Determinants of U.S. Textile and Apparel Trade

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Abstract

A gravity model using panel data is applied to determine factors affecting textiles and apparel trade flows into the United States. The study confirms that a nation's aggregate output and per unit productivity serve as important determinants of textiles and apparel trade into the U.S., and the exporting country's depreciating exchange rate as well as its lower prices relative to U.S. prices for textiles and apparel play an important role in determining textiles and apparel trade flows to the U.S. market. Since the WTO's multilateral trade restraining policies of the multi-fibre arrangement (MFA) is found to have slowed down imports, its abrogation in 2005 should lead to greater textiles and apparel imports to the U.S.

Keywords: brand equity; brand valuation; real options; food firms; growth option value

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Introduction

For the past twenty years, U.S. textile and apparel industries have faced challenges related to increasing trade flows from foreign producers that sell their products at relatively lower prices. Therefore, the U.S. industry complex stands to lose its once strong hold on the U.S. domestic market, at least in part because recently negotiated trade agreements have provided freer access by foreign producers into the U.S. market. For years, the industry had been a thorn in the side of policymakers attempting to do the right thing by liberalizing textiles and apparel trade. Trade agreements and other trade liberalizing initiatives have had to be abandoned, curtailed, or saddled with red tape to accommodate the industry's unwillingness to compete. According to Ikenson (2005), the time has come for the Bush administration to cut the textile industry lobby's cord. He states further that the industry complex has used threats and extortions to achieve its objective of protectionism, often saddling consumers with stealth taxes, and dragging down market prospects for other industries.

Trade flows are generally determined on the basis of the principle of comparative advantage in a free trade system (Salvatore, 2004, p.35). Gelb (2005) writes that as trade barriers are further removed, lower wage rates in developing countries along with labor-intensiveness of textile and apparel manufacturing would give developing countries a comparative advantage in textile and apparel manufacture. Thus, we expect textile and apparel manufacture to continue shifting to developing countries following trade liberalization. The Economic Research Service of the U.S. Department of Agriculture, in its briefing room on cotton, also states that competition with imported products has reduced capacity in the U.S. textile and apparel sectors, and the domestic textile industry no longer consumes the majority of the cotton produced in the United States. As a consequence, analysis of the U.S. textile and apparel industries is an important part of understanding cotton production and prices
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Despite such anecdotal evidence, there is paucity of research on trade flows of textiles and apparel manufacture. Therefore, the determinants of trade flows for the sector and their economic implications are not clearly understood. Accordingly, the objectives of this study are to evaluate factors affecting the value and direction of textile and apparel trade flows into the U.S. from leading exporters. Special attention is given to deriving implications arising from textiles and apparel trade for U.S. agribusiness. The rest of the paper is organized as follows: in the first section, we provide background information on the textiles industry complex. In the second section, the rationale for using the gravity model in determining trade flows of textiles and apparel is presented. In the third section, we present the reduced form of the gravity model that is applied to statistically evaluate the determinants of trade in textiles and apparel to the United States. In the fourth section, we provide information on data sources and estimation procedure. The fifth section

presents the results, and the sixth section offers concluding comments and implications from the study.

