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**MFA Quota Removal and Global Textile and Cotton Trade:
Estimating Quota Trade Restrictiveness and Quantifying Post-MFA Trade Patterns**

Aziz Elbehri

Economic Research Service, USDA

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Abstract

This paper develops new adaptations to the GTAP framework and uses them to examine the global trade implications of MFA quota removal on cotton and textile industry. The analysis is based on a new set of MFA-trade restrictiveness estimates based on 2002 product-level quota trade and price data. Using a multi-regional general equilibrium, the analysis provides comparative static assessment of changes in global trade patterns in post-MFA. The analysis also takes into account the MFA-induced implicit tax on cotton and allows for inter-fiber substitution. The model is run for several scenarios including quota removal only or in combination with tariff liberalization. The analysis confirms previous findings of significant shifts in textile and apparel trade from preferential exporters to Asian and south Asian suppliers that are subject to binding MFA-quotas. However, not all MFA-exporters benefit equally from the expanding apparel trade. The United States shows significant increases in apparel imports substituting for domestic products, raising overall consumption and producing substantial welfare gains. The implications for fiber markets on the U.S. show lower demand for cotton domestic use but expanding U.S. cotton exports due to higher world demand, particularly when both quotas and tariffs are removed.

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Aziz Elbehri is an economist with the Economic Research Service, USDA; Correspondence: 1800 M St NW, Washington D.C., 20036. Tel: 202-694-5291, Fax: 202-694-5823, E-mail: aelbehri@ers.usda.gov.

1. Introduction

The Multi-Fiber Agreement (MFA) in place since 1980's, provided a framework under which developed countries including the United States, the European Union and Canada imposed quotas on exports of yarn textiles and apparel from developing countries. The United States is one of the largest importers of textiles and apparels globally and has a significant influence on world markets. The United States has quotas on textiles and apparel from 46 countries including six non-WTO members. The European Union maintains quotas on textile and clothing from 21 countries including 5 non-WTO members. The Agreement on Textiles and Clothing (ATC) concluded during the Uruguay Round of multilateral trade negotiations provides for the phase-out of import quotas established under MFA for a period ending in December 2004. During the ten-year transition period, the ATC agreement calls for a progressive phase out of these quotas and the integration of traded textile and apparel products within the GATT system which disallow quantitative restrictions such as import quotas.

During the 1990's a significant portion of bilateral textile trade from MFA-constrained suppliers (India, Pakistan, Hong Kong, Korea, Taiwan and China) has shifted to preferential sources (Mexico, CBI countries). In 1990 about 42.5 percent of apparel and textile came from MFA countries. By 2003, these shares have dropped for apparels to 33.5% and slightly rose for textiles to 12.8%. Nevertheless, MFA-constrained suppliers continue to hold substantial shares of total trade and the removal of MFA quotas is expected to have a significant impact on global trade in these products as well as to induce a reversal of these trends in favor of MFA-restricted suppliers.

The implications of post-MFA on U.S. textile and fiber sector will be quite different for apparel, textile and cotton sectors. Without MFA quotas, U.S. firms currently sourcing apparel

imports from preferential suppliers such as Mexico, CBI, Andean, or AGOA countries may have economic incentives to shift to Asian suppliers. This has direct implications on U.S. textile industry since a large share of apparel imports from preferential sources is made in large part from U.S. fabrics whereas MFA sourced apparels use little U.S. fabric. This is critical given that the United States is relatively more competitive in capital-intensive textiles compared to labor-intensive apparels. The MFA-induced shift in apparel imports from preferential to MFA sources will also impact the U.S. textile patterns. In fiber markets, the United States is a major cotton producer and exporter. It is expected that MFA-induced changes in textile and apparel global trade will also affect domestic and foreign demand for fiber inputs. Increases in demand for textiles will have opposing effects on cotton demand both from adjustments in domestic textile industry as well as from new and expanding export opportunities in global markets, which could be even larger if further tariff liberalization takes place.

