisation in India poses an important question: Has this increase been further enhanced due to the initiation of the gradual phasing out of the quotas in the Multi Fibre Arrangement in 1995?

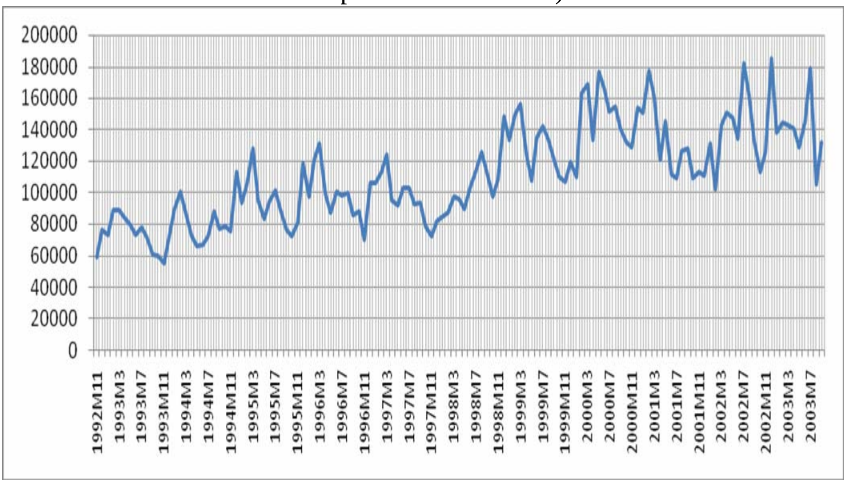
The major decision taken by the WTO was to phase out the existing quota restrictions made by the Multi Fibre Arrangement in the textile trade gradually and remove them in their entirety by 2005. For India and other developing countries particularly in South Asia, this is expected to increase the garment exports by leaps and bounds, because they were being restrained to a very large extent.

Figure 1: The Indian Garment Exports: 1959-60 to 2005-06 (Billion Rupees at 1994-95 Prices)



Source: Calculations from Statistics of Directorate General of Foreign Trade and Ministry of Commerce and Industry, Ministry of Foreign Trade and External Affairs.

Figure 2: Plot of Monthly Garment Exports: 1992:11 - 2003:9 (100000s of Rupees 1994-95 Prices)



Source: Calculations from Ministry of Commerce and Industry and Ministry of Foreign Trade and External Affairs, Government of India: Annual Statistics Books.

In fact, a glance at Table 1, which shows the quota utilisation rates for India, indicates that in the early 1990s, before the beginning of phasing out of quotas, the utilisation rate has been mostly exceeding 100% to European countries (EEC, consisting of Germany, France, Italy, Benelux, Denmark, Ireland, UK, Greece, Spain and Portugal) and the USA. Hence, a removal of quotas should result in considerable rise in the exports of garments from India.

Table 1: MFA Quota Utilisation rates in % for Indian Garment Exports

Year	EEC	USA
1985	69.2	115.7
1986	88.8	137.9
1987	106.8	119.2
1988	97	102.4
1989	102.5	106.4
1990	110	121.1
1991	100	125.8
1992	97.9	105.5
1993	102.2	100
1994	107.5	87

A theoretical framework developed by Narayanan (2007) shows that mergers of firms may improve the benefits derived from trade liberalisation. Calculations from Annual Survey of Industries (2004-05) data show that garment sector has been growing tremendously in terms of output per enterprise, at double-digit annual rates, after 2000, despite only a marginal annual growth in number of factories (around 3%). Thus, it is evident that mergers and consolidation are taking place in this sector and hence, the benefits from phasing out of quotas are likely to be higher than they could have been in the absence of such expansion of scales.