Background

By gleaning U.S. Department of Labor data, in 1994 the U.S. textile and apparel industry complex employed about 1.5 million workers. Additionally, from 1994 through 2003, the industry complex produced output worth at least $50 billion every year. However, as textile and apparel trade liberalized over the last few years, production has shifted to countries with lower wages and imports increased into the United States. As a result, many U.S. textile and apparel plants closed; some firms went out of business and others relocated production overseas. The U.S. lost more than 900,000 jobs over 1994-2005 (U.S. Department of Agriculture, Economic Research Service1). In particular, this industry has lost 441,800 jobs from January 2000 through April 2005 (U.S. Department of Labor). The National Council of Textile Organizations (NCTO, 2005) reports 354 plant closings from 1997 through 2005, of which 131 and 80, respectively, occurred in North and South Carolina. Additionally, Kletzer (2001) found that increased imports of textiles and apparels since the mid-1990s have contributed significantly to job losses. Both textiles interest groups and the popular press also blame job losses and plant closings on import surges to the United States (ATMI, 2001; Patterson, 2004).
It can be observed from Figure 1 that U.S. exports of textile and apparel grew from $12 billion in 1994 to $15 billion in 2003. At the same time, the U.S. imported $45 billion worth of textile and apparel in 1994 and $82.8 billion in 2003. These imports contributed to more than doubling the textile and apparel trade deficit from about $33 billion in 1994 to $68 billion in 2003. The share of imports relative to domestic consumption grew from 37% in 1994 to 66% in 2003 (U.S. Department of Agriculture, Economic Research Service2). Therefore, it appears that growth in U.S. textile exports has been relatively small while imports as a share of domestic demand have continued to increase.

Trade in textiles has historically been governed by quantitative restrictions. From 1974 through 1995, the Multi-fibre Arrangement (MFA) governed the bulk of world textile and apparel trade, but textile and clothing quotas were negotiated bilaterally between trading partners. Among other things, the MFA provided for quantitative restrictions when import surges of particular products caused or threatened to cause damage to the industry of an importing country. The WTO ratified the Agreement on Textiles and Clothing (ATC) in 1995 to phase out quotas established under the MFA by January 1, 2005. Consequently, the world textile market effectively became fully integrated into the WTO when the ATC ended. This integration also ended U.S. government control of the imports of textiles and apparel into the United States.

MacDonald et al. (2001), by using a dynamic computable generalized equilibrium (CGE) model simulation, found that the 2005 trade reforms in textiles and clothing

would improve economic welfare in every region in the world, and would cause world textile, apparel, and cotton production to rise. In particular, the study documented that U.S. production would decline for cotton as well as for textiles and apparel, although U.S. cotton exports potentially would rise. Therefore, it appears that conditions are currently rife for global exporters of textiles and apparel to demand even greater access into the U.S. market. Yet, over the years many developed countries, including the U.S., which were expected to lift their import quotas, have been reluctant to do so because many developing countries, such as China, pose a threat in increasing their exports of textiles and apparel to their markets.

Moreover, the textiles complex is a sector where relatively modern technology can be adopted even in poor countries at relatively low investment costs. These low investment costs have made this industry suitable as the first rung on the industrialization ladder in poor countries, some of which have experienced very high output growth rate in the sector (Nordås, 2004). Indeed, the latest statistics from the WTO show that developing countries took 55% of the global textile exports, which stood at $1.369 trillion, in 2003. Also, developing countries accounted for 71% of the global apparel exports. Moreover, relative prices of textiles and apparel generally tend to be higher in the U.S. than in its trading partners (U.S. Department of Agriculture, Economic Research Service2). Therefore, despite imposition of barriers to trade, U.S. imports of textile and apparel products have increased over time (see Figure 1). The leading sources of textile imports in 2003 were China, Pakistan, India, Mexico, Taiwan, South Korea, Thailand, Indonesia, Japan, Hong Kong, Philippines, Canada, and Sri Lanka (U.S. Department of Commerce). These countries are included in the panel analysis below.