This study compares alternative scenarios of MFA quota and tariffs elimination and examines the production and trade effects in textile and cotton sectors in the post-MFA environment. The analysis focuses on three sets of issues. The first is to examine the impact at the global level sorting out not only the extent of global expansion but also the critical shifts in bilateral textiles and apparels trade patterns. Second, we look at the trade implications for United States in textile and apparel markets. Changes in apparel imports have implications on domestic production, consumption and overall welfare. Textile export demand will be affected by several inter-related factors. For the United States, we expect that as apparel imports increase, this will tend to cut U.S. demand for domestic textiles. Also, a shift of apparel imports from preferential to MFA-constrained sources will have a downward effect on U.S. textile export demand as preferential suppliers use more of U.S. fabrics than MFA-restricted apparel suppliers. On the other hand, the

expansion effect works in the opposite direction as U.S. textile exports are expected to benefit from overall growth of global textile and apparel trade.

The third issue we also examine is impact of textile and clothing expansion on global fiber demand. Several offsetting forces are at play for cotton fiber market as a result of MFA removal. To the extent that the net effect on U.S. textile demand is negative, this will have a downward impact on cotton fiber demand. The second effect in the opposite direction is the upward push for cotton supply in response to expanding world trade in textiles and clothing. An example of this is a recent surge of U.S. cotton exports to China in response to growing demand for an expanding textile and apparel sector. An additional boost to cotton fiber demand also arises from substitution of cotton for man-made fiber in response to the removal of MFA-induced distortions. Such substitution favors cotton fiber input given that MFA quota are generally more restrictive for cotton-based products compared to man-made fiber products. MFA quotas also induce an implicit tax on cotton fiber the removal of which would induce an additional boost to cotton demand. We also expect to see substitution between cotton and man-made fibers in response to relative price changes. There is empirical evidence for a strong price co-movement between cotton and synthetic fibers and evidence for negative relationship between cotton consumption and man-made fiber price (Baffes and Gohou, 2003). Market conditions that push up cotton prices lead to fiber substitution in favor of man-made fibers.

We examine these issues in relation to MFA removal using a multi-regional CGE model of bilateral trade. Our estimates are based using a new set of estimates of MFA trade restrictiveness expressed as export tax equivalents (ETE). These estimates are derived for the United States using 2002 quota price data reported by the USITC (2004) and the 2002 quota trade and quota utilization data from the Department of Commerce. The estimated ETE values are incorporated into the GTAP database version 6.1 as an update to existing data (for Canada we assume the same

ETE as for the United States and for the European Union we keep the GTAP values). The analysis applies a comparative static short-medium run perspective (5 year)--a period span sufficient for the textile industry adjustments to fully take place.

The remainder of this paper is as follows. Section 2 provides a detailed background and reviews recent trends in U.S. textile and clothing trade in light of the ATC and the various preferential agreements enacted in the 1990's. Section 3 describes the modeling framework and database, while section 4 presents the scenarios and results, while section 5 concludes.

2. Textile Trade Patterns leading up to MFA Removal

The ATC Agreement calls for a gradual phase out of the MFA quotas and an acceleration of the rate of quota growth for quota restricted products not yet integrated. (Integration here means putting a list of traded textiles and apparel products under WTO rules, and hence not subject to quantitative restrictions such as quotas.) The ATC agreement also requires the remaining products still under quotas to grow at accelerated rates until these quotas are completely removed in January 2005. The phase-in integration stipulates four stages, the first three cover the periods 1995-1997, 1998-2001, and 2002-2004, in which the United States integrated 16, 17, and 18% of 1990 trade, respectively, leaving 49% of trade for the last integration phase beginning January 1, 2005. During the transition period, products under quotas not yet integrated were also allowed to grow at quota growth of 16, 25, and 27%, respectively for each of the three periods. For example, if under MFA quota annual growth rate is 6%, then the acceleration of quota growth of 25% in phase two will bring the new ATC quota growth rate to 7.5%. Most products integrated in the first three stages were either not subject to quotas or were subject to non-binding quotas with low utilization rates. By contrast, 94 percent of the products due to be integrated in January 2005 are

currently under restrictive quotas. This back-loading of the quota removal is generally expected to bring about substantial changes in trade patterns in textiles and apparel.

