

Impact of MFA Phase-Out on the World Economy -- An Intertemporal, Global General Equilibrium Analysis

Xinshen Diao
Trade and Macroeconomic Division
International Food Policy Research Institute

Agapi Somwaru
Economic Research Service
U.S. Department of Agriculture

May 2001, First Draft

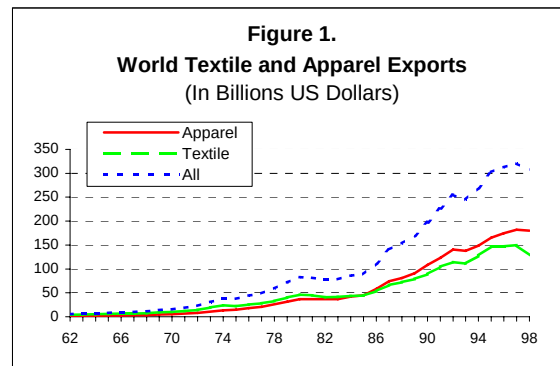
International trade in textile and apparel has been governed by quantitative restrictions under the Multi-Fiber Arrangement (MFA) and earlier agreements for more than 30 years. One of the major “accomplishments” of the Uruguay Round was the conclusion of the Agreement on Textiles and Clothing (ATC), which provides for the dismantling of these restrictions. Under the Uruguay Round ATC, the MFA restrictions are to be phased out over a 10-year period and are scheduled to end by the year 2005. Purpose of this study is to evaluate the possible effect of the MFA phase-out on the world economy especially the effect on the structure of world textile markets. As growth in textile and apparel industries and in the exports is one of the most important sources of economic development in many developing countries, this study will focus on the effect of the MFA phase-out on the developing countries.

Trend in World T&A Trade Flow

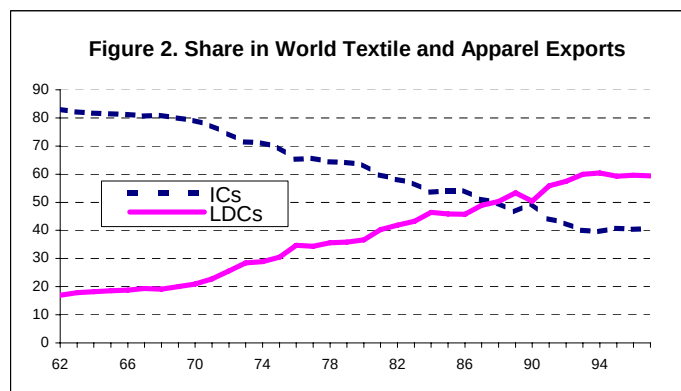
In the last four decades, world textile and apparel (T&A) trade has increased by more than 50 times, from less than 6 billion US dollars in 1962 rising to 300 billion in 1999. Of the 300 billion US dollars of T&A trade, slightly less than two-thirds is trade in apparel goods and the rest is trade in textile goods. Four decades ago, however, value of world textile trade was twice of the world apparel trade (figure 1). As the world textile trade has increased by 30 times and trade in apparel has grown more than 100 times, apparel trade takes the lion share in total world T&A trade. While the growth rate of T&A trade is higher than the growth rate of world agricultural trade (up 15 times in 40 years), textile trade has grown more slowly than the trade in the total manufacturing goods (up 55 times in 40 years). Share of T&A trade in world total trade is around 5 percent in the last four decades, and share of textile was been replacing by the share of apparel.

In general, developing countries have a comparative advantage in textile and apparel trade. This advantage allows developing countries to increase their export ability outside the traditional primary commodities’ production activities that are often restrained by a country’s natural resources. As a leading labor-intensive manufacturing sector, the

textile and apparel industry is often thought to represent the first base in economic growth and development in a country. Moreover, unlike the primary agricultural commodities for which growth in consumer's demand is often slower than the country's income growth, demand for textile and apparel commodities steadily grow in both developed and developing countries as countries become wealthier. This implies that for many developing countries there are enough rooms to expand their production and export capacities in the future.

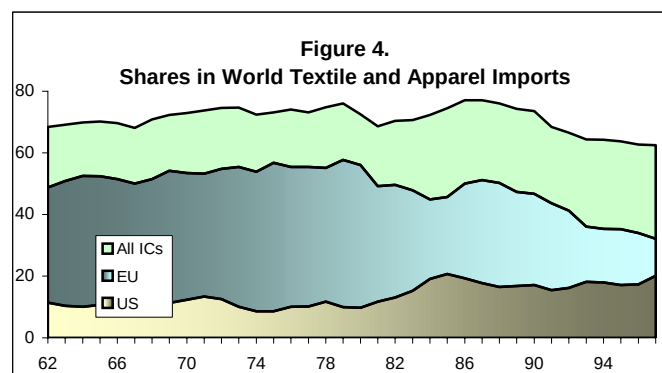
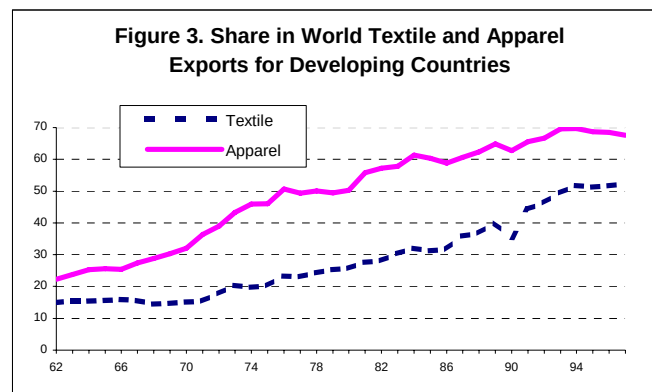


In term of the contribution to a country's economic development, many countries' experience shows that once export growth begins in textile and apparel sector, everything else follows. This trend has taken place in Korea, Taiwan, and now is happening in China, India, and many other South and Southeast Asian, and Latin American countries. One reason is that there exists strong links of textile industry to both agriculture and non-agriculture in the economy. Growth in textile sector benefits its "upstream" agricultural or manufacturing sectors by increased demand for material inputs or machinery and equipment. In addition, textile and apparel sector, especially export-oriented textile and apparel sector, depends on and require the presence of many modern economic activities. Through developing export-orientated textile and apparel industry, a country has in general acquired other knowledge and skills in many fronts such as marketing, advertising, transportations, and communication. All these highlight the importance of the textile and apparel industries, and hence are crucial in a country's development process.