Figure 1:   U.S. Trade in Textile and Apparel
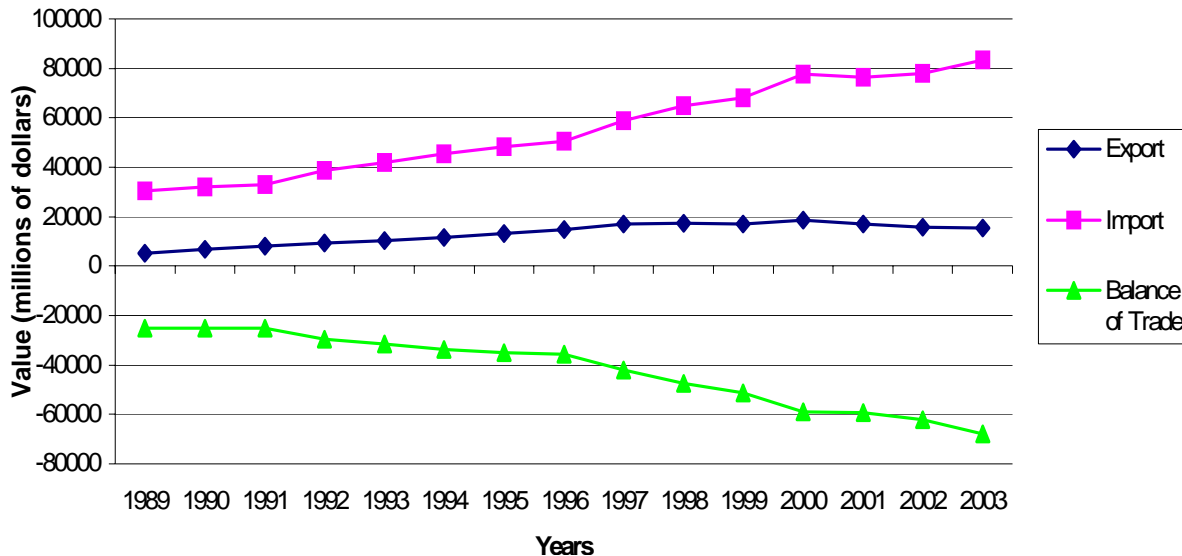
Source::On-Line Database of the U.S. International Trade Commission: ITC Trade Dataweb, Washington, DC, 2004 *http://dataweb.usitc.gov*

Development of the Gravity Model

Research on trade flows has used spatial equilibrium models in the past. Examples of such studies include Takayama and Judge (1964), Bawden (1966), Koo (1984), Sharples and Dixit (1989), and Mackinnon (1976). In these studies, trade flows are explained by the relative prices of commodities in importing and exporting countries and transportation costs between countries. However, as Thompson (1981) and Dixit and Roningen (1986) indicate, spatial equilibrium models perform poorly, especially in explaining trade flows of commodities that could be distorted by both exporting and importing countries' trade programs and policies.

Gravity models analogously determine trade flows between two or more countries as a function of their respective economic masses, the distance between the economies and a variety of other factors. The gravity model derives application from the partial equilibrium model of export supply and import demand as presented by Linemann (1966). Anderson (1979), Bergstrand (1985, 1989), Thursby and Thursby (1987), and Helpman and Krugman (1985) apply microeconomic foundations in deriving the gravity model which show that price variables, in addition to conventional gravity equation variables, are statistically significant in explaining trade flows among participating countries. Generally, a commodity moves from the country where prices are lower to the country where prices are higher. Therefore, trade flows are expected to be positively related to changes in export prices (Karemera et al., 1999).

The gravity model has found empirical application in determining trade flows and policy analysis (Koo and Karemera, 1991; Koo et al., 1994), boarder effects inhibiting trade (McCallum, 1995; Helliwell, 1996 and 1998), and impacts of currency arrangements on bilateral trade (Rose, 2000; Frankel and Rose, 2002; Glick and Rose, 2002). The gravity model has also been applied to evaluate bilateral trade flows of aggregate commodities between pairs of countries and across regions (Oguledo and Macphee, 1994).

Classical gravity models of trade generally have used cross-sectional data to estimate trade effects and trade relationships for a particular time period. But, Koo and Karemera (1991) and Rahman (2003) have applied panel data to the gravity model. Koo and Karemera reveal that using panel data to determine factors affecting trade flows of a single commodity result in more robust results than cross-sectional data alone. Furthermore, Rahman states that the advantages of this method are that panels can capture the relevant relationships among variables over time, and panels can monitor unobservable trading–partner pairs' individual effects. In addition, the combination of time series with cross-sectional data can enhance the quality and quantity of data in ways that would be impossible to achieve by using only one of these two dimensions (Gujarati, 2003). Conceptually, the difference in the nature of individual effects can be classified into the fixed

effects which assume each country differs in its intercept term; and the random effects which assume that individual effects can be captured by the difference in error terms.

