# China's Role in World Cotton and Textile Markets

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**Abstract**

The growth of China's textile industry has been one of the dominant factors shaping world cotton and textile markets in recent years. Since China's accession to the World Trade Organization (WTO) in December 2001, China's textile and apparel (T&A) exports have grown by more than 40 percent and China's cotton consumption has grown by 34 percent. By the end of 2003, China had nearly doubled its share of world T&A exports in less than a decade, to about 21 percent. T&A exports from China and other developing countries are constrained by quotas originally implemented by developed countries under the Multifibre Arrangement (MFA). Under the Uruguay Round's Agreement on Textiles and Clothing (ATC), these quotas have been gradually phased-out since 1995, with complete removal scheduled for the end of 2004. This study incorporates alternatives of the impact of the ATC's implementation in an analysis of China's textile industry, and its impact in turn on China's cotton sector. The study finds that, assuming equilibrium levels of income and exchange rates, alternative ATC scenarios are expected to increase China's net apparel exports, textile production, cotton consumption, cotton production, and cotton imports. This study also finds that these results are somewhat sensitive to estimates of expected efficiency gains around the world.

## Introduction

There are many influences on world textile and apparel (T&A) trade. Consumption of clothing is more income and price responsive than food, for example. International cross-sectional analysis has shown clothing expenditure has an income elasticity of about 0.9 while food has an income elasticity of 0.1 to 0.3 in high-income countries (Seale, et al, 2003). Similar results were found for price elasticity. Time series analysis of U.S. textile trade suggests an even higher responsiveness for imports of cotton products. Sanford (1989) found the volume of U.S. cotton textile imports had an elasticity of 3.1 with respect to real exchange rates and 3.3 with respect to an index of leading economic indicators.

In recent years, world economic growth, fiber prices, and exchange rates have all fluctuated significantly. T&A imports by the United States, which is by far the world's largest importer, have grown significantly in recent years reflecting, among other things, China's accession to the WTO, initial phases of ATC liberalization, and a period of unusually strong U.S. exchange rates. However, during marketing year 2003/04, the volume of U.S. cotton textile net imports is estimated to be unchanged from the year before (MacDonald, 2004). Net textile imports rose every year between 1995/96 and 2002/03, even rising at a 5 percent annual rate as total U.S. domestic consumption of cotton textile products fell in 2000/01 and 2001/02. In 2002/03 growth in cotton textile imports shot up to an 18 percent annual rate, before falling to 0 percent growth more recently. These changes are illustrative of the market forces affecting the T&A sectors in every country.

Trade policy is an other factor. Global textile and apparel (T&A) trade has been affected by quotas and other impediments for decades, with the MFA affecting about 40 percent of world apparel trade (Cline, 1990). While the United States and the European Union (EU) are expected to remove their MFA quotas, developing countries are also obliged under the ATC to remove T&A import barriers incompatible with the General Agreement on Tariffs and Trade (GATT). Many developing countries maintain non-trival trade barriers for T&A and some countries have already had to change their policies in order to comply with WTO dispute panel rulings. Thus, while developing countries will benefit from the opportunity to increase their exports to developed countries like the United States and the EU, their textile industries could also face import competition in their home markets under the ATC's provisions.

Furthermore, some developing countries have T&A industries that are indirectly protected by MFA quotas. When quotas restrict export opportunities, textile producers in exporting countries have transferred resources to countries whose smaller textile industries have not yet come under quota restriction. Thus, the quotas have sometimes diverted investment in textile capacity away from successful exporting countries and into other countries that otherwise would be producing and exporting substantially less. Typically, quotas are eventually imposed on these countries, although some have preferential trade agreements with the United States or the European Union (EU), but in either case, a garment assembling industry has been established there that is indirectly protected by the MFA. China is not one of those countries—China's exports have been relatively constrained under the MFA. There has been substantial investment in China by other countries, but not in order to take advantage of preferential treatment for China's exports (joint-venture enterprises are much more common in apparel than textiles as foreign buyers must

exercise greater oversight over these final goods). A number of other countries are concerned that China's T&A sector might overwhelm the textile industries of other developing countries as well as those in the developed world once textile trade is liberalized.

World cotton trade is relatively unencumbered by tariffs and other trade barriers. However, as an input into textile production, cotton trade could be substantially altered by the indirect effects of changes in world T&A trade policies. Just as China is the world's largest producer and exporter of textiles, it is frequently the largest importer of cotton. If anything, China's tendency to relinquish and later regain the role as top import market for cotton only heightens the importance of China to world cotton prices. China's presence as a major importer tends to coincide with price peaks, such as during the mid-1990's, and its absence tends to correspond to periods of price depression, such as in 1999-2001.

