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Policy Implications of Textile Trade Management and the U.S. Cotton Industry

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This study investigates the effects on the U.S. cotton industry of textile trade liberalization using a multi-market equilibrium displacement model. The simulation results suggest that textile trade liberalization would induce small changes in the total demand for U.S. cotton but would affect considerably U.S. cotton demand structure, making U.S. cotton growers more dependent on world markets. The welfare analyses reveal that textile trade liberalization would result in a small welfare loss for U.S. cotton producers. As expected, textile trade liberalization also would lead to considerable substitution of imports for domestic production and substantial declines in prices of all textile products.

Textile trade liberalization is one of the major issues in the Uruguay Round of the GATT negotiations that have been in progress since 1986. Proposed changes include phasing out the Multi-Fiber Arrangement (MFA) which has regulated and managed trade in textiles and apparel since the early 1970s. The MFA is a legal agreement negotiated and signed by participating countries to manage textile trade flows. Currently, the United States has bilateral restraint agreements with 43 countries and regions, covering 80 percent of textiles and apparel imports from developing countries (USITC). In the EC, the MFA regulations cover about 77 percent of total EC textiles and apparel imports from 27 countries (Anson and Simpson).

Hufbauer et al., Cline, Pelzman, Trela and Whalley, U.S. International Trade Commission (1987, 1989), and Anson and Simpson have shown that substantial welfare gains for both exporting and importing countries would be obtained by phasing out the MFA. Most of these studies, however, center their analyses on textile and apparel and pay little attention to the welfare effects on textile input industries of liberalizing textile trade. The derived demand for various inputs for the textile production is determined by the output level; hence changes in textile output should have important effects on the demand for these inputs.

The objective of this study is to empirically investigate the effects on the U.S. cotton industry of phasing out the MFA. The United States is one of the leading cotton producers and exporters, and since cotton is a basic input for textile production, textile trade liberalization would have fundamental effects on the U.S. cotton industry. Given the fact that cotton is the largest field and export crop in U.S. agriculture, any effect on the cotton industry has important implications for the whole agricultural sector. On the other hand, U.S. cotton production has long been supported by farm programs so shifts in U.S. cotton demand must have important effects on government expenditures. Limited attention has been given to these issues with the exception of Shui, Beghin, and Wohlgenant (1992), and Coleman and Thigpen.

The point of departure of this paper is the modelling aspect of the analysis and the incorporation of the U.S. farm program in the analysis. Cotton and textile trade and production involve many countries, and their analysis requires a large set of parameter estimates and number of equations/

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relations describing the numerous flows. The present analysis uses a multifactor, multisector derived demand model to capture the basic linkages between the U.S. cotton industry and textile and apparel markets in the United States and foreign countries.

The study centers on the effects on the U.S. cotton industry of phasing out the MFA. For completeness, effects on the U.S. textile industry are also presented. Results from this study have important policy implications for current textile trade negotiations and, possibly, for future U.S. farm programs.

Demand for U.S. Cotton and the MFA

The significant effects on the demand for U.S. cotton of phasing out the MFA are mainly attributable to the demand structure for U.S. cotton and to world textile trade patterns. Demand for U.S. cotton is composed mainly of two components: domestic mill use and exports. Domestic mill demand, which meets about 29 percent of U.S. total mill demand for all fibers, accounts for about half the total demand for cotton in recent years. Export demand accounts for another 50 percent of total demand for cotton, of which a large proportion (about 60 percent), is imported by the major textile exporters whose textile exports are restricted by the MFA. Other major U.S. cotton importers such as the EC, Japan and Canada account for about 40 percent of the U.S. cotton export market (USDA).

The United States, the EC and Canada are the major importers of textiles in the world. Their imports account for more than half of world textile trade in recent years. Annual average cotton textile imports from 1984–87 accounted for 45.7 percent of total U.S. textile imports, and cotton apparel accounted for 52.4 percent of total cotton textile imports during the same period (USDA). Imports of cotton textiles and apparel in the EC accounted for 46.6 percent of total textile imports from non-OECD countries from 1982–86, of which about 50.6 percent were apparel imports (TEB).