Model Derivation

In this study, the traditional gravity model for aggregate goods is re-specified as a commodity-specific model to analyze trade flows in textiles and apparel among 13 countries (China, Pakistan, India, Mexico, Taiwan, South Korea, Thailand, Indonesia, Japan, Hong Kong, Philippines, Canada, and Sri Lanka) and the U.S. The traditional gravity model incorporates three variable components: (1) economic factors affecting trade flows in the origin country; (2) economic factors affecting trade flows in the destination country; and (3) natural or artificial factors enhancing or restricting trade flows. We follow the approach used by Koo and Karemera (1991) and Koo et al. (1994), where they derive a single commodity gravity model to analyze the determinants of wheat and meat trade policies, respectively. The approach derives its foundation from Linneman (1966) and Bergstrand (1985, 1989), where the gravity model is specified as a reduced form equation from partial equilibrium demand and supply systems.

From the derived model (see Appendix for model derivation), the applied empirical reduced form of the gravity model we use to evaluate factors explaining textile and apparel trade between the U.S. and the 13 key trading partners is specified in equation (1) below. The variables and summary statistics are presented in Table 1 and the explanation of expected signs on independent variables is provided in Table 2.

Table 1: Descriptive Statistics Analysis

	Mean	Std. Deviation	Minimum	Maximum	Skewness
TEXIMP	496.96	538.74	3	3885	2.51
APPIMP	2412.14	3483.75	61	41146	7.49
GDP_i (Billion)	586.6	1074.70	6.98	5283.05	3.04
PCI_i	8244.73	10488.44	317.08	42071.92	1.31
GDP_{us} (Billion)	8013.06	1771.75	5438.7	11004	0.17
PCI_{us}	30039.12	5409.86	22159.88	39011.87	0.15
$EXRATE_{ius}$	0.95	0.35	0.22	2.61	1.57
$PRICED_{us}$	2.99	1.05	1.55	5.4	0.86
$PRICED_i$	6.92	7.13	-3.96	57.64	2.78
$DIST_{ius}$	11151.84	4265.74	733.89	16370.82	-1.44
DMFA	0..31	0.46	0	1	0.84

Table 2: Explanation of Expected Signs on Independent Variables

Variable	Expected Sign	Explanation
GDP of importing country	+	As income increases purchases are likely to increase. Thus increased income results in increased imports.
GDP of exporting country	+	Higher GDP indicates potential to export more textiles.
Per capita income of importing country	+	A higher per capita income indicates greater potential to demand higher quality and more exotic imports.
Per capita income of exporting country	+	A higher per capita income indicates higher productivity of labor (skill content) in output and would potentially lead to greater exports.
Distance	-	Proxy for cost of transportation. The further the distance, the less imports of goods from a country.
Exchange rate	-	The lower the exchange rate of the exporting country to the dollar, the cheaper its goods will be on the importing country's market. This results in an increase in imports.
Price Deflator$_{us}$	+	Importing country with high price deflator (a proxy for inflation rate) would substitute domestically produced goods with foreign imports.
Price Deflator$_{i}$	-	An Exporting country with a relatively high price deflator/inflation would be less competitive in the world market.
Effect of Multifiber Arrangement (Agreement on Textiles and Clothing)	-	MFA restricted trade in textiles and clothing until January 2005 for a majority of the countries trading with the U.S (but it allowed bilateral agreement to grant access). Therefore, MFA would lead to less import from trading countries to the U.S.