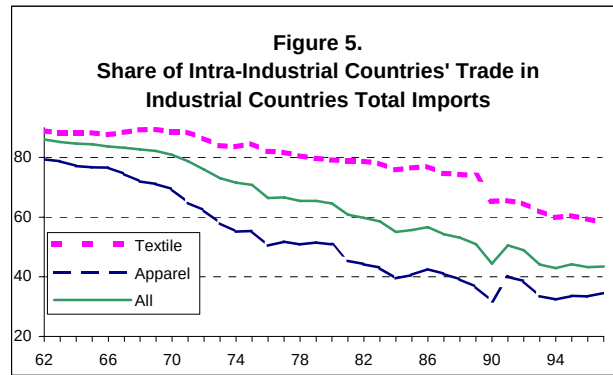
However, international trade in textiles and apparel has been governed by quantitative restriction under the MFA and earlier agreements for more than 30 years and the actual restriction in T&A trade can be traced back to late 1950s when Japan was pressured by the U.S. into imposing “voluntary export restraints” on cotton textile (Spinanger, 1998). It is estimated that the MFA covers about 15 percent of world textile trade and 40 percent of world apparel trade (Cline, 1990). Under these restrictions, industrial countries as a group had taken hold of the largest share of world total T&A exports until 1990 and only in the last decade the market share for the developing countries as a group became larger than the industrial country group’s share (figure 2).

When we consider textile and apparel as two separate categories, the industrial country as a group exported more textile goods than that of the developing country group until the last decade, while exports of apparel goods from the developing country group had exceeded the exports of the industrial country group in late 1970s. In the last five years, almost 70 percent of world apparel goods were exported from the developing countries (figure 3). The developing countries have gained their market share in world apparel trade mostly due to the rapid growth rate. In other words, industrial countries’ apparel exports also grew quite rapidly and even faster than their textile exports in the last four decades (40 vs. 15 times). But, as developing countries’ apparel exports increased by more than 250 times, many developing countries are becoming major exporters in world apparel markets.



While industrial countries are the destination of more than 70 percent of world T&A trade (figure 4), the market is not fully open to the developing countries. Even though the

developing countries have considerably gained grounds and increased their market share in the last two decades, the industrial countries are still trading with other industrial countries a big share of their textile and apparel goods. This is in particular true for the European Union, the world largest textile and apparel importer. While the share of the EU's T&A imports is about 40 – 50 percent of world T&A trade, intra-EU's trade accounts for more than 50 percent of total EU's T&A imports even in the recent years. That is, roughly about 20 percent of world T&A exports are actually traded among the EU's member countries. If we further take into account trade between U.S. and EU, and between US and Canada, intra-industrial countries' trade accounts for 50 percent of T&A market share in the industrial countries (figure 5).



Economic Growth and T&A Trade

Purpose of this study is to evaluate the possible gains to the developing countries if the MFA is dismantled. Before we proceed with the analysis, we first empirically investigate the impact of trade in textile and apparel products on the standards of living. Many studies have empirically examined the correlation between trade and income. However, most of these studies look at trade in general, i.e., the relationship between total trade (exports plus imports for all commodities) and income level. While these studies provide guidance to us, for the purpose of our study, we want to specifically investigate the linkage between trade in textile and apparel goods and income.

We employ the UN database to develop a data set of textile and apparel trade for 91 countries over 37 years (1962-98). Together with GDP and population data on each of 91 countries, we conduct a time-series and cross-sectional estimation to analyze the relationship between textile and apparel trade and income growth. In order to compare with the results obtained by the other studies, we also include in the estimation the data of total trade, agricultural trade, and total non-agricultural trade of these 91 countries over 37-year period. The estimated equation is adopted from Frankel and Romer (1999). Due to the data constraints, we are not able to develop the constructed trade shares that Frankel and Romer have estimated in their study and hence we use the actual trade shares. Moreover, we do not include country's geographic area in the equation, as in the time-series data, any geographic condition such as the area of a country is constant overtime and hence is already captured by the constant term in the estimated panel model.

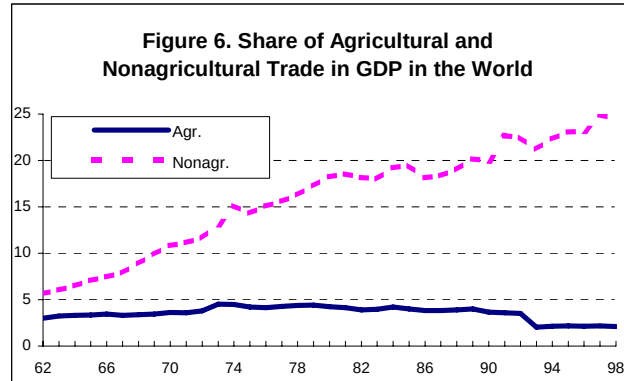
Specifically, the country's income is assumed to be a function of economic interactions with other countries (trade) and other factors:

$$\ln Y_{it} = \alpha + \beta T_{it} + \gamma A_{it} + \varepsilon_{it} \quad (1)$$

Where Y_{it} is income per person of country $i = 1, 2, \dots, 91$, and time $t = 1962, \dots, 98$, T_{it} and A_{it} are international trade share and population for country i at time t , and ε_{it} is the error term. In our pooled model we account for serial correlation, contemporaneous correlation, and heteroskedasticity among the cross-sections and time series data. We assume a first-order autoregressive error structure with contemporaneous correlation. The error term ε_{it} has the following structure:

$$\begin{aligned} E(\varepsilon_{it}^2) &= \sigma_{ii} && (\text{heteroscedasticity}) \\ E(\varepsilon_{it} \varepsilon_{jt}) &= \sigma_{ij} && (\text{contemporaneously correlated}) \\ \varepsilon_{it} &= \rho_i \varepsilon_{i,t-1} + v_{it} && (\text{autoregression}) \end{aligned}$$