Textile and apparel export supply come mainly from non-OECD countries. Leading suppliers are Hong Kong, Korea, China, Taiwan and India, which account for about 50 percent of the U.S. cotton textile import markets, 66 percent of the EC textile import markets, and 67 percent of the Canadian textile import markets (Anson and Simpson). Some textile and apparel export suppliers such as Korea, Taiwan and Hong Kong import U.S. cotton, but others such as India and Pakistan use little U.S. cotton. Trade in textiles and apparel also occurs between the United States and other OECD countries and among other OECD countries; however, this trade is free of the MFA restrictions.

Under such a demand structure and textile trade patterns, it appears that phasing out the MFA in all OECD countries will have significant effects on the demand for U.S. cotton. If textile trade is liberalized, the supply of textile exports would increase to the amount it would have been without intervention; that, in turn, will bring down the consumer's import price. This lower import price induces consumers to substitute imports for competing domestic goods, which causes demand for domestically produced textiles to fall. Since demand for cotton is a derived demand, increases in foreign textile exports may induce increases in demand for U.S. cotton exports, but decreases in demand for domestic outputs lead to a decrease in demand for cotton. On the other hand, textile trade liberalization also induces changes in demand for other foreign cotton imports. Because there is substitution between U.S. cotton and other foreign cotton, an increase in demand for U.S. cotton is likely. The final effect on the demand for U.S. cotton of liberalizing textile trade can be determined only by quantifying these direct and indirect effects.

The effects on U.S. cotton producers' welfare of phasing out the MFA depend largely on government farm policy. If the current program provisions remain unchanged, there would be a relatively small effect on cotton producers' welfare because about 85 percent of cotton producers are protected by farm programs. Given the high cost of programs and huge federal deficit, it seems unlikely the government would bear the increased program costs. Any downward changes in the target price will result in changes in cotton producers' welfare. To capture the different effects on cotton producers of phasing out the MFA, this study examines two polar cases. The first one assumes that all cotton producers participate in the programs and that there is no acreage adjustment if the current target price remains unchanged. Thus, phasing out the MFA has little effect on the supply of U.S. cotton and therefore producers' welfare. All costs would fall on the government program. The second case considers free market adjustment in which the U.S. cotton supply is market determined without government intervention. These two cases provide upper estimates to changes in

government expenditures and producers' welfare, respectively.

The Model

Based on the previous discussion, the structure of the model is illustrated in figure 1. The two major components of demand for U.S. cotton are domestic mill demand, which is derived from domestic textile production, and export demand, which is derived from other OECD countries' textile production and exports of developing textile exporters. The model classifies textile industries based on a further disaggregated classification (four digit SIC) rather than the traditional two-industry group (textiles and apparel industries, SIC 22 and 23). Here, the textile industry is defined as one that uses fibers along with other inputs to produce two types of final outputs: (1) household and industrial use items and (2) semi-manufacturing textiles, called "fabrics", which are inputs to the apparel