We use dummy variables to differentiate countries receiving policy benefits associated with the MFA governed by the WTO. But similar to the approach used by MacDonald et al (2001), we distinguish countries by whether or not trade in textiles and apparel was restrained by the MFA. Therefore, among the countries whose exports to the U.S. were restrained by the MFA, we include China, India, Pakistan, Taiwan, South Korea, Thailand, Indonesia, Japan, and Hong Kong. However, the Philippines and Sri Lanka (as less developing countries enjoying preferential trade

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treatment) were free from trade restraint. Canada and Mexico, by virtue of their NAFTA membership, were also free from trade restraint.

To conform to the approach used by MacDonald et al. (2001), this study abstracts from the issue of whether importing or exporting countries capture rents from MFA quotas, and it assumes that these rents are dissipated by rent-seeking behavior. That is to say, the MFA does not create either a price gap per se between domestic and border prices or quota rents for the restraining country (the U.S.). Instead the restraint merely causes difficulty for some countries (especially developing countries that do not benefit from preferential access) in exporting their textile and apparel products to the restraining country.

To be sure, one limitation of the study is that it does not capture the reduced import protection over time associated with the ATC. Therefore, it does not adequately capture the potential increase in export efficiencies attained by some exporting countries with trade reform; such as China following its bilateral trade agreement with the U.S. in 1999.

Therefore, the reduced form of the applied model is as follows:

$$\text{TEXIMP}_{iust} = \beta_0 + \beta_1 \text{GDP}_{it} + \beta_2 \text{GDP}_{ust} + \beta_3 \text{PCI}_{it} + \beta_4 \text{PCI}_{ust} + \beta_5 \text{EXRATE}_{iust} + \beta_6 \text{PRICED}_{ust}$$
$$\beta_7 \text{PRICED}_{it} + \beta_8 \text{DIST}_{ius} + \beta_9 \text{DMFA}_{it} + \varepsilon_{iust} \qquad (1)$$

Where:

TEXIMP_{iust}	=	value of annual textile/apparel imports (in million dollars) by the United States from the exporting country i;
GDP_{it}	=	Gross domestic product of the exporting country i;
GDP_{ust}	=	Gross domestic product of the United States
PCI_{it}	=	Per capita income of the exporting country i;
PCI_{ust}	=	Per capita income of the United States;
EXRATE_{iust}	=	Exchange rate of the currency of country i to the U.S. dollar;
PRICED_{ust}	=	Price deflator (proxy for inflation rate) of the U.S.;
PRICED_{it}	=	Price deflator of te exporting country i;
DIST_{ius}	=	Distance in kilometers between the exporting country i and the U.S.;
DMFA_{it}	=	Dummy variable identifying whether country i was free from trade restraint (1 if country i was free from restraint in year t, and 0 otherwise); and
ε_{iust}	=	error term
t	=	time (represents the time series from 1989 through 2003)

Unlike the traditional gravity models of aggregate good trade in Bergstrand (1985, 1989), Anderson (1979) and Linneman (1966), the commodity-specific gravity model (Koo and Karemera, 1991; Koo et al., 1994) can incorporate the unique characteristics and policies associated with trade flows of the specific commodity in exporting and importing countries. In the model, the GDP serves as a proxy for

levels of income. The exporting country's GDP can also be interpreted as its production capacity, while the importing country's GDP represents its level of effective demand. It is expected that trade flows are positively related to exporting and importing countries' GDP. Per capita income for the exporting country is also included as a separate independent variable and as a proxy for greater productivity of labor (Deardoff, 1997).

A higher output per person indicates potential efficiency in production or increased productivity which may potentially lead to greater exports. However, a high population may lead to decreasing exports, especially if there is a higher domestic demand for the product. As a country's market develops and, especially, if the level of development is matched by innovation in the production of new or higher quality products, then more goods are demanded as imports by other countries (Frankel and Wei, 1993). For similar reasons, as a country develops, consumers with higher per capita income are able to afford higher quality and more exotic imported goods (Rahman, 2003).