We estimate equation (1) using time-series cross-sectional data of the log of income per person in constant 1995 U.S. dollars (Y_{it}), trade share (T_{it}), and the log of population (A_{it}). Trade shares are the ratio of imports plus exports to real GDP (in 1995 \$US) for each country in each year. The results of our analysis are robust even though we did not exclude those outliers or observations that are potentially subject to error. There are many other factors of course that may affect income but our analysis is limited due to the lack of available data



The estimation results indicate a statistically significant positive relationship between total trade and income, total nonagricultural trade and income, as well as textile and apparel trade and income. However, the estimated parameter for agricultural trade share is negative. The estimated parameter for the share of total trade in GDP is 0.431 (table 1, column 1) and this result is consistent with the OLS estimation in Frankel and Romer (1999, table 3). The parameter estimate implies that an increase in the share of total trade in GDP by one percentage point is associated with an increase of 0.431 percent in income per person. When we distinguish total trade into two aggregate categories: agricultural and non-agricultural trade, the estimated coefficients vary considerably and the

coefficient for agricultural trade share is negative (−3.53) and positive for the non-agricultural trade (1.16, table 1, columns 2 and 3). As we mentioned above, world agricultural trade grew much more slowly than the world non-agricultural trade in the last four decades (15 vs. 55 times). This causes the share of agricultural trade in GDP to decline in the world in average (figure 6). A negative coefficient in the estimate equation on the share of agricultural trade is consistent with this fact, which implies that in general, the decline in the share of agricultural trade in GDP is associated with the increase in income. This result also implies implicitly that to increase non-agricultural trade is more crucial for developing countries to raise their living standards than depending mainly on agricultural trade.

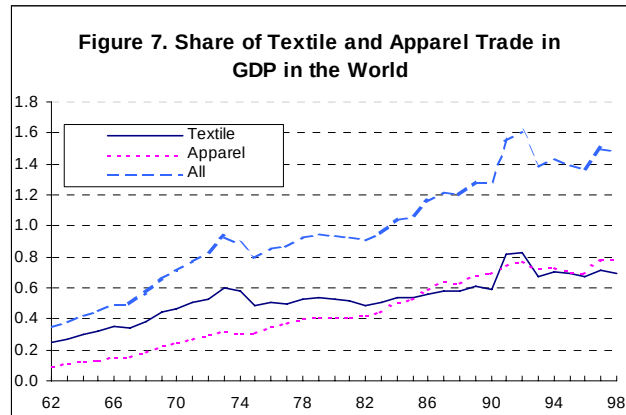
Table 1. Trade and income

Variable/Statistic	Parameter estimate (standard error in parentheses)					
	Total trade	Agricultural trade	Nonagr trade	Textile trade	Apparel trade	Textile & Apparel trade
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	8.957 (0.0135)	6.879 (6.37E-7)	9.512 (2.14E-7)	8.325 (1.42E-8)	8.442 (2.79E-8)	8.443 (5.664E-8)
Trade share	0.431 (0.009)	-3.531 (1.29E-7)	1.158 (4.53E-8)	2.658 (1.703E-7)	3.570 (8.37E-8)	2.864 (1.704E-7)
Ln population	-0.094 (0.0007)	0.013 (3.21E-8)	-0.121 (1.05E-8)	-0.058 (7.71E-10)	-0.066 (1.34E-9)	-0.0658 (3.033E-9)
R-squared	0.999	0.990	0.990	0.999	0.999	0.999

Results are all statistically significant at the 1-percent level

The positive coefficients become significantly large when the textile and apparel trade replaces the total trade in the equation. The results indicate that one percentage increase in textile and apparel trade shares is associated with a 2.7 – 3.6 percent increase in income per person (table 1, columns 4 - 6). While the coefficients of textile and apparel shares are large, the share of T&A trade in GDP is quite small (figure 7). When the share is small, growth in T&A trade has to be extremely rapid in order to have a percentage point rise in its share in GDP. We use an example to further explain this relationship. Assuming that trade of T&A is equivalent to 2 percent of GDP in a country and the country's GDP per capita grows at one percent annually. Then in order to increase T&A trade share to 3 percent of GDP, i.e., a percentage increase in the share, in a 10-year period, T&A trade has to grow 5.2 percent annually, i.e., 5.2 times of GDP growth rate. On the other hand, assuming the total nonagricultural trade is equivalent to 20 percent of GDP in this country. To increase the nonagricultural trade share to 21 percent of GDP in the same period (10 years), trade in non-agriculture needs to grow by 1.5 percent annually, i.e., only 50 percent higher than the growth rate of GDP. While the largest coefficient in the estimated equation for the T&A trade share does not mean the largest contribution to the growth of GDP, it does imply the importance of T&A trade in economic growth. Also, the data show that growth in T&A trade is much rapid than the growth in GDP. In total world GDP per capita rose by more than 2 times in the 37 years while T&A trade has grown more than 50 times. Thus, share of T&A trade in world GDP rises to 1.5 percent in 1998, from its 0.35 percent in 1962.

In sum, the regression results suggest that T&A trade has a quantitatively large, robust, positive, and statistically significant effect on income. Although we do not specifically incorporate policy effect on trade, the results suggest that promoting trade will benefit economic growth. In the following sections, we analyze quantitatively how the MFA and other trade restriction policies affect the economy. The regression results are used for the simulation analysis later.



MFA Phase-Out Process

The MFA phase-out comprises of two parts: a four-stage process eliminating export restraints contained in bilateral agreements previously negotiated on products covered under the MFA, and an increase in quota growth rates for products still under restriction during the transition period. The ATC also deals with other non-MFA restraint measures relating to textiles and clothing.