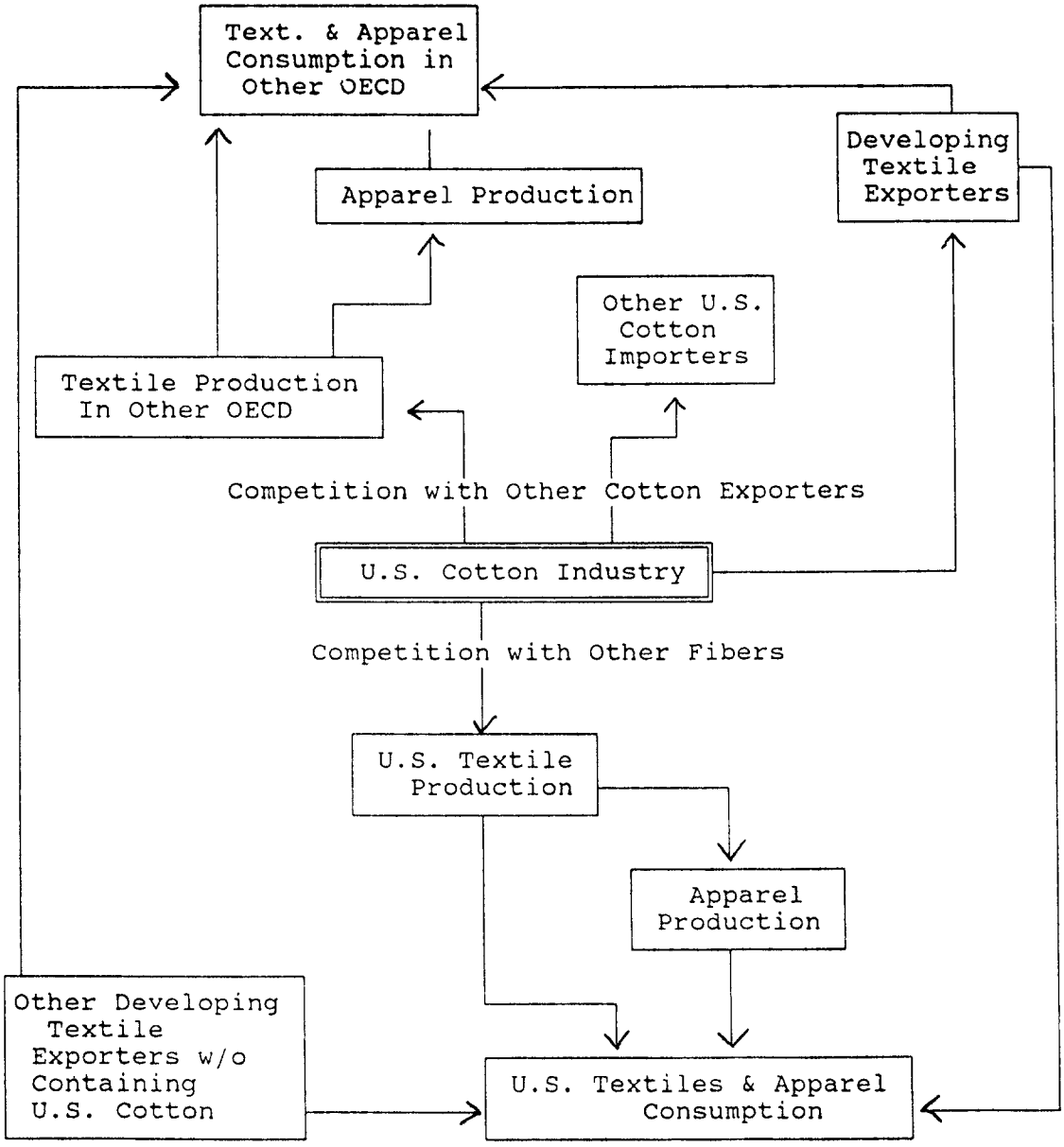

Figure 1. The Demand for U.S. Cotton

industry. The apparel industry includes all firms using domestic and imported fabrics along with other inputs to produce final apparel products. Thus, all fiber inputs enter into textile production. Changes in apparel production cause changes in demand for fabrics, which in turn induce changes in demand for fibers. The major advantage of this alternative classification is that it gives a clear input-output relationship between fiber inputs and textile outputs without double-counting problems.

Based on the coverage of the MFA and the demand for U.S. cotton, the model includes two major groups of developed countries: the United States and other OECD countries including the EC, Canada and Japan. There are three major groups of developing countries: twenty-seven non-OECD countries, other U.S. cotton importing countries as a whole, and foreign cotton-supplying countries as a whole. The United States imports textiles and apparel but exports cotton. The other OECD countries import both textile products and cotton. The twenty-seven developing countries are textiles and apparel suppliers and cotton importers. These countries are further classified into two subgroups according to whether they import U.S. cotton. Other cotton-importing countries import both U.S. and other foreign cotton only for domestic use. All countries involved in this study are listed in Appendix 1.

The supply of U.S. cotton is determined by the "supply inducing" price (Bailey and Womack). If the market price is below the target price, the supply inducing price is the target price; but if the target price is lower than the market price, the supply inducing price is the market price.

A country's production, consumption and trade behavior can be modelled based on neoclassical theories of the firm and consumer. Conventionally, homothetic preferences, identical firms and competitive markets are assumed for consistency in aggregation of demand and supply of diverse consumers and firms. A country's demand and supply functions for domestic goods and traded goods are assumed to be derived from the utility and profit maximization problems of individuals. Since the model involves multi-output production, and because most of the supply-side parameters are unknown, an additional assumption non-jointness technology is made for all textile production. According to Hall, the necessary and sufficient condition for non-jointness in inputs is that the total cost of producing all outputs is the sum of the costs of producing each output separately. With the assumption of constant returns to scale the output supply and input demand behavior for a multi-output firm can be characterized by