However, there is also a possibility of the quota removal resulting in undesirable consequences for India. This fear sprouts from the fact that quotas are to be removed from the trade from all the countries, including those that are as more competitive than India. Hence, the countries that can manage to produce high quality products at low cost are more likely to survive better than those that are unable to do so. India, owing to its being ‘arguably’ inferior in productivity-related aspects (See Sutton, 2003, for example) to many of the other developing countries such as China, Asian Tigers such as Indonesia and Malaysia, Sri Lanka and Bangladesh, might suffer from the quota removal rather than being benefited by it. There are also other important factors such as sensitivity of export volume with respect to exchange rates: for example, the appreciation of Rupee since late-2006 has been causing a slower growth of export volumes so far (Mid-2007). All these factors, positive and negative, raise the central question of this study: whether the removal of quotas would matter for India’s garment exports.

3. Data Sources and Methodology

The monthly data for exports of different categories within garments was taken from the official statistical source-books of the Ministry of commerce and industry and Ministry of foreign trade and external affairs, Government of India. Then, the aggregated exports in garment sector were calculated from them. The GDP deflators with base year as 1994-95 are used to convert this data of exports in real terms. The period considered is from 1992:11 to 2003:9, *i.e.*, November 1992 to September 2003. Clearly, January 1995, when the initiation of phasing out of quotas was implemented, is the breaking point for this series, as explained in this section.

Firstly, the series was tested for seasonality, which is required because *apriori* we may expect garment exports to vary across seasons. Secondly, unit roots were tested for the whole sample. This is to check whether and to what extent the exports depend on their past values. If unit root exists, it means that they depend solely on their past values, in addition to a stochastic shock, captured by an error term.

Examining the sample we are looking at, *i.e*., January 1995 is the month when a structural change in garment exports can be expected to have occurred, because the phasing out of MFA quotas was initiated in this period. Thus, it would be interesting to test whether the garment exports are behaving differently in the periods before and after this ‘breakpoint’. In other words, we split the sample into two: pre-1995:1 and post-1995:1 and examine the unit roots and seasonality in these two periods, to infer on to what extent has this initiation of global integration resulted in a change in the structure and behaviour of garment exports from India.

This is followed by the testing for 'trend-break' hypothesis, which involves checking whether there has been any structural break at this 'hypothesised breakpoint'. For example, it could be inferred on whether there is a change in the intercept after the hypothesised break period or whether the series contains a unit-root after accounting for trend-break. Here, we do not endogenously determine the structural breaks because it is well-known that the phasing out of quotas started in 1995:1 and its impact has been clearly seen even in the graphic plots.

Identification, estimation and forecasting of the series have been done by the procedure explained in Appendix. Intuitively, identification of a series involves pinpointing the variables that influence the series: past period values (lags), i.e., AR (Auto-Regressive) terms and shocks of current past periods, i.e., MA (Moving Average) terms. For example, a series identified as influenced by 1 AR term and 1 MA term is represented as ARMA(1,1). Once a series is identified, it could be estimated by evaluating the coefficients on its different determinants. Using the estimated coefficients, we could forecast the series for future values. By performing in-sample forecasting, i.e., using the model to predict the values that we already know, we can evaluate forecast errors.

If we assume that there is an exogenous variable other than AR and MA terms, which influences the series, the resultant model would be ARMAX. An intervention analysis could be carried out to make inferences on the impacts of initiation of the MFA phase-out, using a dummy for the relevant time period (1995:1), as an exogenous variable. This is an analysis that evaluates the effect of a policy/institutional intervention. In this paper, the intervention is initiation of global integration, captured by a dummy variable that takes 1 when the period is 1995:1. A few inferences could be made from the forecast errors in different models (ARMA and ARMAX), mainly as to whether assumption of existence of 'intervention' leads to a better specification, i.e., one with a lower forecasting error.

Further, the relevance of models with heteroskedastic residuals was also tested for. Existence of heteroskedastic residuals implies that the variance of dependent variable varies over time. It is quite plausible that the variance of exports change over time: for example, with the initiation of phasing out of quotas, variance of exports could have become higher than pre-1995 period, when variance could be lower owing to the stable quotas. However, this question is open to empirics and hence, we explicitly test for hetroskedastic residuals, using methods such as ARCH (Auto Regressive Conditional Heteroskedasticity) and GARCH (Generalised Auto Regressive Conditional Heteroskedasticity), outlined in the Appendix.