Parallel to implementation of ATC Agreement, the United States concluded several preferential trading agreements (NAFTA, CBI, Andean, AGOA) which have significantly altered trade patterns away from MFA sources and into greater bilateral trade with preferential partners in the Americas. Figure 1 shows the share of total apparel and textile imports for four groups of countries. From 1990 to 1999, the share of imports from MFA-restricted exporters declined from 39.4 percent of total to 32.9 percent, to the benefit of preferential exporters who improved their export share to the United States during the same period. This shift in trade sourcing is more pronounced when we consider only the quota-restricted products due to be integrated in 2005. In this case, the drop in MFA-sourced import shares is much larger from 71.6 percent in 1990 down to 52.6 percent in 1999 (Figure 2). During the 1990's, quota restrictions have enabled preferential exporters to expand their market shares at the expense of MFA-restricted suppliers. At the same time, because of rules of origin, such shifts in trade patterns have reinforced a two-way trade favoring textiles exports by the United States at the same time as the increase in apparel imports.

The growth in trade with preferential partners was concentrated mostly within the highly constrained products by MFA quotas. By contrast MFA-constrained countries have shown slower growth in their exports for these products. Moreover, even within this group there are different growth patterns between countries which reflect contrasting levels of relative competitiveness. Figure 3 compares export growth of quota-constrained and non-quota constrained products from various MFA countries to the United States. For high growth MFA suppliers such as India, China and Turkey, the 5-year growth of non-binding quota exports is much higher compared to quota binding products. For China a big part of the surge of exports of non-binding quotas arises from China's WTO accession in January 2002, enabling China to benefit from first three stages of ATC

integration of textile trade (USITC 2004). For a second group of countries like Bangladesh, Malaysia, Philippines, export growth is shown only for quota-restricted products while unrestricted product exports actually decline. For these countries, MFA quotas are protecting their current market access, but continued export growth is uncertain in a post-MFA environment. A third group of countries like Korea, Taiwan and Hong Kong show declining apparel exports to the United States regardless of the product quota status. These trends reflect an underlying change in comparative advantage in these economies which have moved away from labor-intensive apparel and into capital intensive textile and other industries all together. At the same time, these countries have outsourced their production to other low-wage countries such as China and therefore are indirectly benefiting from apparel trade growth via investment. Overall this review highlights the potentially significant realignments of global trade patterns in textiles and clothing in a post-MFA environment. However, several forces are at play in affecting the overall direction and magnitude of production and trade that need to be carefully sorted out and examined. We now turn to the quantitative assessment of MFA phase out.

3. MFA Quota Removal: A Quantitative Assessment

3.1. Model and Data

In this paper we employ a modified version of an applied general equilibrium GTAP model (Hertel, 1997) and use recent estimates of MFA trade restrictiveness in analyzing MFA removal impact. The model offers many features critical to a global assessment of textile and clothing trade. First, the GTAP production system allows for differences in intermediate input intensities, while import intensities are allowed to vary across uses. Lowering the cost of imported wearing apparel to consumers is quite different from lowering the cost of intermediate imports used by

domestic firms, which in turn may be competing with consumer-oriented imports in the product market.

Second, given our emphasis on MFA implications on fiber demand and the strong negative relationship between cotton and synthetic fiber, the GTAP model is modified to relax the assumption that intermediate inputs are used in fixed proportion to output and model the fiber substitution between cotton and synthetics following Elbehri, Hertel and Martin (2003). This enables us to capture substitution possibilities between fibers at play under MFA. Finally, we note that the GTAP model also employs the widely used “Armington” specification in which products are differentiated by region of production. Thus Mexican textiles are treated as distinct from (but highly substitutable with) Chinese textiles, etc. This permits us to track bilateral trade flows, which is key to accurately representing the MFA quotas. The model is solved using GEMPACK (Harrison and Pearson, 1996).

We use the GTAP database version 6.1 aggregated up to a level that highlights sectors and countries of interest for this particular study. The 85 regions in GTAP were aggregated into 21 regions separating out major textiles and clothing exporters and importers. In addition to the United States, Canada and EU-25, three MFA-importing regions, the regional aggregation also separate between the exporting countries that are MFA-quota restricted, such as China, India, Pakistan, from the unrestricted suppliers (North Africa, Oceania, Japan) and supplying countries under preferential trading arrangements (Mexico, CBI, AGOA, Asean5, Turkey) (Table 1). The sectoral aggregation distinguishes 12 aggregate sectors including cotton, wool, textiles and apparels. The remaining sectors include: crops, fruits & vegetables, livestock, processed food, primary resource industries, chemical industry, and other manufacturing. When combined with services, these sectors exhaust all economic activity.