This paper analyzes China's textile industry and its impact on China's cotton industry by examining alternative scenarios of the end of the MFA quotas and other trade restrictions per the provisions of the ATC. The models used in this analysis are not capable of capturing the large short-term fluctuations in the macro-economy and economic policy and the results should not be considered forecasts. A dynamic computable general equilibrium (CGE) model was used to analyze how the global restructuring of T&A production and consumption would be expected to change production by China's textile industry. An econometric partial equilibrium model of China's agricultural sector was then used to examine the impacts of changing demand by the textile industry on China's cotton consumption, regional cotton production, and cotton trade.

**Methodology**

This study examines how China's textile industry might change under alternative scenarios of the impact of ATC elimination. The CGE model used incorporates global T&A trade. Historical trends suggest that world T&A trade can be expected to grow, and hence change in the world market structure may continue regardless of trade policy changes. Similarly, world T&A trade fluctuates in response to shorter-term macroeconomic factors, like periods of unusually strong or weak income growth.

The method used in our study does not allow us to make forecasts. In the shorter term, the effect of macroeconomic fluctuations may induce changes in production and trade over time that look very different from the impacts estimated in this study's scenarios. In longer run, we cannot predict future trends or the pace of future structural change. The method used here is sometimes called a 'counter-factual' or scenario analysis. We ask questions such as: given the trend in the growth and the change in the market structure, how will the implementation of the ATC add additional growth to world trade or cause further changes in world market structure? We use this counter-factual approach with both the CGE and the partial equilibrium models.

The intertemporal CGE model used in this study is documented in Diao and Somwaru 2000, 2001. The econometric model of China's agriculture used in this study is documented in Fang and Babcock 2003, and recently has been redeveloped by the Department of Agricultural and Applied Economics, Texas Tech University (Pan, Mohanty and Ethridge, 2003). The study brings together these two models, relying on the CGE model's global economy-wide coverage to capture the changes in the world economy that guide the development of China's textile industry

in the post-ATC world, and relying on the econometric model to analyze the response of China's agricultural sector to the growth in its textile industry.

The data for the intertemporal CGE model used in this study are from the *GTAP database* version 6, pre-release 1 (GTAP, 2003), including data about trade flows around the world and production and consumption in each country/region in 2001. The original data set includes 85 countries/regions and 57 aggregate sectors. For this study, we aggregate the data into 14 countries/regions (see below) and 7 sectors, including cotton, other crops, livestock, processed food, textiles, apparel, and an aggregated manufacturing and services sector.

In the study, we first group exporting countries by whether or not trade is restrained under the MFA. Specifically, the countries/regions whose exports are restrained by the MFA include: (1) China, (2) India, (3) much of Southeast Asia (Indonesia, Thailand, and Malaysia), (4) the Middle East, (5) the region of former Soviet Union countries, (6) the region of the Latin American countries (excluding Mexico and the Caribbean countries), and (7) the region of the other South and Southeast Asian countries. On the other hand, the following regions are treated as free from restraint, due to preferential trade agreements: (8) the region of North African and East European countries, (9) the region of other African countries (representing the developing countries free from restraint in the EU market), and (10) the region of Mexico and Caribbean countries, (representing 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: (11) North America (U.S. and Canada), (12) the EU,

and two non-restraining regions: (13) Australia and New Zealand, and (14) Japan, Taiwan, Hong Kong, and Korea. As Taiwan, Hong Kong and Korea currently have unused quotas in their apparel exports, we treat them as developed countries in the model.

The implementation of the ATC can be expected to affect T&A trade directly. Other factors also affect T&A trade, and the actual implementation of the ATC will be in the context of changes in other factors that affect markets. Changes 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 scenarios of the ATC implementation on the world economy. The intertemporal specification of the model captures the benefits not only due to resource re-allocation but also the dynamic behavior of investment/production, consumption/saving, and international capital flows.

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

This study abstracts from the question of whether importing or exporting countries capture the rents from MFA quotas. Since quotas are not auctioned by importing governments, the rents created by quantitative restrictions on imports are presumably available for exporting countries

to appropriate. However, recent research has demonstrated that in many cases importing firms are able to exercise market power and capture at least some of these rents (Krishna and Tan, 1998). In some studies estimating the impact of MFA liberalization, loss of rents is a negative component of the welfare changes expected for some developing country exporters. This study assumes these rents are dissipated by rent-seeking behavior and inefficiency (Krueger, 1974). In effect, the MFA restraints cause difficulty for some developing countries in exporting their textile and apparel products to the restraining countries (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) – (7)], and hence exports grow. One important significance of this approach is that this study does not assume that the restrained exporters lose quota rents once the MFA quotas are removed.