$$P = AC(W), \text{ and}$$

$$X = X(W, Y),$$

Table 1. Definitions of Variables in the Model

Variable	Definition
TD_i	demand for domestic textiles in country i
AD_i	demand for domestic apparel in country i
TMD_i	demand for textile imports in country i
AMD_i	demand for apparel imports in country i
PT_i	price of domestic textiles in country i
PA_i	price of domestic apparel in country i
PT_i^D	demand price of textiles import in country i
PA_i^D	demand price of apparel import in country i
TS_i	domestic supply of textiles in country i
FS_i	domestic supply of fabrics in country i
PC	demand price of U.S. cotton
PC_a	support price of U.S. cotton
PO	foreign cotton price
PF_i	price of fabrics in country i
PF_i^D	demand price of imported fabrics in country i
TMS	total textile export supply
FMS	total fabric export supply
AMS	total apparel export supply
TMS_j	textile export supply from country j
AMS_j	apparel export supply from country j
PT^S	world textile export supply price
PA^S	world apparel export supply price
PF^S	world fabric export supply price
FD_i	demand for domestic fabrics in country i
FMD_i	demand for imported fabrics in country i
CD_i	derived demand for U.S. cotton in country i
OD_i	demand for foreign cotton in country i
CD_j	import demand for U.S. cotton in country j
OD_j	import demand for foreign cotton in country j
CD_h	import demand for U.S. cotton in country h
OD_h	import demand for foreign cotton in country h
PT_j^S	export supply price of textiles from country j
PA_j^S	export supply price of apparel from country j
PF_j^S	export supply price of fabrics from country j
CS	U.S. cotton supply
OS_k	cotton export supply from country k
T	the total ad-valorem equivalent of the quota and tariff
Parameters:	
η	output demand elasticities
η^*	demand elasticities for imported textile and apparel
δ	production cost shares
μ	the output elasticities in demands
τ	fabric demand elasticities and cotton demand elasticities
ϵ	supply elasticities
α	textile export market shares
s	textile import market shares
π	U.S. cotton import market shares
ϕ	other foreign cotton import market shares

where AC is the average cost function and P, W, X, and Y are the output price vector, input price vector, input vector and output vector, respectively. The assumption of non-jointness with constant returns to scale has important implications for the elasticities of inputs with respect to outputs, which requires that the elasticities of the ith input with respect to all outputs sum up to 1 (Bigman). It also implies that (minimum) average cost equals output price and that changes in output prices are fully explained by input price changes. (see equations (5) to (8) and (11)–(12)).

To center on effects on the U.S. cotton industry of phasing out the MFA, some additional assumptions are made in this study.

1. Domestic and foreign textiles and cotton are not perfectly substitutable.

2. To reflect the existence of product differences from different sources of exports, an Armington structure is assumed for the demand for the developing textile exports. Thus, the world market textile price is a composite price.

3. Prices of manmade fibers, labor, capital, energy, and other materials are assumed to be exogenous to the textile and cotton industries.

4. All exports of textiles are in unrestricted categories and textile trade among OECD countries and among non-OECD countries are unaffected by removing the MFA.

Finally, changes in U.S. cotton stocks due to textile trade liberalization are assumed negligible because speculative demand for stocks would likely be unimportant (Duffy and Wohlgenant). Following Bigman and Muth, the derived demand model is expressed in log differential form through comparative statics of all markets. Variables and parameters are defined in Table 1. The model gives proportional changes in variables, in log differential form (EX = dlogX), and is written as:

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1. Textile End-Uses and Apparel

Demand

(1) $$ETD_i = \eta_{TTi}EPT_i + \eta_{TTIi}EPT_i^D, \quad \text{(demand for domestic textiles)}$$

(2) $$EAD_i = \eta_{AAi}EPA_i + \eta_{AAIi}EPA_i^D, \quad \text{(demand for domestic apparel)}$$

(3) $$ETMD_i = \eta^*_{ITTi}EPT_i + \eta^*_{TTi}EPT_i^D, \quad \text{(demand for imported textiles)}$$

(4) $$EAMD_i = \eta^*_{AIAi}EPA_i + \eta^*_{AAi}EPA_i^D, \quad \text{(demand for imported apparel)}$$