Thus, our methodology is unique in the sense that it combines various time series techniques, so that results are robust to different statistical and econometric assumptions. Since the issue is very complex and different econometric models may be used to explain the garment exports, it is essential to test for robustness and use sophisticated techniques. The major issues that have been analysed using all these techniques are: Change in trends, structure and behaviour of exports after initiation of MFA phase-out.

One major question that arises with approach adopted in this study is to what extent the influence of other variables that have not been considered here may render the analysis unreliable or inadequate. We justify this methodology by citing a study by Narayanan (2005b), which considers the effects of variables such as exchange rate, productivity and prices and finds that there is no co-integration between all these variables taken together. Thus, the impacts of variables such as exchange rate are not so profound that they may not be captured by the past values of garment exports, as done in this study.

4. Results

A. Plot

Figure 2 shows the plot of the data of the garment exports from 1992:11 to 2003:9. Seasonality and trend seem to exist in this series. However, this cannot be said with sufficient degree of certainty without performing the test for seasonality.

B. Tests for Seasonality

Table 2, in the Annex, shows the results of test of seasonal unit root (DHF's test) for the entire sample, by estimating Equation (2) shown in the Appendix. The inference is that there is no seasonal unit root in the series during the sample period and in its split samples, since the t-statistic is quite higher than the DHF's upper limit at 5% level of significance. Hence, existence of seasonality is ruled out.

C. Unit Root Tests in Full and Split Samples

Table 3, in the Annex, shows the results of the ADF test for the series, carried out based on Equation (1) in the Appendix. The inference is that there is no unit root in the series. The results have been shown only for the tests with mean and trend. Hence, pre-break sample contains unit root while the full sample and the post-break sample do not contain it. This might prompt us to conclude that the result of the WTO's decision to phase out the MFA quotas has caused a transformation in the behaviour of the time series of garment exports itself, in the sense that it has become less sensitive to the shocks in past periods, which is characteristic of any trend-stationary model. Thus, a sort of stability or roughly put, a self-sustaining equilibrium, appears to have been imparted in the Indian garment exports by this intervention of the WTO. No sudden unanticipated changes or shocks in exports might affect the long run values in the future.

D. Trend Break Analysis

The results of the Perron's trend break hypothesis are shown in Table 4. Instead of the values, only the significance and signs have been shown in this table for simplicity and clarity. The coefficients in this table correspond to those in Equations (3) to (8) given in the Appendix, respectively corresponding to the models A to F. It should be noted that since the coefficients of the lagged term are much lower than one in all models, unit root does not exist, while there is a trend in the model. The break postulated is January 1995, which is 26th period from the beginning of a total of 132 periods considered in this paper. The critical values of the coefficients of the lagged variables (AR terms) are, as mentioned in Perron (1989), for "Time of break relative to total sample size"=0.2 (=26/132). The results broadly indicate that there is no unit root in the system, trend-stationarity is not rejected and a change in intercept after this period is likely to have occurred. By trend-stationarity, we mean that the series does not much depend on its past values, once it is controlled for trend. Thus, after accounting for trend, garment exports are not affected solely by their past values, while the initiation of phasing out of quotas has led to a shift in intercept, i.e., a jump in exports. Hence, it could be concluded that there has been a 'trend-break' since 1995 January.

Table 4: Results of Perron's Trend Break Hypothesis

Model	**Parameter**	**Value**	**t-statistic**	**CV**	**Implication**
A	δ β α_1	0.7703 -20418.02 26305.8	14* -1.06 4.14*	-3.47	No unit Root
B	α_1 $(\alpha_2-\alpha_1)$ δ	26347.63 12081.39 0.681	4.22* 2.37* 10.34*	-3.47	No Unit Root, but a change in intercept
C	α_1 β δ $(\alpha_2-\alpha_1)$	26481.12 -22670.73 0.679 12374.51	4.25* -1.2 10.33* 2.43*	-3.47	No Unit Root, but a change in intercept
D	α_1 β $(\alpha_2-\alpha_1)$	69399.68 580.613 4806.018	17.47* 9.19* 0.8		There is Trend
E	α_1 β_1 $(\beta_2-\beta_1)$	69012.55 717.9 -113.46	9.62* 2.14* -0.31		There is Trend
F	α_1 β_1 $(\beta_2-\beta_1)$ $(\alpha_2-\alpha_1)$	71944.35 392.119 191.352 2035.58	8.98* 0.76 0.37 0.21		There is no Trend