Using the CGE model we simulate the possible effect of MFA phase-out by improving the efficiency of textile and apparel exports from the countries/regions restrained by MFA (countries/regions included in (1) – (6)). Based on an extension of Frankel and Romer's (1999) work, we analyze the relationship between T&A trade and national income of 91 countries over 37 years. Based on this econometric analysis, we exogenously increase the growth of T&A trade in the simulation. Technically, we exogenously increase the efficiency coefficient in the export functions for these regions by 0.3 percent annually (on average, with variation across countries): assuming that the MFA phase-out will increase certain developing exporting countries' ability to export, we calculated for each developing exporting country the share of their T&A production to GDP. We assume that this ratio represents for each country the efficiency in their exporting ability (a crude approach equivalent to a productive index). Two alternative scenarios were also

run where these efficiency gains were varied by 4 to 5 percent first upwards and then downwards to test the role this analysis has on the results.

Moreover, we assume other trade barriers (represented by tariff equivalent rates) on textile and apparel imports are reduced in *all* countries (including developing countries restrained by MFA), and the reduced tariff equivalent rates are close to each country's average tariff rate for other manufacturing imports. Integrating trade barrier reductions in the developing countries into the simulation means the simulation includes the reciprocal trade reform the ATC introduced with the MFA phase-out.

The next step in this analysis is to utilize the CGE model's estimated change in China's textile output in a simulation with the econometric model. This requires an assumption about the relationship between textile output and fiber use. Growing textile production requires a greater amount of inputs, including fiber, and it is assumed that changes in textile production can be translated on a one-to-one basis into changes in demand for fiber in China. While data to test this hypothesis are not readily available, the intuition is clear. Furthermore, while the increases in China's textile production simulated by the CGE model are changes in value, and partially reflect higher textile prices, the fiber content per dollar of exports could increase with the end of the MFA. One widely predicted and documented impact of quantitative restrictions on apparel trade is quality upgrading, so presumably free trade could result in a shift to products with more fiber per dollar as exports shift towards lower quality products on average (Krishna and Tan, 1998). The assumption used here is that the shift in quality is exactly the same and opposite to

liberalization-induced increase in price, so that the change in volume of fiber used is the same as the change in the value of output.

In the econometric model, China's cotton is modeled as a sector in a global comprehensive supply and demand framework, which includes China, the United States, the EU, Africa, and 20 other countries and regions. The historic and predicted macro variables (real GDP, exchange rate, population, and GDP deflator) are from the Food and Agricultural Policy Institute (FAPRI). Cotton production, consumption, ending stock, import, and export data are from USDA's Production, Supply & Distribution (PSD) database. The fiber mill consumption and manmade fiber data are from FAO World Fiber Consumption Survey (before 1994), Fiber Organon (after 1994), and some personal contacts with different countries. Major components of the cotton model include a supply sector, a demand sector, price linkage equations, manmade fiber production, and a textile output equation.

Area sown to cotton is modeled in a two-stage framework. The first stage determines gross cropping area. The second stage uses economic variables (expected net returns) to determine cropping patterns (area allocation) for cotton and major substitute crops. China's cotton production occurs in three regions: 1) the Yellow River or North China Plain, including Henan and Shandong; 2) the Yangtze River region, including Jiangsu and Anhui; and 3) the Northwest, primarily accounted for by Xinjiang. The partial equilibrium model allows each of these regions to be simulated separately, with separate cropping pattern and yield equations. Perfect price transmission is assumed between national and regional level prices. Major competing crops are

as follows: rice in Yangtze River region; soybeans and corn in the Yellow River region; and corn in the Northwest.

Cotton domestic consumption is also modeled in two stages: total domestic fiber consumption and cotton's share of the fiber consumption. After two decades of rapid development, China has emerged as the world's largest producer of chemical fiber. Since 1997, consumption of chemical fiber has grown rapidly and has overtaken that of cotton. The share of cotton in total yarn production has declined from 86 percent in 1982 to about 60 percent in recent years (Figure 4). In this model, the weighted fiber price (cotton, wool and polyester) and GDP per capita determine the total fiber consumption, and the price ratio of cotton and other fibers is used to determine the share of cotton and share of manmade fiber. Prices for both polyester (as a representative for manmade fibers) and the world cotton price (A-index) are endogenous and determined by world net trade. The domestic cotton price is also determined by the domestic production, consumption, net trade, and ending stocks.

In this study, changes in total domestic fiber consumption are imposed exogenously on the econometric model, per the results of the CGE analysis, and the remaining variables in the model are allowed to freely adjust, completing the counter-factual scenario. While the CGE model assumes forward looking economic agents optimized over a long time span (50 year time horizon), this study generally only examines likely impacts on China and the world over the decade following 2004. This shorter time horizon is long enough to permit significant adjustments and investment in response to the policy changes, but short enough to ensure that other unexpected developments don't invalidate the results.

**Results**

World T&A trade increases in the CGE model due to the implementation of the ATC (Figure 1). Compared with the base, world T&A trade increases by 4 – 14 percent annually, using the midpoint of our efficiency increase estimates. That is, if world T&A trade were expected to grow 8 percent annually in the next 25 years after 2004, then due to the ATC, the new annual growth rate in the model is about 8.5 percent on average. The gains in world T&A trade are about $20 billion in the early periods after liberalization and could increase to $200 billion in the longer run. Varying the exporters' efficiency gains by 4 to 5 percent had little impact within the 10-year horizon. However, by 25 years the growth of world trade could be seen to vary by 2 percentage points between a high and low efficiency gain scenario (Figure 1a).