Supply

(5) $$EPT_i = \delta_{TCi}EPC + \delta_{TOi}EPO, \quad \text{(domestic textile supply)}$$

(6) $$EPA_i = \delta_{AFi}EPF_i + \delta_{AFIi}EPF_i^D, \quad \text{(domestic apparel supply)}$$

(7) $$EPT_j^S = \delta_{TCj}EPC + \delta_{TOj}EPO, \quad \text{(world textile export supply)}$$

(8) $$EPA_j^S = \delta_{ACj}EPC + \delta_{AOj}EPO, \quad \text{(world apparel export supply)}$$

2. Fabrics

Demand

(9) $$EFD_i = \mu_{FAi}EAS_i + \tau_{FFi}EPF_i + \tau_{FFIi}EPF_i^D, \quad \text{(demand for domestic fabrics)}$$

(10) $$EFMD_i = \mu^*_{FIAi}EAS_i + \tau^*_{FIFi}EPF_i + \tau^*_{FFi}EPF_i^D, \quad \text{(demand for imported fabrics)}$$

Supply

(11) $$EPF_i = \delta_{FCi}EPC + \delta_{FOi}EPO, \quad \text{(domestic fabric supply)}$$

(12) $$EPF_j^S = \delta_{FCj}EPC + \delta_{FOj}EPO, \quad \text{(fabric export supply)}$$

3. Cotton

Demand

(13) $ECD_i = \mu_{CTi}ETS_i + \mu_{CFi}EFS_i + \tau_{CCi}EPC + \tau_{COi}EPO$, (demand for U.S. produced cotton)

(14) $EDO_i = \mu^*_{OTi}ETS_i + \mu^*_{OFi}EFS_i + \tau^*_{OCi}EPC + \tau^*_{OOi}EPC$, (demand for foreign produced cotton)

(15) $ECD_j = \mu_{CTj}ETMS_j + \mu_{CAj}EAMS_j + \mu_{CFj}EFMS_j + \tau_{CCj}EPC + \tau_{COj}EPO$, (textile exporters' demand for U.S. produced cotton)

(16) $EOD_j = \mu^*_{OTj}ETMS_j + \mu^*_{OAj}AjEAMS_j + \mu^*_{OFj}EFMS_j + \tau^*_{OCj}EPC + \tau^*_{OOj}EPO$, (textile exporters' demand for foreign produced cotton)

(17) $ECD_h = \tau_{CCh}EPC + \tau_{COh}EPO$, (other cotton importers' demand for U.S. produced cotton)

(18) $EOD_h = \tau^*_{OCh}EPC + \tau^*_{OOh}EPO$, (other cotton importers' demand for foreign produced cotton)

Supply

(19) $ECS = \epsilon_{CC}EPC$, (U.S. cotton supply)

(20) $EOS = \epsilon_{OO}EPO$, (other foreign cotton supply)

4. World Textile Export Market Price Formation

(21) $EPT^S = \Sigma\alpha_j^T EPT_j^S$, (supply price of textile exports)

(22) $EPF^S = \Sigma\alpha_j^F EPF_j^S$, (supply price of fabric exports)

(23) $EPA^S = \Sigma\alpha_j^A EPA_j^S$, (supply price of apparel exports)

V. Trade Restrictions and Equilibrium Conditions

(24) $EPT_i^D = EPT^S + [T_i^T/(1 + T_i^T)]ET_i^T$,

(25) $EPF_i^D = EPF^S + [T_i^F/(1 + T_i^F)]ET_i^F$,

(26) $EPA_i^D = EPA^S + [T_i^A/(1 + T_i^A)]ET_i^A$,

(27) $ETS_i = ETD_i$,

(28) $EFS_i = EFD_i$,

(29) $EAS_i = EAD_i$,

(30) $\Sigma\alpha_j^T ETMS_j = \Sigma s_i^T ETMD_i$,

(31) $\Sigma\alpha_j^F EFMS_j = \Sigma s_i^F EFMD_i$,

(32) $\Sigma\alpha_j^A EAMS_j = \Sigma s_i^A EAMD_i$,

(33) $ECS = \Sigma\pi_i ECD_i + \Sigma\pi_j ECD_j + \Sigma\pi_h ECD_h$, and

(34) $ECSO = \Sigma\phi_i EOD_i + \Sigma\phi_j EOD_j + \Sigma\phi EOD_h$.