We also use the GDP deflator as a proxy for price of goods in each country, since consistent time series data for prices of all categories of textile and apparel products for all the countries are not immediately available. Additionally, in the model, we maintain the exchange rate values between the U.S. and the respective textiles and apparel exporting countries so as to measure the terms of trade between those countries and the U.S. Additionally, we substitute distance between the exporting country and the U.S. for cost of transportation, since data on the latter is not readily available.

Data Sources and Estimation Procedure

The empirical evaluation of equation 1 is based on secondary data obtained from the following sources: (i) GDP, exchange rate, price deflators and population for the calculation of per capita income were obtained from the International Marketing Data and Statistics (2004); (ii) distance in kilometers between the U.S. and the exporting country was obtained from the research aid website of the Macalester College of Economics; and (iii) trade values were obtained from the United States International Trade Commission's trade data website. Textile and apparel trade values, classified in SIC codes 22 and 23, respectively, were used for years 1989-1996. The new NAIC code, which commenced in 1997, was used for the years 1997-2003. Under this new industrial code, NAIC 313 and 314 are specified as equivalent to the old SIC code 22 (for textile products); and NAIC 315 is equivalent to SIC 23 (for apparel products).

Results and Policy Analysis

Equation (1) was estimated by a SAS program using distinct panel data sets for

textile and apparels, respectively. The Hausman test was run to check if the fixed or random effects model is more efficient. We use the Hausman's (1978, p. 1261) notation where equation 9 in the time series and cross-section framework is written as:

$$X_{iust} = Z_{iust}\,\beta + \mu_{ius} + \mu_{iust} \qquad\qquad (2)$$

where

X_{iust} = trade observation from exporting country i to the U.S. at time t (t = 1,…,T);
Z_{iust} = a corresponding trade determinant vector of exporting country and the U.S.;
μ_{ius} = the trade effect associated with an exporting country and the U.S.; and
μ_{iust} = the error term.

By assuming individual effects, we proceeded to test if µiust is fixed or random. According to Greene (2003, p.301), Hausman's null hypothesis is that "the covariance of an efficient estimator with its difference from an efficient estimator is zero." Results indicate a Hausman m-statistic of 27.44 and 25.84 for the specified models for textiles and apparel imports, respectively, where the critical χ^2 value for 8 degrees of freedom at the 1% level is 20.09. Thus, we reject the random effects in favor of the existence of individual country fixed effects, and use the fixed effect model commonly known as the covariance model. We used a SAS estimation procedure that automatically corrects for potential econometric problems associated with panel models by applying the Parks (1966) and Kmenta (1986) methods.

Table 3: Gravity Model Estimates on the Import of Textiles and Apparel

	Textile		Apparel	
Variable name	**Point Estimate**	**P-value**	**Point Estimate**	**P-value**
Intercept	13.627	0.0001	17.262	0.0001
GDP_i	0.451***	0.0001	0.236***	0.0001
PCI_i	0.0129***	0.0001	0.043*	0.0848
GDP_{us}	13.206***	0.0001	10.154***	0.0001
PCI_{us}	18.182***	0.0001	11.720***	0.0001
$EXRATE_{ius}$	-0.463***	0.0001	-0.331***	0.0001
$PRICED_{us}$	1.640***	0.0001	1.079***	0.0001
$PRICED_i$	-0.022***	0.0001	-0.002**	0.0064
$DIST_{ius}$	-0.785***	0.0001	-0.332***	0.0001
DMFA	-0.695***	0.0001	-0.085***	0.0016
R^2	0.98		0.86	
N	195		195	

***	Refers to significance at 1% level
**	Refers to significance at 5% level
*	Refers to significance at 10% level

Table 3 presents estimated logarithmic (log-linear) results for the gravity models on textiles and apparel imports, respectively, from the major exporting countries to the U.S. For the textile results, all parameter estimates have the expected signs and are statistically significant at the 1% level. For the apparel results, all estimated parameters are of expected signs and are significant at the 1% level, except for the parameters on per capita income and inflation rate for the exporting countries that are significant at the 10% and 5% levels, respectively. The fit statistics indicate R2 values of 0.98 and 0.86 for textiles and apparel, respectively, indicating that parameters of the regression models provide a good fit in explaining trade flows of textiles and apparel commodities.