The integration of the textile and clothing sector into the GATT is expressed as a percentage of the total volume of imports in 1990 of “covered” products. The four stages are defined in the ATC as follows:

Stage 1 – On January 1, 1995, members shall integrate products that account for at least 16 percent of their total 1990 import volume;

Stage 2 – On January 1, 1998, they shall integrate products that account for at least an additional 17 percent of the total 1990 import volume;

Stage 3 – On January 1, 2002, they shall integrate products that account for at least an additional 18 percent of the total 1990 import volume;

Stage 4 – On January 1, 2005, all remaining ATC restrictions are eliminated and the textile and clothing sector is integrated into the GATT.

In addition to these minimum percentages, products from each of the four groups – tops and yarns, fabrics, made-up textiles, and clothing – must be included in each stage. However, the selection of products to integrate is determined by the importing country.

Also, products not liberalized but under quota or other restraint will have their quota growth rates increase during the first three stages of the phase-out period by 16, 25, and 27 percent, respectively.

As successful as the countries were in achieving an agreement on T&A products, they were just as unsuccessful in structuring it in a manner which would have effectively brought T&A products under the jurisdiction of the GATT framework throughout the phase-out period. The trade liberalization will progress slowly as many of the “covered” products have never been specifically restricted. United Nations estimates in Thomas and Whalley (1998) suggest that the major restraining countries fulfilled their obligations under the ATC in the first two stages without significantly eliminating any MFA quota in place. As a result, modest trade opportunities for developing countries may be available only after the third stage is in place in 2002. Even then, about half of the 1990 import volume will remain restricted until 2005 as specified in the ATC. Moreover, the ATC specifies nothing about what might or might not happen beyond the year 2004 when the MFA is absent. The language of the agreement speaks of textiles and apparel as a sector simply returning to normal GATT/WTO disciplines. However, this need not, and probably will not, mean that free trade will prevail in T&A trade. There are fears of new developed country dumping actions in this sector partially substituting for existing restraints; there are also doubts openly expressed by developing countries as to whether the developed countries will have the political will to actually implement their commitment. These doubts focus more heavily on the North American than the European importers, but both are the subject of questioning ((Whalley, 1999).

Perspectives of a Post MFA World

Given the fact that the substantial trade liberalization due to the MFA phase-out will happen after 2004, this study does not take into account those commitments that will be implemented in the first three stages. That is, we do not attempt to analyze specifically what will happen in each stage in which the phase-out commitments are implemented. Instead, we focus on the potential outcome in a post MFA world.

Several facts make the study difficult and distinguish it from a standard trade liberalization case. First, there exists strong growth in regional trade of textile and apparel goods around the two world largest industrial (importing) regions – the North America and the EU. In the last 5 – 8 years, U.S. has increased apparel imports from Mexico under NAFTA and from Jamaica and Dominican Republic under the Caribbean Basin Initiative, while EU has increased imports from the Central European countries. Most of this trade is free of quota restraints and hence is growing rapidly. This regional trade growth has built a constituency among a subset of exporting countries who now may find themselves more favorable to the MFA, since these countries now have export markets partly protected through MFA quotas from other suppliers.

Second, Korea, Taiwan, and Hong Kong, which were the largest apparel exporters among developing countries 15 – 20 years ago, are now left with unused and unfilled MFA quota for their apparel exports, while countries like China, India, and Pakistan are facing tight

quota restraints due to the fast growth in their apparel exports. As the current quotas may be not binding for some countries, it seems improper to use quota levels to quantitatively measure the restrictions that the exporting countries face due to the MFA.

Third, different from most other non-tariff barriers in which importing countries capture the rent generated from the restricted imports, the MFA is some time called a “dirty deal”, that is, the importing countries (industrial countries) are “selling” to the exporting countries the right to continue to export given amounts of T&A products to importing countries. The exporting countries have the opportunity to capture the rents ensuing from restricting supplies. Thus, the domestic prices of imported T&A products in the restraining countries are not necessary higher than the border prices in the international markets, and hence, it is not proper to assume that the gap between the domestic prices and the border prices in the importing countries (i.e., the so called tariff equivalent rate) can represent a restraining country’s protection level under the MFA. To model the MFA restriction as an export tax in the exporting countries are also questionable as in many of these countries, such as China and India, exports of T&A products are actually encouraged by their domestic policies.

To take into account these facts, in the study we first try to distinguish the exporting countries by whether the T&A trade restrained under the MFA. Specifically, we include (1) China, (2) India, (3) the region of the other South and Southeast Asian countries, (4) the region of the Middle-east countries, (5) the region of former Soviet Union countries, and (6) the region of the Latin American countries (excluding Mexico and the Caribbean countries) in the study and these countries represent the exporting countries restrained by the MFA quotas. We also include (7) the region of North African and East European countries and (8) the region of other African countries to represent the developing countries free from restraint in the EU market and (9) region of Mexico and Caribbean countries to represent the countries free from restraint in the North American markets. The study also includes the following industrial countries as major importers and exporters in the world, including two restraining regions: (10) the North America (U.S. and Canada), (11) the EU, and two non-restraining regions: (12) Australia and New Zealand, and (13) Japan, Taiwan, Hong Kong, and Korea. As Taiwan, Hong Kong and Korea are currently with unused quotas in their apparel exports, we treat them as developed countries in the model. Second, we try to model the MFA quotas as the impact on some developing countries’ export efficiency. That is, the MFA does not create either a price gap between domestic and border prices or quota rents for the restraining countries, instead, the restraints cause the difficulty for some developing countries to export their textile and apparel products to the restraining countries (the North America and the EU in the model), and hence lower the efficiency of their exports. In a post MFA world, exports of textile and apparel products become relatively easy for the developing countries [included in (1) – (6)] and hence exports grow.

T&A vs. the rest of economy – An illustration of input-output linkages

The study is conducted in an intertemporal general equilibrium framework. The detailed description of the model can be found in Diao and Somwaru (2000, 2001). The data we

use in the study is the *GTAP database* version 5, pre-release 3 (GTAP, 2001), which include data about trade flow in the world and production and consumption in each country/region in 1997. The original data set includes 66 countries/regions and 57 aggregate sectors. For the purpose of this study, we aggregate the data into 13 countries/regions (listed in the previous section) and 7 sectors, including cotton, other crops, livestock, processed food, textile, apparel, and an aggregated manufacturing and services sector.