Note: CV: Critical value for δ

E. Identification and estimation of the Series

As shown in Table 5, the autocorrelation functions (ACF) are significant till ninth lag and the partial autocorrelation functions (PACF) are significant till third lag, after which they abruptly die off. This suggests that the series could be either AR(3) (Auto Regressive with 3 lags)[3] or ARMA(1,1) (Both Auto Regressive and Moving Average with 1 lag each) or some other lower order AR(.) process. With this tentative idea, we select the models with minimum Schwarz Bayesian Information Criterion (SBIC) criteria among all the ARMA(p,q) models estimated based on the squared canonical correlation estimates and extended sample autocorrelation function, such that p=0,1,2,3,4,5, and q=0,1,2,3,4,5. ARMA(1,1) is thus found out to be the model with the minimum SBIC (=19.68), and its CLS (Conditioned Least Squares) estimates are shown in Table 6. Thus, both past values and past shocks influence the garment exports to some extent.

Table 5. Some Estimates of Correlation

	Lag										
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Cov	9	7	6	6	5	5	5	5	4	4	4
ACF	1	0.76	0.67	0.64	0.58	0.56	0.56	0.56	0.48*	0.46*	0.45
SE	0	0.08	0.12	0.15	0.17	0.18	0.19	0.21	0.22	0.23	0.23
PACF		0.76*	0.20*	0.18*	0.05	0.08	0.11	0.09	-0.11	0.02	0.03

Notes: Cov: Covariance (in 10^8); S.E.: Standard Error; ACF: Autocorrelation Function; PACF: Partial Autocorrelation Function.

[3] In simple terms, AR(1) is a series that includes one of its own lag, *i.e.*, previous period term, in the equation that explains its movement over time, while MA(1) includes a lag of shock and ARMA(1,1) contains both. Intuitively, AR(1) series is self-driven and MA(1) series is sensitive to past shocks.

Table 6: ARMA(1,1): Conditional Least Squares Estimation Results

Parameter	Estimate	T Value	Pr > |t|
Constant	73651.5	4.82	<.0001
MA1,1	0.55270	7.01	<.0001
AR1,1	0.99024	57.53	<.0001

F. Intervention Analysis and Forecasting

This was carried out by defining a dummy that takes the value of 1 if the time period is after the break postulated,i.e., January 1995, or the 26^{th} period in our study. In other words, The ARMAX(1,1) (ARMA model with an exogenous explanatory variable) model was stimated, with a dummy variable. The correlation of the series with this dummy is given in Table 7. Though all the coefficients from the lag (-16) to the lag (24) are positive and significant, only few of them are shown for simplicity. The estimates of the coefficients of this model are shown in Table 8. A noteworthy observation in this table is that the coefficient on dummy is high (41719.5) and significant at all levels. In other words, the jump in exports in 1995:1 has been to the tune of 4.172 billion Indian Rupees (Rs.), which is an immense rise for one time period!

Table 7: Correlation between the intervention dummy and the series

Lag	-8	-4	0	4	8	12	16	20	24
Coefficient	4236*	5689*	6829*	5958*	5755*	5641*	4677*	4191*	4170*
Standard Error	0.35	0.47	0.57	0.49	0.48	0.47	0.39	0.35	0.34

Table 8: Estimates of the ARMAX(1,1) Model

Parameter	Estimate	Standard Error	t Value	Approx Pr > |t|	Lag
MU	76603.6	10610.9	7.22	<.0001	0
MA1,1	0.41590	0.11098	3.75	0.0003	1
AR1,1	0.88118	0.05809	15.17	<.0001	1
Dummy	41719.5	11538.0	3.62	0.0004	0