Consistent with the generally observed pattern of tariff escalation with degree of processing, apparel imports have been more constrained worldwide than textile imports. Furthermore, since the MFA quotas were largely in response to growing imports from developing countries, the quotas were typically more restrictive for the labor-intensive apparel products than the more capital-intensive textiles. Thus with the implementation of the ATC, world apparel trade is 9 percent higher than in the baseline, while textile trade is only 7 percent higher by 2014.

It is no surprise that the increase in world trade is mainly due to more apparel exports from developing countries, as their exports become more efficient in the model, and the base scenario's trade restraints were greatest for these trade flows. However, the model results also show that exports of T&A by the industrial countries rise. 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 protective 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 hampers the efficiency of world T&A trade. 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 world trade.

Developed countries increase their apparel exports, especially initially. But, by 2014, these gains have been eroded as investment in developing apparel industries outpaces that in developed countries. Developed countries initially increase their exports in response to freer trade and improved incomes, but in the long run developing countries continue to replace them on the world market.

China's apparel exports increase at about the average rate for a developing Asian country (Table 1). They increase slightly more than India's, but slightly less than those of the rest of developing Asia. All the developing countries that did not have preferential trading relations with the United States and the EU see similar increases in apparel exports. India's gains are slightly lower than China's, with an initial increase in exports of 5 percent and a 14-percent increase by 2014. Latin America had a 4-percent initial increase and a 12-percent increase by 2014. Developing Other Asia's exports grew the most, 9 percent initially and 20 percent by 2014. Southeast Asia (Indonesia, Thailand, and Malaysia) has a similar increase. China's imports of apparel also increase, but do so from a negligible base (Figure 2).

Varying the efficiency growth expected to stem from MFA liberalization results in some variation of these results: Southeast Asia's and the Middle East's exports vary slightly from the above results in both the low and high efficiency gain scenarios. In each case, in 2014 exports grow one percentage point more in the high scenario and one percentage point less in the low scenario. Interestingly, Japan, Korea, and Taiwan's exports grow slightly slower (2 percent rather than 3 percent) in the high efficiency gain scenario. Most regions are the same in all three scenarios. China is one percentage point lower in the low scenario but the high scenario is the same as the mid-point estimate.

Exports of textiles show a pattern similar to exports of apparel (Table 2): Southeast Asia growing the most, while Mexico and the Caribbean Basin fall the most. China's increase is again about average for a developing Asian country. Among the developed countries, only the Asian developed countries have textile export gains that are substantially better than their apparel export gains. Korea and Taiwan in particular are more able to exploit their proximity and investment ties to developing Asia to play the role of supplier of the relatively more capital-intensive textiles as an input for growing textile exporters. However, Southeast Asia plays a similar role, but also shows strong gains in apparel exports.

China's textile exports increase 5 percent initially and 12 percent by 2014. Textile imports increase more than exports initially, up 8 percent. By 2014 however, imports are only 9 percent higher than the baseline as China meets more of its expanded needs by increasing textile production. Note that during the 1990's the value of China's textile imports was somewhat close to the value of its exports, although exports have grown faster in the last 2 years (Figure 3).

China is both a source of yarn and fabric for other countries to convert into apparel and a substantial importer of textiles for reprocessing into exported apparel. The reprocessing trade accounts for a substantial portion of all of China's imports, not just textiles.

Varying the efficiency growth results in some variation of these results, although less than in the case of apparel. The results for China are the same in all three scenarios. As with apparel, Southeast Asia varies the most, with textile exports 1 percent lower in the low scenario and 1 percent higher in the high scenario.

China's textile production rises with trade liberalization (Table 3). China's textile imports rise nearly twice as fast as exports initially with the implementation of the ATC, suggesting that in balance, textile trade might not increase. However, the increase in apparel exports guarantees a need for increased textile production in China. Apparel exports are approximately double those of textiles, while apparel imports are negligible. With the increased demand for inputs into apparel production for both export and domestic demand, China's textile industry increases its output by 1 percent initially and by 3 percent by 2014. Varying the global efficiency growth changes the growth in China's apparel production by 1 percentage point. However, the impact on textile production is smaller: while textile production growth is one percent point smaller in the low efficiency gain scenario, it is unchanged in the high efficiency scenario.

However, growing demand for fiber is not likely to translate into a one-to-one change in demand for cotton. Globally, cotton's share of fiber use has been declining for decades. This has also been true of cotton's share of fiber used in yarn production in China (Figure 4). China has

become the world's largest producer of polyester in recent years, with chemical fiber production exceeding year-earlier levels by as much as 30 percent. China's yarn output has also grown substantially in recent years, and while the rate of increase in yarn output has been dismaying to textile producers in other countries, it has generally not kept pace with gains in production of chemical fibers.