The study focuses solely on the impact of MFA phase-out and removal of the other related trade restrictions in world T&A trade. Trend of the historical data discussed in the previous sections shows that world T&A trade can be expected to grow constantly and hence change in the world market structure would continue regardless of possible policy changes in world T&A trade. The method used in our study does not allow us to predict quantitatively how the trend will move ahead and how the structural change will take place in the future. The method we use in the following analysis is some time called a ‘counter-factual’ analysis, i.e., we ask questions such as given the trend in the growth and the change in the market structure, how the MFA phase-out will add additional growth in the world T&A trade or will cause further change in the world market structure.

The MFA phase-out or any change in T&A trade policy are expected to affect T&A trade directly. However, change in a country’s textile and apparel exports can also affect the country’s domestic economy as well as the world economy through input-output, supply-demand, and price linkages. The study tries to capture such linkages among economic activities and hence to evaluate the general equilibrium impact of the MFA phase-out on the world economy. We first present an example to illustrate how such linkages, e.g., the input-output linkages, work when a country’s exports of textile and apparel rise. We start by assuming that the countries and regions in (1) – (6) increase their textile and apparel exports by 5 percent. We further assume that prices in the world and in each country/region remain unchanged as well as the world total T&A trade. Hence, textile and apparel exports from the North America and the EU are assumed to decline. With fixed domestic demand, increase in exports needs to be supplied by increase in production, which consequently causes more intermediate inputs, labor and capital employed. Increased use of intermediate inputs may promote production in the intermediate producing sectors, such as cotton and manufacturing goods. In addition, textile products are inputs of apparel production and hence apparel exports stimulate textile production. The intermediate inputs may be imported from abroad and hence exports can stimulate imports, which allows intermediate exporting countries to expand production. Putting all these linkages together, increase in the exports of T&A products results in rises in GDP, total labor demand and hence household’s income. Similarly, decrease in the textile and apparel exports in the North America and EU causes GDP and income to fall in these countries (table 2).

It is observed in table 2 that a 5 percent increase in exports of T&A generates differential effects among the countries. These effects mainly reflect the difference in production and trade structures across countries. In general, the more export-oriented a country’s textile

and apparel industry, the larger the T&A share in a country's GDP, or the more available labor supply, the stronger the response of the rest economy to the exports of T&A. If we further take into account some dynamic factors, such as investment and capital accumulation, the higher a country's saving rate, or the easier a country to get foreign investment, the larger the effect of trade on the economy.

The above illustration only considers the input-output linkage while the possible effects of change in the structure of world T&A trade on the prices, consumers' demand, and firm's investment behavior are ignored. In the following analysis, we will take into account these factors in an intertemporal general equilibrium framework.

Table 2. An illustration of input-output linkages between textile and apparel exports and the rest of economy
(% change from the base after a 5% increase in textile and apparel exports in developing countries)

	China	India	Mid-east	USA	Other L.A.	EU
Demand for labor						
Textile	2.11	1.28	2.63	-0.95	0.16	-1.97
Apparels	2.49	2.25	2.13	-0.95	0.11	-1.78
Demand for intermediates						
Cotton	2.05	0.22	1.59	-0.80	0.13	-1.62
Textile	1.61	1.20	1.65	-0.62	0.11	-1.29
Apparels	0.38	1.32	0.67	-0.80	0.02	-1.04
Manufacturing & services	0.13	0.13	0.07	-0.02	0.01	-0.04
Output						
Cotton	1.96	0.10	1.04	-0.57	0.11	-0.68
Textile	2.11	1.28	2.63	-0.95	0.16	-1.97
Apparels	2.49	2.25	2.13	-0.95	0.11	-1.78
Manufacturing & services	0.08	0.06	0.03	-0.01	0.00	-0.02
Imports						
Cotton	1.96	0.11	1.23	-0.80	0.11	-1.58
Textile	1.49	0.51	1.21	-0.46	0.08	-0.83
Manufacturing & services	0.09	0.07	0.03	-0.01	0.00	-0.02
Macroeconomic effects						
Total labor demand	0.21	0.12	0.07	-0.02	0.01	-0.05
Income	0.15	0.09	0.05	-0.02	0.01	-0.03
GDP	0.19	0.10	0.06	-0.02	0.01	-0.04

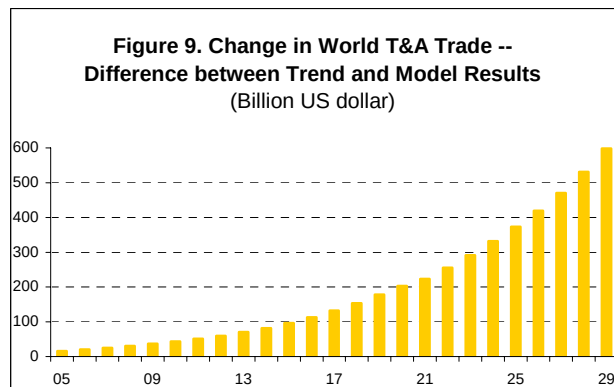
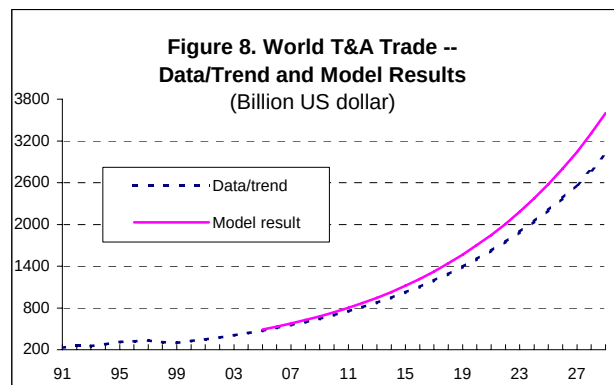
General equilibrium perspective of MFA phase-out