Some results from the in-sample forecasts have been shown in Tables 9 and 10 (see Annex) for ARMAX(1,1) and the ARMA(1,1) models respectively. The lower and upper limits indicate the lower and upper 95% confidence interval limits, respectively. A comparison of the forecast values with the actual values as well as of the standard errors in these two boxes would show that ARMAX(1,1) is better than the ARMA(1,1). Even in terms of SBIC, ARMAX model is better. Further, the fact that the coefficient on dummy is quite high, positive and significant at all levels could be taken as a point to support the argument that the quota-removal have had significant positive effects over Indian garment exports and would persist in future also.

Further, tests for the ARCH disturbances had been conducted and all existing models of heteroskedasticity, namely, ARCH, GARCH, e-GARCH, ARCH-mean and I-GARCH were estimated. However, since the tests showed that there is no significant heteroskedasticity in the disturbances, these results have not been shown. Thus, either because of the intervention by WTO or because of its inherent nature, the garment exports from India do not vary at increasing or different rates in different time periods, i.e., "volatility" is absent in India's garment exports.

4. Conclusions

The main objective of this study is to explore one of the dimensions of global integration, in a comprehensive manner: its impact on labour-intensive and export-oriented sectors in a developing economy. Taking India's garment exports as a typical example, we examine the impacts of initiation of phasing out of MFA quotas in 1995 on export performance, based on numerous time-series and regression techniques that include unit-root testing, seasonality tests, split-sample unit-root tests, Perron's structural break analysis, intervention analysis and volatility models.

The WTO's decision to phase out the MFA quotas has had a positive impact over the Indian Garment Exports. Perron's trend break hypothesis does support this as a cause for change in intercept, while the split-sample analysis shows that there has been a structural transformation in terms of introduction of trend-stationarity in place of difference-stationarity. Thus, garment exports do not depend on their previous period shocks, after controlling for trend, indicating that they have attained certain degree of stability. Positive change in intercept confirms that there has been a positive shifting effect of global integration.

Intervention analysis shows that the effect of initiation of phasing out of quotas (1995:1) has been positive, significant and long-lasting. Further, the model that includes a dummy for initiation of phasing out of quotas is more credible as it makes better forecasts than the originally identified model. Thus, garment exports cannot be predicted better without incorporating the phasing out of quotas.

The clear implication of this analysis is that global integration of garment sector, by means of phasing out of MFA quotas, is quite desirable for the India’s garment sector, mainly in terms of increased exports and stability in export performance. As explained in the beginning of this paper, this could be taken to make much more general observations. Labour-intensive industries in emerging market economies, which are export-oriented as well, might be expected to be benefited from their global economic integration. The reason for this is that the competitive edge of the emerging market economies lies in the labour-intensive sectors. Hence, from the viewpoints of employment and export performance, global integration of such sectors may be expected to benefit the developing economies. However, this analysis may not be used to generalised the same for capital-intensive, less competitive and domestic-oriented sectors.

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Appendix: Econometric Theory
This appendix briefly explains the methodological aspects involved in this paper.

A. General Unit Root Testing

A stationary time series involves a value, to which the forecast of a sufficiently farther period in the future would converge. However, in most of the economic time series, there is a trend, which leads to two sets of non-stationary specifications, namely, trend-stationary and difference-stationary models. Formal tests can help determine whether or not a system contains a trend and whether that trend is deterministic or stochastic. Augmented Dickey-Fuller (ADF) test is used for the testing of the null hypothesis of unit root. The most general equation for Δy_t (Change in output y in period t) that is estimated in this test is given below:

$$\Delta y_t=\alpha+\beta y_{t-1}+ \gamma t + \delta_2 \Delta y_{t-2+1} + \delta_3 \Delta y_{t-3+1} +\ldots+ \delta_p \Delta y_{t-p+1}+\varepsilon_t \qquad (1)$$