Subscript i refers to the United States and to other OECD countries, j refers to the twenty-seven textile exporters, k refers to other cotton exporters and h refers to cotton importing countries without textile exports. The system of equations is written in a matrix form, A * EX = ET, where A is a non-singular matrix of parameters, EX is the vector of endogenous variables, and ET is the vector of exogenous shocks. The system of equations is solved for relative changes in the endogenous variables induced by policy shocks. Given all parameter and share values, the solution shows how the equilibrium quantity and price are affected by phasing out the MFA.

With the exception of mill demand for cotton, demand-side parameter estimates are obtained from the existing literature (e.g., Cline; Duffy, Wohlgenant, and Richardson; Gardiner and Dixit). Demand elasticities for cotton at the mill level are obtained through estimating a complete input demand system for the U.S. textile industry. The input demand system is derived from the representative firm's cost-minimization behavior and incorporates the effect on the derived demand for fibers of technical changes in the textile industry as well as substitution effects among all inputs. The econometric model is a linear logit cost share function augmented to incorporate dynamic adjustment processes. The model was estimated using time-series data from 1950–1987. The results are reported in Shui, Beghin, and Wohlgenant (forthcoming, 1993). The estimated own price elasticity of demand for natural fibers of −0.617 is relatively elastic compared to most previous estimates.

Most existing estimates of price elasticity of U.S. cotton supply are obtained under the consideration of farm program effects so the long-run supply elasticity of U.S. cotton is considerably smaller than that of foreign cotton exports. The estimate of U.S. cotton supply elasticity is 0.6 in Duffy et al. (1987); the supply elasticity for other cotton exporters is 2.36 in Monke and Taylor. It is inappropriate to directly use such elasticities when free market adjustment is assumed. This study assumes that the U.S. long-run supply elasticity is the same as that of foreign exporters. Since various textile demand and supply elasticities for other OECD countries as a whole are not available, we assume that they are the same as those of the United States. Sensitivity analysis was performed for all assumed parameter values; results are not sensitive to changes in elasticity values. See Shui (Chapter 6) for details on sensitivity analysis.

All shares are computed using an average for 1982–87. All shares for the United States are based on the physical volume data, but value data are used to compute various shares related to the other OECD countries. The major data sources used to compile these shares are Comitextil, TEB, and USDA. A complete list of parameters and shares used in the model can be found in Shui (Chapter 5).

The Policy Simulations

Phasing out the MFA in all OECD countries implies only partial liberalization of trade because, in addition to quota restrictions, textile trade is distorted by tariffs. This study presents two policy reform scenarios: (1) completely liberalizing textile trade and (2) phasing out the MFA only. It is expected that textile trade liberalization can be only achieved gradually so long-run cotton supply elasticities are used to reflect the long-term adjustment process in the cotton industry. The evaluation of textile trade reform is complicated. The difficulty stems from the coexistence of quotas and tariffs which may result in ambiguous welfare evaluations. Conventionally, the complicated trade reform evaluation problem is addressed by estimating an ad valorem tariff equivalent of the quota and using the total tariff equivalent to measure the price effect of trade reform. The major weakness of this approach is that it may cause biased welfare estimation from trade liberalization because the importance of the rate of quota rent retention and its endogeneity are ignored (Anderson and Neary). Since this study centers on the welfare effect for the U.S. cotton industry rather than the textile industries, the use of the total tariff equivalent to measure the price effects of textile trade liberalization will not jeopardize our welfare evaluation for the United States.

The USITC (1989) has reported the average U.S. tariff rate and quota equivalent rate for different types of textile imports. Based on its estimates, the tariff and quota equivalent rates are computed for fabrics, textiles and apparel according to their import share. The average tariffs on textile end-products, fabrics and apparel are 15.7, 13.4 and 19.0 percent respectively, and the quota rates on these items are 23.3, 21.1 and 28.3 percent, respectively. Tariff and quota equivalent rates for other OECD countries are based on the estimates of GATT (1984). Since data for individual imported items are not available in GATT, we assume similar tariff and quota rates for textile end-products and fabrics.