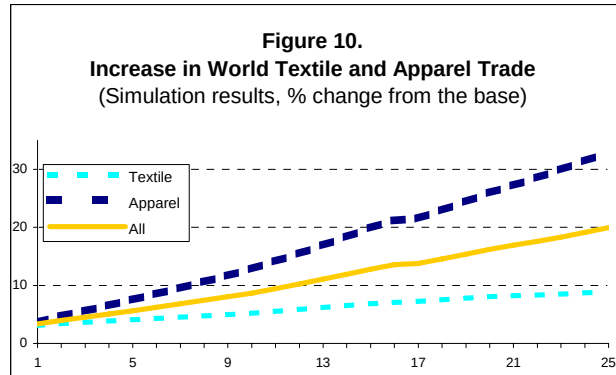
We simulate the possible effect of MFA phase-out by improving the efficiency of textile and apparel exports in the countries/regions included in (1) – (6). Technically, we exogenously increase the efficiency coefficient in the export function by 0.3 percent annually. Moreover, we assume tariff rates on textile and apparel imports are reduced by 30 – 40 percent in all countries and the reduced tariff rates are close to each country's average tariff rate for other manufacturing imports. Integrating tariff reductions into the simulation is based on the fact that while many developing countries face the restraints in their textile and apparel exports under the MFA, there exist high barriers on imports of T&A goods in some of these countries, such as China and India. Hence, there are also conflicts over textile and apparel trade among the developing countries. For this reason, we assume when the MFA is finally dismantled, other trade barriers (represented by

tariffs here) have to be also reduced in the world. The econometric results discussed in the previous section about the linkage between increase in share of T&A trade in GDP and growth in GDP are also incorporated into the simulation.

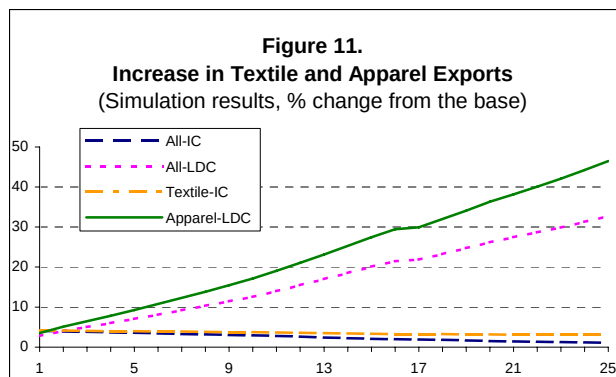
1. More textile and apparel trade in the world

World T&A trade increases in the model due to the MFA phase-out and the tariff reduction. Comparing with the base, world T&A trade increases by 3 – 20 percent annually in the simulated time period of 25 years. That is, if world T&A trade were expected to grow 8 percent annually in the next 25 years after 2005, then due to the MFA phase-out, the new annual growth rate in the model is about 8.67 percent in average, equivalent to add 3 – 20 percent of more trade annually on the level (not the growth rate) of the trade indicate by the trend (figure 8). The gains in world T&A trade are about 20 billion U.S. dollar in the early periods post MFA and may increase to near 600 billion in the long run (figure 9). Such increase in the T&A trade causes share of the T&A trade in world total trade up by a half percentage point, from 5.7 to 6.2 percent (Assuming in the base the world total trade to grow at a similar rate as T&A trade). Consistent with the trend in the historical data, the model results show that world apparel trade will increase twice more than the textile trade in the post MFA world (figure 10).





It is obvious that increase in world trade is mainly due to more exports especially apparel exports from developing countries, as their exports become more efficient in the model. However, the model results also show that as a group, exports of T&A by the industrial countries, especially their textile exports, do not fall, instead rise by about 3 percent from the base (figure 11). As we discussed in the above example, textile and apparel sector has strong inter-linkages. When developing countries increase their apparel exports, which are mainly labor-intensive products, their demand for industrial countries' textile products, which are often capital intensive, rises and hence industrial countries' exports also increase. This result indicates that protection policies in the world T&A trade not only restrain exports of developing countries, but also limit the possible exports of industrial countries and hence reduce the world overall trade flow. While liberalization may cause competition between rich and poor countries in world T&A markets, it can also induce interdependency among countries and hence enlarge the world trade.



2. Countries' market shares change in the world

The simulation results show that the world market share for some countries or regions changes in the post MFA period. In total developing countries gain 5 percentage points of the world T&A market that originally belong to the industrial countries in the base. The most rapid growth in textile and apparel exports is observed in the region of the other Asian countries, which allows the region to gain 3.3 percentage points of the world T&A market (figure 12). As China is the largest exporter among the developing countries, it also captures about 2.5 percent more world market share (table 3). Exports in some

developing countries/regions that are free from quota restraints under the MFA decline and in total, they lose about 20 percent of their T&A markets (equivalent to 2.58 percentage points of world total T&A markets) to those countries restrained by the MFA.

Changes in country's market shares may be underestimated due to the regional aggregation in the model. The aggregation causes trade among the countries that are aggregated into a region to be ignored. In some regions, especially in the EU, intra-regional trade is likely to be replaced by imports from countries outside the EU. For example, total EU's exports of T&A goods accounted for 30 percent of the world T&A trade in the last decade, on average. As about half of the exports are intra-EU's trade, which are not taken into account in the model, the model only captures the exports of EU to the rest of world, which is about 14.4 percent of the world total textile and apparel exports in the base. This share falls to 12.4 percent in the simulation, which implies that as an exporter, EU loses about 14 percent of its markets outside the EU. However, if the intra-EU's trade were included in the model, then the developing countries would not only gain the markets in the rest world, but also within the EU.