3.2 Export Tariff Equivalent Estimates

The estimated magnitude of MFA effects on world clothing and textile markets depends not only on the parameters of the model, but also on the restrictiveness of the impact of quotas (Yang). Being able to determine which countries is quota constrained and which are not is a critical necessary first step in accurately assessing the bilateral and global implications of quota elimination. The ETE represent a rent as a percent of the price of the export product (exclusive of rent). Exporters who have licenses are able to capture rents by increasing the export prices of their products. Hence these quotas result in an implicit tax on exports of textile and apparel products from restrained countries to the MFA-maintaining importers. ETE are obviously zero for non-restrained products or countries since elimination of unfilled or non-binding quota has little effect in a country's ability to export because it could have continued to export to the quota limit in any case.

The most desirable approach to calculating export tax equivalent (ETE) is to directly collect data on quota prices in exporting countries. To date however, quota price data have been collected only for few countries, namely China, Hong Kong and India. Francois and Spinanger (2001) estimated ETEs for Hong Kong based on quota price data for 1998-1999. These estimated ETEs were the basis for ETE rates reported in the GTAP database. Kathuria and Bhardwaj (1998) report ETE data values for 1993-1998 period using collected MFA apparel quota prices for India's exports to the United States and the European Union. The USITC also report the import-weighted ETEs for U.S. imports of apparels and textiles, including quota prices for MFA apparel items from China (USITC, 2004).

In this paper, we modify the GTAP database to include our own estimates of export tax equivalents (ETE) facing exports to the United States. These estimates are derived from 2002 quota prices reported by USITC as well as 2002 product-specific quota trade and quota utilization

rates for all MFA-quota constrained countries. The ETE calculations were carried out using the following steps:

- For each MFA-constrained country, we attributed quota price at the three-digit MFA category level to each product with binding quota assuming that China quota price is the same for other regions; We use 90% quota utilization rate as the cut off for binding status following USITC approach.
- We calculated an aggregate ETE per country for textiles and clothing aggregated over all quota-binding MFA products as a group using imports as weights.
- We scaled our ETE estimate for textile and apparel by country using the ratio of binding quota imports over total imports.
- For India we used the ETE calculations for textiles and clothing from Kathuria, Martin and Bhardwaj (2001).

Using a preliminary simulation we updated the ETE values in GTAP database. We also assume that the same ETE estimates for United States hold for Canada (for the European Union we keep the GTAP ETE values). For many bilateral flows, our estimates depart significantly from those reported in GTAP version 6.1. This is particularly the case for textiles for which many of the major suppliers have low quota utilization rates, no binding quotas (India, Bangladesh) and hence zero associated ETEs. Except for China, all apparels ETEs are larger than for textiles. For many quota constrained exporters, textile imports have low utilization rates and zero ETEs. China is the exception with ETEs for textile being larger than apparels (24 versus 17%, respectively). ETE levels by fiber are also consistently higher for cotton-based apparel compared to man-made fiber. The calculated ETE by fiber show differences between cotton-apparel and synthetic apparel range from 0.6% for Macau to 20% for China (figure 4).

4. Scenarios and Results

Scenarios: Modeling the impacts of the MFA Agreement is carried out in two steps (table 2). The first step is to bring the world economy to 2005--the year where the Quota-free world trade is taking place among WTO member countries. This required a projections simulation from 2001 to 2005. These projections are based on a relatively small number of exogenous shocks, including projections of regional endowments of agricultural land, physical and human capital, the state of technology, population, and labor force. These are derived from a combination of historical data and World Bank projections for the growth of population, labor force, real GDP and investment (Bach, *et al.*, 2000).

Taking the updated 2005 database as the starting point, we compare several alternative scenarios in post-MFA world (Table 2). The base scenario consists of just removing MFA quotas on textiles and apparels for all quota-constrained countries. An alternative scenario removes the MFA quotas as well as the implicit tax on cotton resulting from MFA quotas. Quota removal scenario is also compared to a case where in addition to MFA quotas removal, multi-lateral textile, apparel and cotton tariffs are also removed.