where, $\Delta y_t=y_t - y_{t-1}$

The hypotheses of this test are: Ho: $\beta=0$ and $\gamma=0$; H1: not Ho

The equation (1) is to be estimated for this test if an existence of trend is suspected. If it is not so, then the term γt alone could be removed, leading to a specification in which a mean exists without trend or α term could also be removed leading to a zero-mean process without trend. The choice among these variations is crucial in many cases as they tend to contradict each other. This could be done by a combination of the examination of the plot and a sequential procedure developed by Doldado, Jenkinson and Sosvilla-Rivero (1990) which advocates stopping the procedure as soon as the null is rejected, while conducting the joint test starting with the equation (1). If the null is not rejected at this stage, then Ho of $\gamma=0$ is tested using normal distribution and if it is significant, unit root is retested using standardised normal distribution. Similar trials are undertaken sequentially with the equation with mean and then that without mean to decide upon the unit root.

Philips and Perron (1988) (PP) developed a test, which is an improvement over the ADF, since in the framework, it accounts for the serial correlation using a non-parametric correction. The test statistics of ADF and PP have the same distributions. The optimal number of lags p for these tests is decided based on the criterion given by Newey, Whitney and West (1987) that selects the model with minimum autocorrelation in the error term.

B. Seasonal Unit Root Testing

Charemza and Deadman (1992) explain the Dickey-Hasza-Fuller (DHF) Seasonal Integration test as follows, to test for the seasonal unit roots, with s=12 for monthly data and 4 for quarterly data:

$$\Delta_s y_t=\alpha+\beta y_{t-s}+\gamma t+\delta_2 \Delta_s y_{t-2+1}+\delta_3 \Delta_s y_{t-3+1}+\ldots+\delta_p \Delta_s y_{t-p+1}+\varepsilon_t \qquad (2)$$

where, $\Delta_s y_t=y_t-y_{t-s}$

The hypotheses of this test are: Ho: $\beta=0$ and $\gamma=0$; H1: not Ho

C. Unit Root Testing with Trend Break Hypothesis

Perron's (1989) analysis of unit roots in series with trend break is based on the null that it has a unit root with possibly nonzero drift against the alternative that the process is trend stationary. Perron finds that the estimation of equation (1) would have low power in rejecting the null of unit root, even if they are estimated for samples split based on an exogenous change in slope or intercept. For this purpose, Perron has clearly explained the models under null and alternative hypothesis as follows:

Null Hypotheses:

Model A: $y_t=\alpha_1+\beta D(TB)_t+\delta y_{t-1}+\varepsilon_t$ -------(3)

Model B: $y_t=\alpha_1+\delta y_{t-1}+(\alpha_2-\alpha_1) DU_t+\varepsilon_t$ -------(4)

Model C: $y_t=\alpha_1+\beta D(TB)_t+\delta y_{t-1}+(\alpha_2-\alpha_1) DU_t+\varepsilon_t$ ------(5)

Alternative Hypotheses:

$$\text{Model D: } y_t = \alpha_1 + \beta t + (\alpha_2 - \alpha_1)\, DU_t + \varepsilon_t \qquad \text{-------(6)}$$

$$\text{Model E: } y_t = \alpha_1 + \beta_1 t + (\beta_2 - \beta_1)\, DT_{t*} + \varepsilon_t \qquad \text{-------(7)}$$

$$\text{Model F: } y_t = \alpha_1 + \beta_1 t + (\beta_2 - \beta_1)\, DT_t + (\alpha_2 - \alpha_1)\, DU_t + \varepsilon_t \text{ ---(8)}$$

where DT_{t*} =t-TB and DT_t =t if t>TB and 0 otherwise.
DU_t =1 if t>TB, 0 otherwise.
$D(TB)_t$ =1 if t=TB+1, 0 otherwise.
$A(L)\,\varepsilon_t = B(L)\,v_t$

The subscripts 1 and 2 on the coefficients denote those of pre- and post-trend break (TB), respectively. By definition, the coefficient on DU_t captures the change in intercept, the one on DT_t captures the change in trend alone and that on DT_t captures the change in trend, when change in intercept also co-occurs. Significance of any of these would mean that there has been a change of the corresponding kind after the hypothesized trend break.