The opportunities provided by the implementation of the ATC are expected to induce increased production of both chemical fibers and cotton in China, but, as in the past, investment in chemical fibers capacity is expected to be more robust than the ability of China's finite supplies of arable land to switch into cotton production. While total fiber demand increases from the baseline by 1 percent initially and 3 percent by 2014, the econometric model of China's agricultural sector indicates that cotton consumption goes up only 1 percent initially and by 2 percent by 2014.

In the simulation, China is able to increase polyester production with a smaller increase in price than cotton, up only 3 percent in 2014. Cotton prices in China, on the other hand, rise 2 percent initially, and are 6 percent above the baseline by 2014. As a result, cotton loses a few more percentage points from its share of fiber usage in China's yarn production. Higher prices are in part driven by the need to draw land away from other crops. Production of competing crops falls negligibly (Table 4). Competing crop prices rise by negligible amounts. China can draw upon financial resources from anywhere within China or from other countries to increase its chemical fiber capacity, but the amount of land suitable for growing cotton within China is much more limited.

China's cotton production is 2 percent higher than the baseline by 2014. The Northwest increases the most, since cotton is the region's primary crop. During the latter half of the 1990's, the Northwest was the only region in China where cotton output was expanding. After 1998, the introduction of Bt cotton led to a rebound in cotton planting in the Eastern Chinese regions. Adoption should have run its course within a few years, and the relationship between Western and Eastern China's cotton production growth should have stabilized by the time the policy changes in this scenario have an impact. Virtually no soybeans are produced in the Northwest, so all the impact on soybeans in this scenario occurs in the Yellow and Yangtze River regions.

China consumes more cotton than it produces, and the implementation of the ATC results in a 2 percent increase in both consumption and production. As a result, China increases its cotton imports, but imports only increase 1 percent (Table 5). While China is likely to be the world's largest importer during much of these years, a 1-percent increase would have a negligible impact on world trade. Likewise, the impact on world prices is negligible in this scenario. China's exports are reduced, but China's cotton exports are so small in any case that this has little bearing.

With WTO accession, China instituted a tariff-rate quota (TRQ) system for cotton. Previously, cotton imports had been in effect subject to licensing, with the government choosing whether to distribute or withhold permission to import depending on its assessment of the needs of the cotton and textile sectors. Since 2002, China has been obliged by its WTO accession agreement to permit at least 819,000 tons of imports at a 1 percent tariff rate. By 2004, this TRQ had grown

to 894,000 tons, where it will remain. China is permitted to charge an above-quota tariff ranging from 76 to 40 percent, depending on the year. However, late in 2003, China announced a 500,000-ton increase in its 2003 quota, and extended shipping dates for cotton purchased under 2003 quota until June 30, 2004. In 2004, China opened still more quota. Prior to WTO accession, China's government licensed imports equivalent to an even larger share of domestic production than the current TRQ levels imply. As events during 2003 and 2004 indicate, the negotiated TRQ level is not a barrier to an increase in cotton imports driven by freer textile trade. This is particularly true with respect to the results of this analysis since the increases suggested by the model are a fraction of the quota increases added by China's government in the last year.

This study found an impact on China's textile industry due to the implementation of the ATC similar to the impact found by previous studies. Most other CGE studies show China's apparel exports expanding by at least 20 percent with textile trade reform. However, even studies that suggest larger gains for China's apparel exports than this study have increases in textile output similar to this study's, even when the trade changes are expected to be much larger. Also, while the results emphasized in this study are lower than 20 percent, the dynamic results beyond the 10-year horizon are greater. Expected gains to apparel trade reach 20 percent after 14 years and 33 percent after 25 years. This study focuses on the medium-run results in order to integrate the two modeling frameworks. Note also that textile output is still only 9 percent higher after 25 years.

This study also indicates a smaller increase in China's cotton imports than found by Fang and Babcock. Most of this difference is due to the smaller expected increase in China's cotton

consumption. Fang and Babcock derived a 20-percent increase in yarn production expected for China under the post-2004 provisions of the ATC from a review of previous studies. As noted above, most other CGE studies show apparel exports expanding by at least 20 percent with T&A trade reform. However, there is not a one-to-one correspondence between export changes in apparel and production changes in textiles. Hertel et al (1996), Trela (1998), and Francois and Spinanger (2000) all show textile production changes for China below 10 percent with global textile trade reform. If Fang and Babcock had started from the much lower change in textile output found by this study's CGE analysis, their expected changes in China's cotton imports would be much more similar to those found here.