Results: The short-run impact of MFA quota removal results in an expansion of world trade by 11 percent for clothing and 1.1 percent for textile compared to the 2005 base year. As expected, the MFA removal shifts apparel sourcing to Asian MFA-restricted suppliers. The United States increase imports of apparels (34.4 percent) and textiles (2.2 percent). By comparison, the European Union, which maintain relatively lower quota constraints show smaller growth of apparel imports (1.3%) and little change in textile imports (-0.8%). The expanding global apparel trade also benefits the United States which increase its apparel exports by 8.9% compared to the base (\$US 584 m). By contrast, the European Union show the largest reduction of apparel exports (-\$US 6,900 m; -9.5%) half of this loss come from intra-EU trade and the other half from lower exports to North American markets (United States and Canada). Central and Latin American

countries- which include most preferential suppliers to North American markets show a contraction of apparel exports ranging from 5% in CBI to 52% in Mexico—as these preferential exporters cede ground to MFA-constrained exporters from Asia. Total U.S. consumption for apparel increase (6%) driven by higher flow of cheaper imports which substitute for domestic apparel.

What is the MFA removal impact on fiber input demand? Under the base scenario, the impact of MFA quota removal, inclusive of the removal of implicit tax on cotton result in higher U.S. cotton exports (+9.8% compared to the base year) in response to higher global demand, particularly in Asia. Moreover, this export boost would be larger without allowing for substitution of man-made fibers which can easily substitute for cotton in response to higher cotton-synthetic price ratios. However, lower domestic demand for U.S. cotton results in a net negative effect on cotton output which decreases by 1% compared to the base year. Under the scenario where both quotas and tariffs are removed, the U.S. cotton sector experiences a much larger export growth (20.7 percent) due to higher global demand, but also larger reductions in domestic demand leading to lower U.S. cotton output (-2.6%). Textile producers in much of Asia, including India and China, show significant increases in cotton imports, under this scenario, to meet growing demand in textile and apparel sectors.

Global welfare gains resulting from MFA quota removal are about \$US 10.2 billion. All MFA-importing economies show welfare gains. The United States shows the largest welfare gains (\$US 14.9 billion or 0.17% of change in national income) given the sizable share of its initial textile and apparel trade under MFA quotas. These gains arise from greater economic efficiency (30%) as well as positive terms of trade (70%) owing to significant reductions in import prices compared to export price changes. MFA-restricted exporters show positive allocative efficiency gains but larger losses of terms of trade arising from sharp cuts in their export prices. An exception is India and

HKT region who show larger allocative efficiency gains compared to terms of trade losses, and hence a net overall welfare gains. Under the alternative scenario where both quotas and tariffs are removed, the U.S. welfare gains are still large (\$US 10.7 billion), though smaller than in quota removal only scenario. However, under complete liberalization (MFA quota and multilateral tariff elimination), most MFA-exporters now show positive welfare owing the efficiency enhancing effect of removing their own tariffs.

5. Summary and Conclusions

This study sought to evaluate the bilateral and global impacts of removing MFA quotas as part of WTO Agreement on Textiles and Clothing. A significant contribution of this study is the development and application of new sets of export tax equivalent estimates for MFA-constrained countries using recent 2002 data on quota prices and quota trade and utilization rates at the MFA-product level. Using 2002 data is also critical for MFA analysis since China- a major player in global textiles and apparel trade, joined WTO in 2002, making 2002 textile trade data better reflecting the global trade conditions leading up to MFA removal. We also improve on the usual applied general analyses by factoring in inter-fiber substitution effects enabling a more in-depth examination of the implications on fiber demand taking into account MFA quota bias against cotton fiber.

Using this model, we explored alternative scenarios to measure the direction and extend of production and trade changes textiles and fiber markets in a post-MFA world. In particular we look at MFA quota removal as well as the combined MFA quota removal with multilateral textiles and cotton tariff elimination. Several qualifications need to be stated first. The analysis offers short run assessment and doesn't include potential longer term impacts arising from changing patterns in investments and labor and capital productivity changes that follow trade and investment

patterns. Nevertheless, there is a good argument for looking at short-run (5-year) time horizon as it corresponds roughly to the period needed for production and trade adjustments to take place.