As explained previously and in Table 2, GDP and per capita income of exporting countries are used, respectively, to represent their aggregate production capacity and productivity per capita of labor in output. Both estimated variables are positive as hypothesized and differ significantly from zero at the 1% level for the textiles results. For the apparel results, per capita income for exporting countries is significant at the 10% level, while the GDP for exporting countries is significant at the 1% level. This implies that a rise in exporting countries' total output and per capita productivity lead potentially to increase in exports of both textiles and apparel. The magnitudes of both variables are smaller than 1.0 in both models, implying that the values of textiles and apparel traded are not sensitive (inelastic) to the countries' production capacity or individual productivity of labor. This insensitivity in exporting countries may be attributed to either their excess production capacity, or their respective government's domestic support of the industry complex so as to encourage textiles and apparel firms to increase exports.

The parameters of GDP and per capita income for the U.S. were also of the expected signs and were significant at the 1% level for both textiles and apparel models, although the values were all larger than 1.0. The sensitivity of U.S. import demand for textiles and apparel implies that as incomes rise in the U.S., import demand for foreign-made textiles and apparel rise and vice versa. It may also imply that U.S. firms are willing to import more foreign-produced textiles at least in part because of relative price differences.

Indeed, the estimated coefficients on the price deflators in the U.S. and exporting countries were all of expected signs as hypothesized, and were all significant at the 1% level, except for the price deflator for exporting countries that was significant at the 5% level. The U.S. exhibited sensitivity to changes in domestic prices for both textiles and apparel imports. Therefore, as prices rise domestically, it is expected that less domestically produced commodities would be demanded, but more foreign-made products would be imported. Foreign-made products serve as good substitutes for domestically produced products. Therefore, it appears that increasing GDP deflator (signaling potential higher prices) in the U.S. would cause

the U.S. to increase imports of textiles and apparel from its trading partners. Likewise, decreasing prices in the exporting countries caused them to export more textiles and apparel to the U.S. These results reflect potential import substitution of textiles and apparel during periods of rising relative prices for textiles and apparel in the U.S., especially since relatively lower prices in exporting countries would make foreign-made textiles and apparel more attractive in the U.S. market and would increase the values traded. These results are consistent with results obtained by Oguledo and Macphee (1994) and Karemera et al. (1999).

The estimated parameter for exchange rate is significant at the 1% level, and is of the expected sign for both textiles and apparel. It shows that a proportional decrease in the exchange rate of local currency of the exporting country to the U.S. dollar will result in a proportional increase in value of textile and apparel imports to the U.S. Indeed, depreciation of an exporting country's currency relative to the dollar makes the exporting country's textiles and apparel products cheaper in the importing country's market, leading to increased trade flows. The variable for distance shows a negative and significant relationship at the 1% level with import values for both textiles and apparel, although the parameters are not sensitive to imports of textiles and apparel. The results may explain the possibility that as distance between the U.S. and its trading partners increases, the value of imported textiles and apparel declines. This may imply, ceteris paribus, that trade in textiles and apparel between the U.S. and countries in proximity, such as Mexico and Canada, must be expected to increase more than that with far distant countries, such as China.

Lastly, the significant (at the 1% level) but negative parameters on the dummy variable for MFA in both the textiles and apparel models indicate that generally imports of textiles and apparel were constrained by trade policy restrictions imposed on access to the U.S. market of foreign-produced textiles from most of the leading exporters as a result of the ATC.   Consequently, in tandem with the results of potential greater substitution of domestically produced products with foreign-produced products, the phase-out of the MFA in January 2005 should open the U.S. market to greater imports of foreign-produced textiles and apparel.