The results of this study are slightly different from a previous effort using the same framework and an earlier version of the Global Trade Analysis Project's data. MacDonald, et al (2003) conducted an identical analysis using GTAP database version 5. That study found slightly larger apparel export and textile production responses (22 percent and 6 percent, respectively). The biggest difference between the versions of the database is in the import protection data, which is lower in the more recent database. This has the effect of reducing the impact of liberalization.

Finally, while China's sectoral export and output response to T&A liberalization is about average for a developing Asian country, China does show by far the largest welfare gain (Figure 5). China's favorable terms of trade and the size of its border protection contributes the most its welfare.

**Conclusions:**

As noted in the introduction, in addition to trade policy, there are many other influences on world T&A trade. In recent years, world economic growth, fiber prices, and exchange rates have all fluctuated significantly. T&A imports by the United States, which is by far the world's largest importer, have grown significantly in recent years reflecting, among other things, China's accession to the WTO, initial phases of ATC liberalization, and a period of unusually strong U.S. exchange rates. During 1997-2002 the U.S. textile industry underwent an extraordinary contraction. One plausible scenario is that during this period of rising U.S. exchange rates, the adjustments likely to result from future changes in global trade rules were in effect moved forward. While exchange rates would have been expected to eventually fall from their highs, a U.S. domestic textile producer would not necessarily expect that future decline to result in higher future profits. As the U.S. dollar began falling in 2003, the need to adjust to future changes in quota and current exchange rates began to offset each other, helping stabilize U.S. textile trade. The future path of U.S. exchange rates is uncertain, and the models used in this study implicitly assume largely, constant, equilibrium exchange rate levels. Given that the United States has just passed through a period of above-average exchange rate strength, the actual dynamics of how trade, production, and consumption will adjust in future years to a lower level of exchange rate strength is beyond the reach of this study.

Assuming equilibrium levels of economic growth and exchange rates throughout the forecast period, the removal of the MFA quotas and trade restrictions imposed by developing countries would be expected to increase China's apparel production 6 percent by 2014. Textile production there would be 3 percent higher by 2014 under these global trade reforms, and as cotton production rises less than the cotton consumption increase necessitated by increased textile

production, cotton imports would rise 1 percent. These estimates could also be higher or lower depending on how developing country export efficiency responds to the opportunities presented by the end of the MFA quotas.

These estimated changes in China's textile and cotton production and consumption are in effect driven by a 16-percent increase in apparel exports. This is consistent with previous estimates, although a little lower. Francois and Spinanger (2001) estimated a 33-percent increase. Other studies have averaged around 25 percent (Fang and Babcock, 2003). While a 20-30 percent increase in exports by the world's largest exporter means some other exporters can be expected to see their shares of world trade decline, this result is far from the most pessimistic scenarios feared by some. Furthermore, the implication of this study's more detailed look at China's textile industry is that even if the effect on apparel exports is substantially larger than 16 percent, the impact on textile production is still unlikely to exceed 10 percent by a significant margin. China's textile industry does not take over the world due to the implementation of the ATC, and cotton trade is only slightly affected as well.

As the above discussion of the United States suggests, it is important to examine the results of this study in the context of recent changes in China's textile production and exports. In the last few years, China has increased its share of world textile exports, apparel exports, yarn production, and cloth production substantially. China's accession to the WTO had the effect of relaxing restraints on China's exports as it received ATC concessions previously withheld due to its lack of WTO membership. However, not all of the increase in exports was to countries imposing MFA quotas or to their preferential trading partners. Nor was all the increased textile

output exported. China's extraordinary performance in this pre-liberalization period lends itself to two interpretations relevant to the post-2004 outlook. On the one hand, China appears to have grown considerably in response to liberalization available through 2002, but, on the other hand, China is thriving despite the maintenance of a significant proportion of the initial levels of MFA protection.

China's extraordinary growth over the last few years has not been confined to the textile sector. There is widespread concern that some of the growth there has been unsustainable, and that bank lending is not subject to the market discipline received in most developed countries. China's textile sector has a large state component which may suggest preferential access to investment funds from state-owned banks. While recent data suggests that private firms have come to account for the majority of yarn output (Zhulen, 2003), it is unclear to what extent these private firms utilize state-owned partners to secure investment. CGE models capture long-run changes and the results of this study are not necessarily contradicted by shorter-term economic fluctuations, and they do not predictions of changes that can be expected from current levels of activity.