Given these qualifications, the analysis support some general findings that significant trade in apparel shift in favor of Asian and South Asian suppliers that are subject to binding MFA-quotas.

At the same time the comparative advantage of preferential exporters (Mexico, CBI, AGOA) is eroded. The United States shows significant increases in apparel imports substituting for domestic products but raising overall consumption and producing substantial welfare gains. However, the downward impact on cotton output is dampened by expanded cotton exports due to higher world demand.

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Figure 1. Apparel imports to United States by source

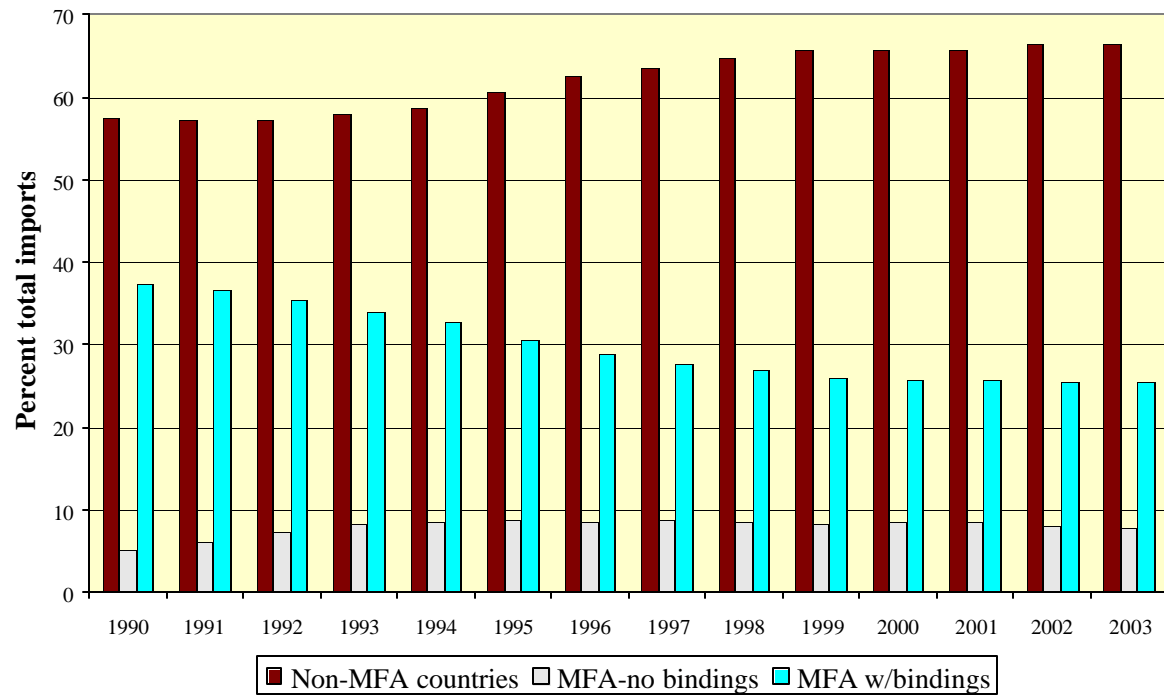


Figure 2. Change in share of imports to the United States by source (Phase 4 Integration products only)