Results of all simulations predict moderate changes in net total demand for U.S. cotton caused by textile trade liberalization. The adjustment pro-

cess is as follows. Both completely or partially liberalizing textile trade induces considerable declines in textile import prices in the United States and other OECD countries. As demand for textile imports increases, the demand for domestic textile products decreases which, in turn, induces a large drop in derived demand for cotton. On the other hand, the demand for U.S. cotton by developing textile suppliers increases because their textile exports increase. The substitution effect is relatively weak because long-term cotton supply responses are taken into account. As a result, the total demand for U.S. cotton decreases but the magnitude is relatively small for the free market adjustment case: 1 percent if there is complete textile trade liberalization and 0.7 percent if there is partial liberalization. When the farm program is in effect there is no cotton supply response so changes in the U.S. cotton demand price are relatively larger compared to the free market adjustment case.

The model predicts a considerable change in cotton demand structure. As textile trade restrictions are removed, the domestic cotton market contracts. The U.S. textile mill demand for cotton decreases about 25 percent when all textile trade restrictions are removed, but about 15 percent when only the MFA is phased out. Textile exporters' demand for U.S. cotton increases about 43 percent if textile trade is completely liberalized but about 30 percent if only the MFA is removed. The change in demand structure makes U.S. cotton producers more exposed to world competitive forces and price risk because export demand represents the lion's share of total demand. Table 2 summarizes all results of the different reform scenarios for the U.S. cotton market structure. Additional results for individual countries can be found in Shui (Chapter 6).

Textile trade liberalization causes changes in the U.S. cotton demand price and quantity which have important economic implications for farm program costs and U.S. cotton producers' welfare. If the current farm program is assumed to be unchanged, textile trade liberalization causes change only in farm program costs and has little effect on cotton producers' welfare. If the free market adjustment is assumed, changes in demand and price induce only changes in U.S. cotton producers' welfare. We evaluate producers' welfare consequences with a change in the cotton industry's total revenue and with a change in producers' surplus. The percent change in the total revenue is calculated as the sum of the percent change in price and percent change in quantity. Producers' surplus is estimated by the equation

$$EW = \eta PC/PC_0 + (1/2) * \epsilon_{CC} * (\eta PC^2/PC_0),$$

where EW is the change in producers' surplus expressed as a proportion of the total value of cotton production; subscript 0 refers to the initial equilibrium cotton price and ϵ_{CC} is the U.S. cotton supply elasticity. Since supply is fixed under the fixed target price, the percent change in the farm program cost can be evaluated by the product of the percent change in market demand price and the ratio of the market demand price to the difference between the target price and the market demand price, that is,

$$EC = -[PC_0^d/(PC_0^t - PC_0^d)] * EPC^d,$$

where EC is the percent change in farm program costs, and PC^d and PC^t are the target price and market demand price of cotton, respectively.

Since it is useful to consider these changes in terms of dollar value, changes in dollar values of producers' total revenue and surplus and farm program costs are also provided. At 1986 constant prices, the annual average total revenue of the U.S. cotton industry during 1982–87 was $3,489.79 million and farm program costs (deficiency payments) were $672.34 million.

Table 3 shows how textile trade liberalization

Table 2. Changes in Demand for U.S. Cotton Under Different Textile Trade Policies and Reactions (Percent change over five year period)

	Price	Total Demand	U.S. Mill Demand	Total Exports	Exports To: OECD	Exports To: Textile Exporters	Exports To: Other
Liberalizing Textile Trade							
(A) Free Cotton Market Adjustment	−0.37	−0.89	−24.63	23.75	−12.69	42.75	2.23
(B) Under the Farm Program	−1.62	0.00	−22.73	23.01	−11.86	41.86	3.21
Partially Liberalizing Textile Trade							
(A) Free Cotton Market Adjustment	−0.29	−0.68	−14.47	15.45	−6.52	29.90	2.38
(B) Under the Farm Program	−1.04	0.00	−12.87	13.08	−5.67	26.74	1.86

Table 3. Changes in Revenue, Producer Surplus and Program Costs

	Revenue		Surplus		Program Cost	
	Percent	Value[a]	Percent	Value[a]	Percent	Value[a]
Liberalizing Textile Trade	−1.62	−56.60	−0.99	−34.41	5.96	40.07
Partially Liberalizing Textile Trade	−0.47	−16.47	−0.28	−9.67	3.28	22.05

[a]millions of 1986 dollars.

affects U.S. cotton producers' total revenue and surplus. Since complete or partial textile trade liberalization induces a decrease in both price and quantity of U.S. cotton under the assumption of the free market adjustment, the U.S. cotton industry would lose some revenue with any trade liberalization. Total revenue would decrease 1.62% ($56.6 million) under complete textile trade liberalization and 0.47% ($16.47 million) under partial textile trade liberalization; correspondingly, producers' surplus would decrease by 0.28% (−$9.67 million) and 3.66% (−$34.41 million) respectively.