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**Table 1. Apparel: changes in exports due to ATC under alternative growth scenarios**

| | Average growth | | High growth | | Low growth | |
|---|---|---|---|---|---|---|
| | 2005 | 2014 | 2005 | 2014 | 2005 | 2014 |
| China | 7 | 16 | -- | -- | -- | 15 |
| India | 5 | 14 | -- | -- | -- | 13 |
| Indonesia, Thailand, & Malaysia | 10 | 19 | -- | 20 | 9 | 18 |
| Other Asia | 9 | 20 | -- | -- | -- | 19 |
| Middle East | 4 | 13 | -- | 14 | -- | 12 |
| Other Latin America | 4 | 12 | -- | -- | 3 | 10 |
| Mexico & Caribbean | -3 | -7 | -- | -- | -- | -6 |
| EU Partners | -1 | -4 | -- | -- | -- | -- |
| USA | 2 | 1 | -- | -- | -- | -- |
| EU Partners | 3 | 1 | -- | -- | -- | -- |
| Japan, Korea, & Taiwan | 5 | 3 | -- | 2 | -- | -- |

-- no change from the initial (average) growth scenario

**Table 2. Textiles: changes in exports due to ATC under alternative growth scenarios**

| | Average growth | | High growth | | Low growth | |
|---|---|---|---|---|---|---|
| | 2005 | 2014 | 2005 | 2014 | 2005 | 2014 |
| China | 5 | 12 | -- | -- | -- | -- |
| India | 4 | 11 | -- | -- | -- | 10 |
| Indonesia, Thailand, & Malaysia | 7 | 15 | -- | 16 | -- | 14 |
| Other Asia | 5 | 12 | -- | 13 | -- | -- |
| Middle East | 3 | 10 | -- | 11 | -- | -- |
| Other Latin America | 4 | 11 | -- | -- | -- | 10 |
| Mexico & Caribbean | -1 | -2 | -- | -- | -- | -- |
| EU Partners | 0 | -1 | -- | -- | -- | -- |
| USA | 1 | 1 | -- | 0 | -- | -- |
| EU Partners | 3 | 2 | -- | -- | -- | -- |
| Japan, Korea, & Taiwan | 6 | 6 | -- | -- | -- | -- |

-- no change from the initial (average) growth scenario

**Table 3. China: changes in textiles and cotton due to ATC under alternative growth scenarios**

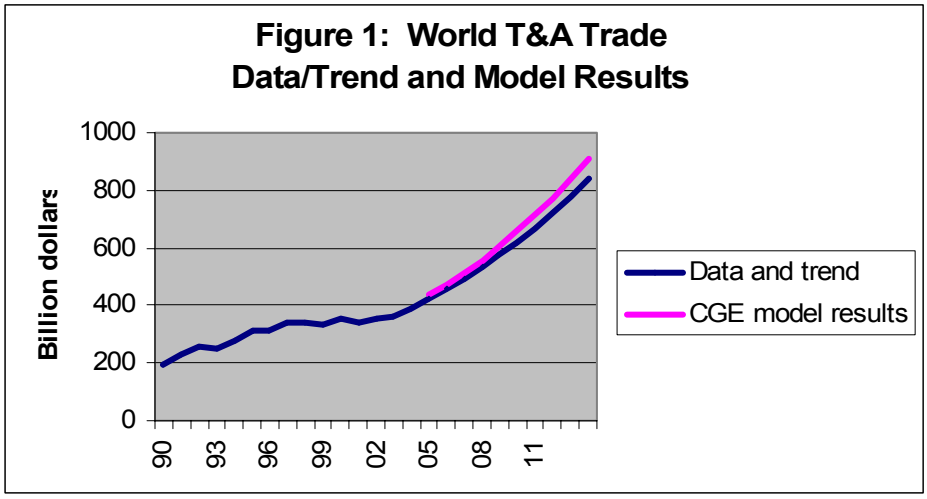
| | Average growth | | High growth | | Low growth | |
|---|---|---|---|---|---|---|
| | 2005 | 2014 | 2005 | 2014 | 2005 | 2014 |
| Apparel exports | 7 | 16 | -- | -- | -- | 15 |
| Apparel imports | 10 | 11 | -- | 10 | 9 | -- |
| Textile exports | 5 | 12 | -- | -- | -- | -- |
| Textile imports | 8 | 9 | -- | -- | -- | -- |
| Apparel production | 4 | 6 | -- | 7 | -- | 5 |
| Textile production | 1 | 3 | -- | -- | -- | 2 |
| Fiber consumption | 1 | 3 | -- | -- | -- | 2 |
| Cotton consumption | 1 | 2 | na | na | na | na |
| Cotton production | 0 | 2 | na | na | na | na |
| Cotton price | 2 | 6 | na | na | na | na |
| Chemical fiber price | 1 | 3 | na | na | na | na |

-- no change from the initial (average) growth scenario

**Table 4**

## China: changes in agriculture due to ATC

| | 2005 | 2014 |
|---|---|---|
| | Percent | |
| **Cotton production** | 0 | 2 |
| **Yellow River** | 0 | 2 |
| **Yangtze River** | 0 | 2 |
| **Northwest** | 0 | 2 |
| **Corn production** | 0 | 0 |
| **Rice production** | 0 | 0 |
| **Soybean production** | 0 | 0 |
| **Cotton price** | 2 | 6 |
| **Corn price** | 0 | 0 |
| **Rice price** | 0 | 0 |
| **Soybean price** | 0 | 0 |