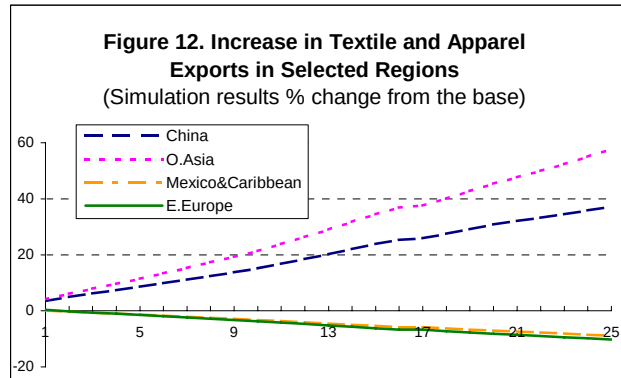


Table 3. Market shares for selected countries/regions in world total exports of T&A

	----- Simulation results -----				
	Base	Year-5	Year-10	Year-15	Year-20
Developing countries	59.57	60.37	61.71	63.41	64.68
China	19.69	20.24	20.85	21.60	22.15
India	4.40	4.45	4.64	4.88	5.07
Other Asia	13.00	13.72	14.51	15.50	16.26
Middle East	5.03	5.31	5.62	6.01	6.30
East Europe	6.50	6.07	5.76	5.41	5.14
Mexico & Caribbean	6.09	5.69	5.43	5.11	4.87
Industrial countries	40.43	39.63	38.29	36.59	35.32
North America	6.61	6.33	6.12	5.85	5.64
European Union	14.39	13.92	13.46	12.87	12.42

Second, while the econometric results on the linkage between T&A trade share in GDP and growth in GDP are incorporated in the simulation, the model does not take into account the growth trend in T&A trade due to population growth or technological change among the countries. The historical data show that growth is a major reason for the

structural change in world T&A market. In the early stage of development, a country tends to export more T&A products, especially high labor-intensive apparel products. When the country becomes wealthy and hence its labor cost increases, the country starts to lose its comparative advantage in producing and exporting labor-intensive apparel goods, and shift to other products which are more capital or human capital intensive. The dynamics in a country's comparative advantage is observed in the process of economic development among countries such as Japan, Korea, Taiwan, and Hong Kong, all of them were large textile and apparel exporters in the past. While the model fails to capture such dynamics in a country's comparative advantage, the model results seem to tell us that, on the other hand, only when the MFA phase-out strongly affects the growth patterns and growth rates of developing countries, do such trade reforms have significant impact on the market structure of world T&A trade in a post MFA world.

3. Differential effect on welfare among countries

From the world's perspective, a more liberalized textile and apparel sector implies more efficient allocation of resources and hence yields higher global welfare. We use the well-accepted equivalent variation (often referred to as the willingness to pay) to measure the social welfare gains or losses in the post MFA world. In a static analysis, the welfare effects are often measured by using the status-quo (pre-reform) prices as the base, and addresses the question: what income would be equivalent to the change brought about by, e.g., liberalizing world T&A trade (Varian, 1984). We borrow this concept in our dynamic analysis, i.e., we evaluate the welfare effects within each time period and the entire time path by summing the discounted value of this measure over time.

Table 4. Welfare effect in the simulation

	Year-5		Year-10		Year-15		Year-20	
	Billion \$	%	Billion \$	%	Billion \$	%	Billion \$	%
Developing countries								
China	9.00	1.74	9.91	1.91	10.59	2.04	11.65	2.25
India	2.97	0.97	3.34	1.10	3.90	1.28	4.90	1.61
Other Asia	5.06	0.90	5.30	0.94	5.76	1.02	6.55	1.16
Middle East	2.66	0.48	2.97	0.53	3.46	0.62	4.32	0.77
Former Soviet Union	-2.99	-0.65	-3.16	-0.68	-3.13	-0.68	-2.96	-0.64
Other Latin America	-2.28	-0.19	-1.66	-0.14	-1.06	-0.09	-0.03	-0.00
East Europe	-2.18	-0.52	-2.22	-0.53	-2.20	-0.52	-2.18	-0.52
Other Africa	-2.37	-0.45	-2.45	-0.46	-2.45	-0.46	-2.54	-0.48
Mexico & Caribbean	-1.56	-0.40	-1.53	-0.39	-1.48	-0.38	-1.42	-0.36
Industrial countries								
North America	0.07	0.00	3.42	0.05	7.42	0.10	11.91	0.16
European Union	0.06	0.00	3.78	0.05	8.36	0.12	13.23	0.19
Australia, New Zealand	0.09	0.03	0.16	0.05	0.26	0.07	0.40	0.11
Japan, Korea, Taiwan	2.79	0.08	3.47	0.10	4.52	0.13	5.98	0.17

As expected, most countries whose textile and apparel exports are restrained by the MFA gain post MFA (table 4). However, as we discussed in the previous section, due to the difference in production and trade structure among countries, a same level of change in

textile and apparel exports can affect the rest of economy differentially across countries. For this reason, the welfare gains can be different among the countries that benefit directly from the MFA phase-out. For example, textile and apparel exports increase the most in the region of other Asian countries in the model (figure 12). However, from the welfare point of view, China gains the most both in absolute value and in percent of total consumers' expenditure. One reason is that T&A sector contributed more to GDP in China than in the other countries. In terms of ratios of sectoral value-added and exports to GDP, T&A sector accounted for more than 5 percent of China's GDP in the base, while it account for 3 to 4 percent of GDP for the region of other Asian countries (table 5). For this reason, exports of T&A create more employment opportunities and hence GDP rises more in China than that in the other countries (figure 13).

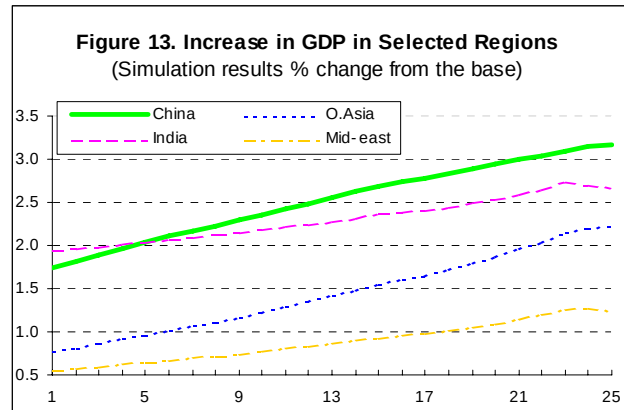


Table 5. Share of textile and apparel in GDP

	T&A value-added (1)	Exports (2)
Developing countries		
China	5.26	5.38
India	3.25	2.64
Other Asia	3.02	3.89
Middle East	1.36	1.68
Former Soviet Union	1.32	0.43
Other Latin America	3.29	0.16
East Europe	2.86	3.10
Other Africa	2.14	1.08
Mexico and Caribbean	3.29	3.00
Industrial countries		
North America	1.22	0.18
European Union	1.06	0.40
Australia and New Zealand	0.87	0.47
Japan, Korea and Taiwan	1.20	0.86