The last two columns in Table 3 report increases in farm program costs when textile trade is partially or completely liberalized. Compared with the loss in producers' surplus in the free market adjustment case, increases in costs are relatively larger because there is no supply adjustment under the program. The largest increase in program costs is $40.07 million.

Table 4 presents the effects on prices and quantities of textile products produced in the United States and imported into the U.S. In contrast to the overall impact on cotton demand, these results indicate a substantial displacement of domestically produced apparel, textiles, and fabrics by imports due to either partial or complete liberalization of trade. Also, all prices (domestic and imports) would be expected to fall dramatically.

Conclusions

This study indicates substantial effects on the U.S. cotton industry of textile trade liberalization. Textile trade liberalization induces moderate changes in total demand for U.S. cotton but brings about considerable changes in the U.S. cotton demand structure, making U.S. cotton growers more dependent on the world market. Our simulations predict also a relatively small welfare loss for U.S.

Table 4. Changes in the U.S. Domestic Textile Supply and Textile Imports Under Different Textile Trade Policy Reforms (percent change[a])

	Liberalizing Textile Trade		Partially Liberalizing Textile Trade	
	Market Adjustment	Under Farm Programs	Market Adjustment	Under Farm Programs
Domestic Apparel Supply				
Quantity	−31.96	−30.02	−22.38	−21.24
Price	−1.41	−1.26	−0.55	−0.81
Domestic Textile Supply				
Quantity	−6.13	−6.04	−3.23	−3.01
Price	−0.10	−0.15	−0.01	−0.07
Domestic Fabric Supply				
Quantity	−33.37	−33.11	−24.80	−23.61
Price	−0.23	−0.37	−0.10	−0.24
Apparel Imports				
Quantity	57.26	55.29	33.87	32.79
Price	−37.91	−31.92	−21.89	−21.79
Textile Imports				
Quantity	38.11	37.11	20.55	20.16
Price	−29.44	−29.14	−15.81	−15.78
Fabric Imports				
Quantity	29.85	29.25	18.01	17.64
Price	−27.31	−28.11	−16.02	−16.14

[a]Based on the five-year average.

cotton producers. Such a result is obtained under the assumption that U.S. cotton producers do not face increasing competition on world markets. Given the emergence of new cotton producers on world markets (Pakistan, China), U.S. producers are likely to face increased competition. Although not accounted for in this study, the cost of adjustment associated with changes in U.S. cotton demand structure could be substantial as U.S. producers search for access to new export channels. The expected adjustment costs may reinforce the aversion of cotton producers to less distorted textile trade.

The results also indicate a substantial impact on the U.S. textile market. Imports would displace domestic production for apparel, textiles, and fabric. Also prices would be expected to fall dramatically for all products. While the magnitudes of the change clearly explain the textile industry's resistance to liberalizing trade, it is nevertheless clear that consumers would benefit through substantially lower prices.

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Appendix 1. Countries Involved in This Study

1. Developed countries (Textile importers)
   (1) the United States.
   (2) other OECD countries:
   Canada, the EC and Japan

2. Developing countries (Textile exporters)
   (1) Countries importing U.S. cotton:
   Hong Kong, Taiwan, South Korea, China[a], Singapore, Thailand, Malaysia, Indonesia, Philippines, Sir Lanka, Bangladesh, Poland, Romaina, Yugoslavia, and Ghana.
   (2) Countries not importing U.S. cotton:
   India, Pakistan, Argentina, Brazil, Colombia, Costa Rica, Dominican Republic, Haiti, Peru, Turkey, Mexico and Egypt.
3. Other U.S. cotton importers
   Chili, other Western Hemisphere countries, other Africa countries.
4. Foreign cotton supply countries
   Argentina, Australia, Brazil, Egypt, former Soviet Union, India, Israel, Mexico, Pakistan, Peru, and Sudan.

[a] China exported cotton 1985–1987 but it imported U.S. cotton on five year average for 1982–1987.