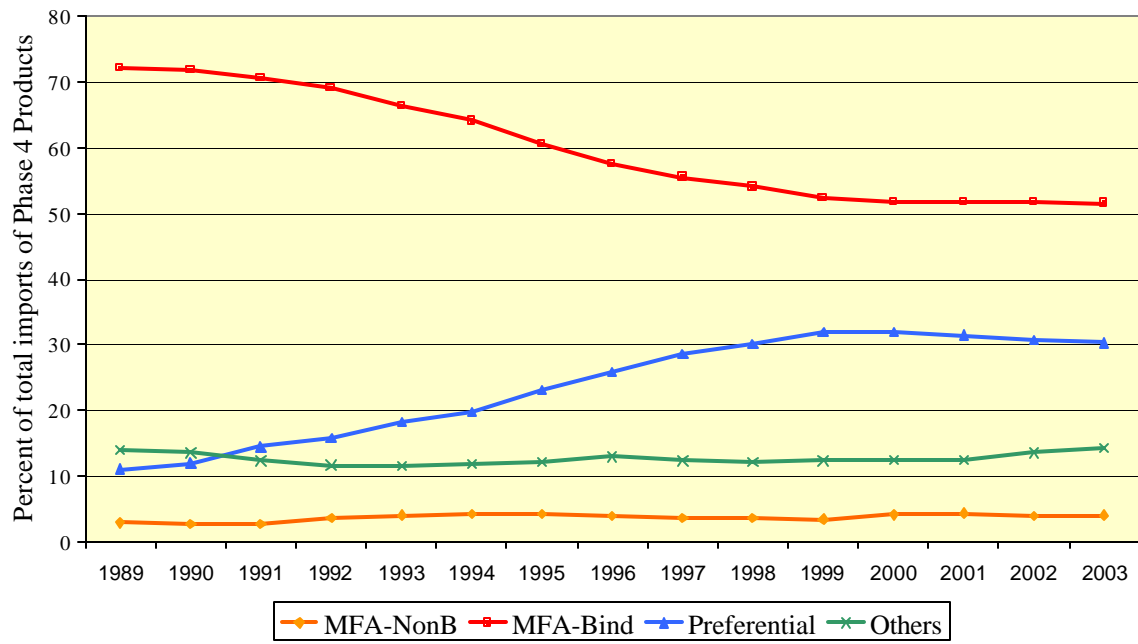


Figure 3. Growth of binding and non-binding quota exports to the US (1999-2003; percent total MFA products exports)

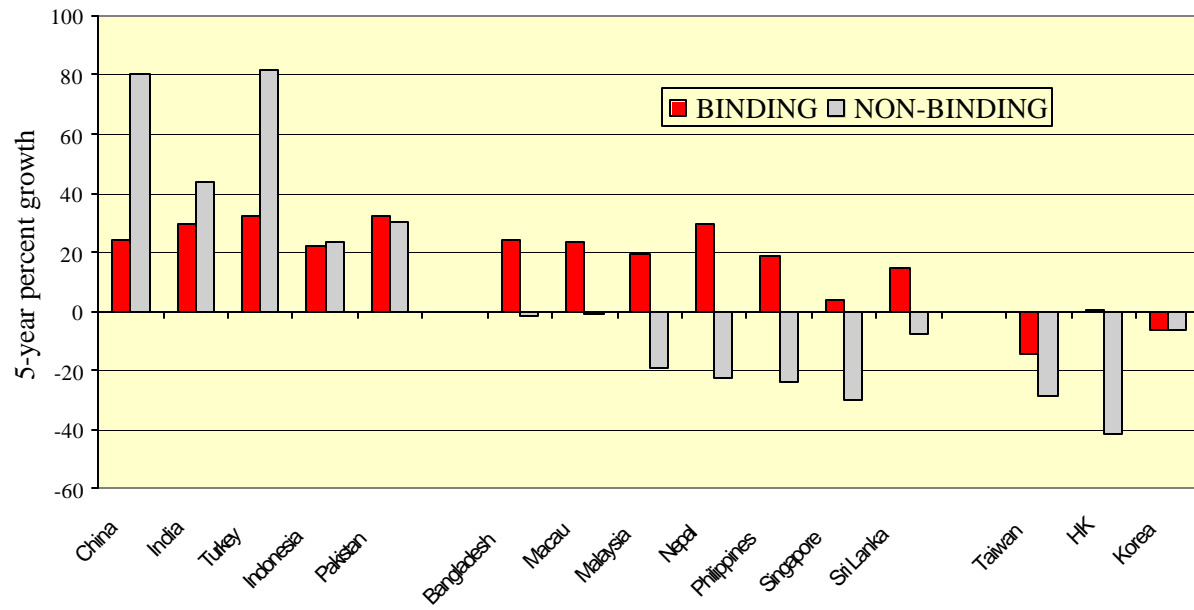


Figure 4. Trade-weighted ETE for MFA exports to United States,
by fiber and source (2002)