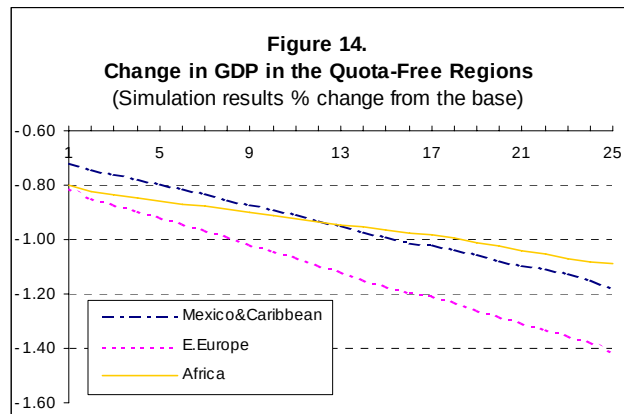
(1) GDP at factor cost

(2) GDP at expenditure

Data source: GTAP database version 5.

Among the developing countries whose exports are restrained by the MFA, the welfare change in the region of former Soviet Union and the other Latin American region turns out to be negative in the model (table 4). The reason is that these two regions' textile and apparel exports' contributions to GDP are quite small, equivalent to less than half percent of their GDP, the smallest one among the developing countries/regions in the model (table 5). While the regions' textile and apparel exports rise, post MFA, production of T&A may fall and GDP may decline. Putting these factors together, we observe a negative welfare effect of MFA phase-out in these two regions.

For the developing countries free from quota restraints under the MFA and industrial (importing) countries, the welfare effect of MFA phase-out is ambiguous analytically. The direct effect of MFA phase-out may be negative for these countries' welfare, as their textile and apparel exports and hence production may fall. However, consumers in these countries may benefit from lowered price for T&A imports. The output of the other sectors may rise by employing the resources released from the protected T&A sector. Even within T&A sector, the indirect effect may be positive as the apparel exporting countries may increase demand for imported textile products.



We observe a negative welfare effect of MFA phase-out in the regions free from quota restraints and a positive welfare effect on industrial importing countries (table 4). Competition from other suppliers who used to be restrained by the quota in the EU and North American markets causes the quota-free regions' exports to fall (figure 12). Moreover, as the North American or EU markets accounted for more than 90 percent of total exports for the quota-free regions, decline in exports further restrains their production, and hence GDP and welfare falls in these regions (figure 14).

While some countries gain and some countries loss, the world aggregate welfare change is positive (around 10 billion U.S. dollars in the short-run and more than 60 billion in long-run in the model), which implies that it is possible to compensate the loss caused by the MFA removal on some developing countries. As many of those countries that may have a welfare loss are less developed and poor, the compensation to the cost they may pay to the world trade liberalization is very important.

Conclusions

This study focuses on the possible impact of MFA phase-out on the world economy. The study starts from analyzing the trend in world textile and apparel trade. The developing countries become a major player in world T&A trade in the recent decades. As 70 percent of world T&A products are imported by the industrial countries, a more open and freer market in the industrial countries is an important condition for developing countries to keep their growth momentum. However, about 50 percent of industrial countries' markets are not available for developing countries and intra-EU trade still accounts for half of total EU's imports of T&A products. The restraints of MFA on the developing countries' T&A trade may partially explain this trend.

The relationship between trade in textile and apparel and standard of living is empirically investigated in the study. Using trade data from 91 countries over 37 years, the regression results indicate a strong linkage between trade in T&A and income per person. Given many developing countries still mainly exporting agricultural or other primary goods, the study also estimates the linkage between agricultural trade and income, and it turns out the coefficient is negative.

The perspective of a post MFA world is analyzed by using an intertemporal general equilibrium model. As the model framework does not allow us to predict the trend in world T&A trade, the study focuses solely on the possible impacts of the MFA phase-out on world T&A trade and world economy. The study finds that MFA phase-out would enlarge world trade of T&A and developing countries will further gain their market share in world total exports. However, without evaluating the possible and differential impact of MFA phase-out on the economic growth pattern and growth rate among countries, the model fails to capture a significant change in world T&A market structure.

Most countries, including the developing countries restrained by the MFA quotas and industrial countries, gain in term of social welfare post MFA. However, the developing countries free from MFA quotas may get hurt post MFA. As many of these countries are less developed and poor, a compensation policy in the world need to be considered in the MFA phase-out process.

Reference:

Cline, William (1990) *The Future of World Trade in Textile and Apparel*, Institute for International Economics.

Diao, Xinshen and Agapi Somwaru (2001) "A Dynamic Evaluation of the Effects of A Free Trade Area of the Americas -- An Intertemporal, Global General Equilibrium Model," *Journal of Regional Integration* 16(1): 21-47.

Diao, Xinshen and Agapi Somwaru (2000) "An Inquiry on General Equilibrium Effects of MERCOSUR -- An Intertemporal World Model, *Journal of Policy Modeling* 22(5): 557-588.

Frankel, Jeffrey A. and David Romer (1999) "Does Trade Cause Growth?" *The American Economic Review* 89(3): 379 – 399.

Spinanger, Dean (1998) "Textile Beyond the MFA Phase-Out," CSGR Working Paper No. 13/98, Center for the Study of Globalization and Regionalization, The University of Warwick, July 1998.

Thomas, Harmon and John Whalley (eds) (1998) "The Implementation of the Uruguay Agreement on Textile and Clothing: Some General Issues," *Uruguay Round Results and the Emerging Trade Agenda: Quantitative-based Analyses from the Development Perspective*, UNCTAD, United Nations.

Varian, Hal R. (1984) *Microeconomic Analysis*, Second Edition, New York and London: W.W. Norton & Company.

Whalley, John (1999) "Notes on Textile and Apparel in the Next Trade Round," prepared for a conference on Developing Countries in the Next WTO Trade Round, Harvard University, November 5 – 6, 1999.