D. Identification, Estimation and Forecasting of Univariate Time Series

A tentative identification of a univariate time series could be done by looking at its autocorrelation functions (ACF) and partial autocorrelation functions (PACF). A positive significant PACF for the n-th lag and insignificant ones for the higher lags than n might indicate AR-n model. A similar observation in the ACF might imply MA-n model. A combination of both of the above might hint at ARMA(p,q) model. In addition to this procedure, we also estimate all these models and select the model with minimum information criterion (e.g. BIC). Once estimated, the series can be forecasted, by equating the initial unknown values of parameters and variables to their unconditional means.

E. Models with Heteroskedastic Residuals

The errors, if they follow ARCH (Auto Regressive Conditional Heteroskedasticity) group of models in the sense that they have heteroskedasticity (variance that varies over time), could be estimated in different ways. The ARCH-p model defines the conditional variance of the residuals in terms of p lags of squared residuals. If p is too high, GARCH(1,q) (Generalised ARCH) could be estimated with one lag of the conditional variance and q lags of squared white noise. Exponential GARCH (e-GARCH) is an improvement of ordinary GARCH(1,q) as it regresses the logarithm of the conditional variance against the its lag and q lags of error terms, thereby allowing for an existence of effects of signs of errors on the variance. However, before conducting GARCH estimation, the presence of heteroskedasticity should be confirmed, for which there Q and LM tests. These tests check the joint significance of the coefficients of the lagged squared errors in the regression of the conditional variance on these terms and a constant.

Table 2: Results of DHF's Test

Sample	**t-statistic**	**DHF's lower limit at 5% LOS**	**DHF's upper limit at 5% LOS**
Full sample	3.4468*	-3.42	-3.25
Pre-break sample	0.6*	-3.42	-3.25
Post-break sample	2.834*	-3.42	-3.25

Note: *: Significant at 5% Level of Significance (LOS).

Table 3: Results of the ADF's Test

Sample	**t-statistic**
Full sample	-4.178*
Pre-break sample	-2.164
Post-break sample	-4.399*

Note: *.Significant at 5% Level of Significance

Table 9: A Few In-Sample Forecasts by ARMA(1,1)

Obs. No.	Actual Value	Forecast	Std.Devn.	Lower limit	Upper Limit
120	113229.39	146016.44	18688.00	109388.63	182644.26
121	125537.30	130964.59	18688.00	94336.78	167592.41
122	185565.27	128030.60	18688.00	91402.79	164658.42
123	138004.59	152673.56	18688.00	116045.75	189301.38
124	144664.06	145484.11	18688.00	108856.30	182111.93
125	143494.50	144424.27	18688.00	107796.45	181052.08
126	140619.22	143326.76	18688.00	106698.94	179954.58
127	128871.63	141462.12	18688.00	104834.30	178089.94
128	145479.10	135291.50	18688.00	98663.69	171919.32
129	179128.91	139147.41	18688.00	102519.59	175775.22
130	105305.56	156001.68	18688.00	119373.87	192629.50

Table 10: A Few In-Sample Forecasts by ARMAX(1,1)

Obs.No.	Actual value	Forecast	Std.Devn	Lower Limit	Upper Limit
120	113229.39	139697.13	18170.93	104082.75	175311.51
121	125537.30	124842.61	18170.93	89228.23	160456.99
122	185565.27	124391.17	18170.93	88776.79	160005.54
123	138004.59	152132.94	18170.93	116518.56	187747.32
124	144664.06	141541.96	18170.93	105927.58	177156.34
125	143494.50	140235.65	18170.93	104621.27	175850.03
126	140619.22	139148.18	18170.93	103533.81	174762.56
127	128871.63	137358.11	18170.93	101743.73	172972.49
128	145479.10	131147.76	18170.93	95533.38	166762.13
129	179128.91	136291.91	18170.93	100677.53	171906.29
130	105305.56	154087.79	18170.93	118473.41	189702.17