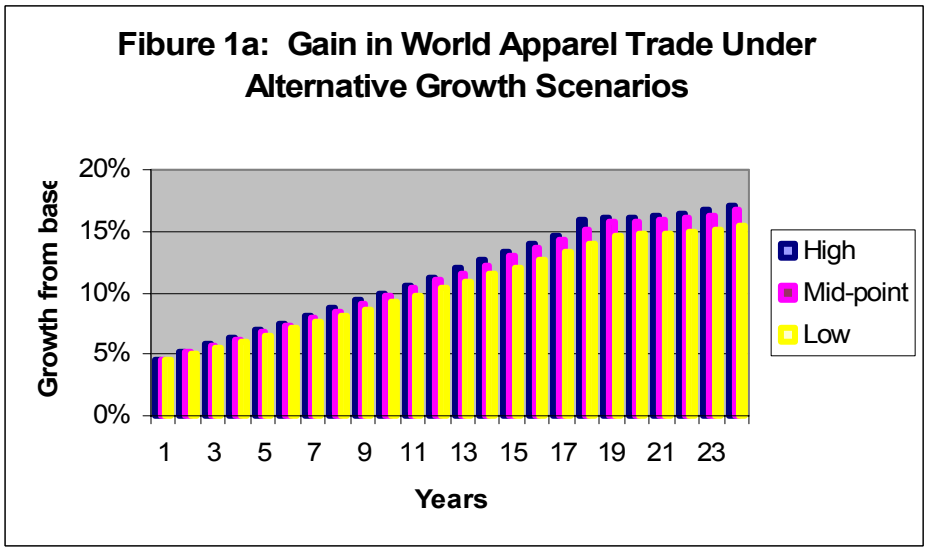




**Table 5**

## China: changes in cotton due to ATC

| | 2005 | 2014 |
|---|---|---|
| | Percent | |
| **Cotton production** | 0 | 2 |
| **Cotton consumption** | 1 | 2 |
| | | |
| **Cotton exports** | -2 | -4 |
| **Cotton imports** | 1 | 1 |

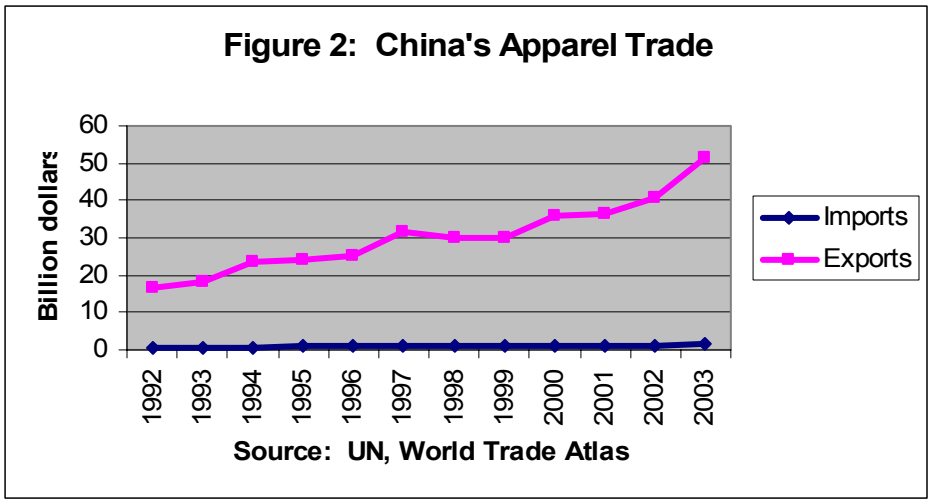
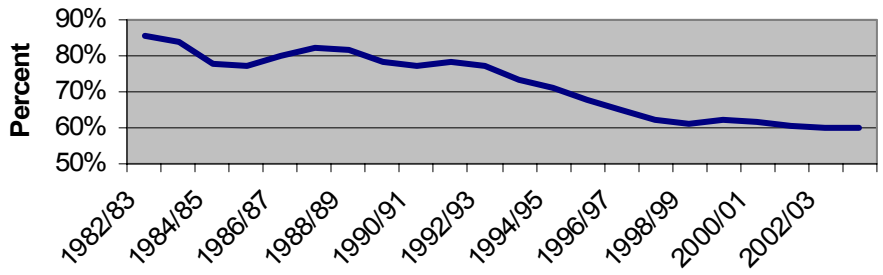


Figure 2: China's Apparel Trade
Billion dollars
60
50
40
30
20
10
0
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Imports
Exports
Source: UN, World Trade Atlas


Figure 3: China's Textile Trade
Billion dollars
30
25
20
15
10
5
0
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Imports
Exports
Source: UN, World Trade Atlas

**Figure 4: Cotton's share of fiber in China's yarn production**




Source: Chinese government data and USDA estimates

**Figure 5: Welfare gains by region after 25 years**