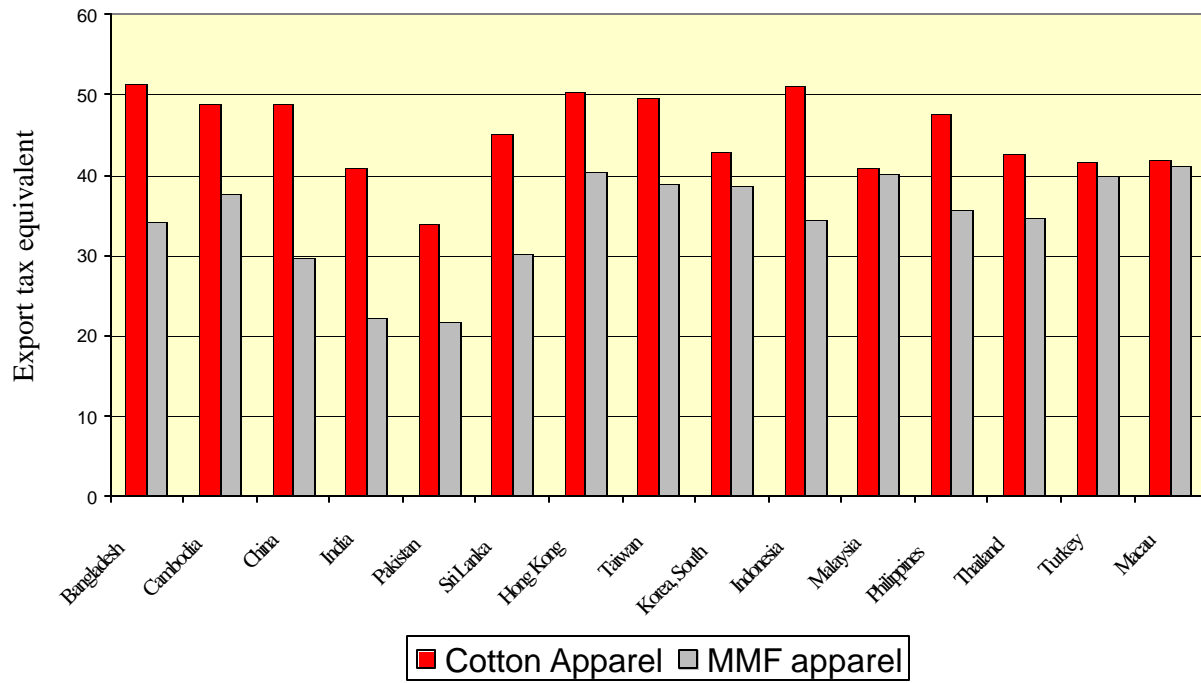


Table 1. Model Aggregation

<i>Sectoral Aggregation</i>	<i>Regional Aggregation</i>
Crops	USA
Cotton	Mexico
Wool	Canada
Fruits & Vegetables	CBI
Livestock & products	Andean
Primary Resources	Mercosur
Processed Food	Rest of Americas
Textiles	Japan
Apparels	China
Chemical Products	HK-Korea-Taiwan
Manufacturing	Asean5
Services	India
	Bengladesh
	Sri Lanka
	RestSoAsia (Pakistan/Nepal)
	EU25
	Turkey
	North Africa
	AGOA
	Oceania
	ROW

Table 2: Model scenarios

Experiment:	Modeled policies and structural changes	Data
Projections Simulation	Growth projections 2001-2005	GTAP database 2001
Base Scenario [MFA_Q]	Elimination of export tax equivalent on all bilateral trade flows for textiles and clothing	Post-2005 database
Quota plus cotton tax [MFA_QC]	Elimination of export tax equivalent on all bilateral trade flows for textiles and clothing Elimination of implicit tax on cotton use for all restricted MFA-exporters	Post-2005 database
Quota plus tariffs [MFA_QT]	Elimination of export tax equivalent on all bilateral trade flows for textiles and clothing Elimination of implicit tax on cotton use for all restricted MFA-exporters Elimination of all tariffs on textiles, apparels, and cotton	Post-E3 2005 database