Concluding Comments and Implications

Although the popular press and textile and apparel interest groups decry the patterns of persistent imports of textiles and apparel products from abroad, to date, no empirical study has been conducted to explain the pattern of textiles and apparel trade between the U.S. and its trading partners. A major objective of this study is to fill that gap by providing econometric estimates to explain some of the key underlying factors supporting recent textiles and apparel trade flows into the U.S. We summarize some of the key policy findings from the study, and derive implications for U.S. agribusiness.

First, a nation's aggregate output and its per unit productivity serve as important determinants of textiles and apparel trade with the U.S., indicating that countries that produce relatively higher quality textiles and apparel would be able to stimulate greater trade with the U.S. Second, U.S. imports of foreign-made textiles and apparel have grown over time, especially as relative price differences between U.S. and foreign-manufactured products have grown, and U.S. importers have found greater substitution of domestic products with foreign-made products. Therefore, consistent with expectations of economic theory, a country's depreciating exchange rate as well as its lower prices relative to that of the U.S. play an important role in determining textiles and apparel trade flows to the U.S. market. In addition, although the aggregate nature of the variables used in the gravity model for this study does not allow a measure of the relative costs of inputs in the textiles and apparel production such as labor relative to capital, nevertheless, we are able to conclude from the results of aggregate price deflators that so long as textile and apparel products are perceived as cheaper abroad, U.S. importers will continue to purchase from abroad and global producers will find it profitable to sell their products in the U.S. market.

Third, the MFA is found to have slowed down imports of textiles and apparel from leading global exporting countries into the U.S. during the study period. Therefore, the abrogation of the MFA in January 2005 is expected to enable products from leading global manufacturers, such as China, to gain greater access to the U.S. market. However, the study finds that textiles and apparel imports would be constrained by distance.

Several implications can be drawn from this study. The study reveals that in tandem with the comparative advantages stemming from relative factor costs and output prices enjoyed by leading global exporters of textile and apparel trade, the phasing out of the MFA will increase imports of textiles and apparel into the United States. Obviously, if this trend is sustained, sizable portions of the U.S. market captured by importers from U.S. producers, causing relatively lower demand for U.S. textile products. Any lowering of demand for U.S textile products would negatively impact demand for U.S. cotton, with potential deleterious implications for the U.S. cotton industry. This is consistent with the conclusion by MacDonald et al. (2001). Additionally, the resulting freer trade and further increase in competition in the sector will likely lower prices of textile and apparel products, and further lead to decreasing U.S. employment in the industry complex. Potential gainers would be U.S. consumers of textile and apparel products, but losers would include those workers and communities that rely on cotton, textile, and apparel production for incomes to catalyze economic growth.

However, textile production (such as yarn and fabric) is more capital-intensive than apparel production. Therefore, U.S. textile producers could stand to gain a portion

of the global market, to the extent that they are able to diversify their marketing strategies to include targeting foreign buyers of U.S. textile yarns. If successful, this could cause demand for U.S. cotton to rise and potentially yield higher cotton prices. Although beyond the scope of our findings, we note that coordination between apparel and textile producers could be further enhanced when both textile and apparel products are manufactured in the same country or region. Consequently, U.S. textile manufacturers may find it beneficial to locate in proximity to apparel producers who are their customers. In fact, Kravis and Lipsey (1993) suggest that labor outsourcing has led to a shift toward more capital- and skill-intensive production in the U.S., as particularly unskilled–intensive production has been allocated to affiliates in developing countries, in part through foreign direct investment. Hudson et al. (2005) also conclude that textile manufacturers would be more interested in capturing factor-cost differentials on the labor component while retaining headquarters activities in the United States. Thus, U.S. textile manufacturers may want to take advantage of regional and bilateral trade initiatives to increase investment in apparel production in countries where relative labor and ancillary costs of production may be cheaper, and to transport their products back to the United States.

Despite the special safeguards imposed by the WTO to control for import surges from China, the ability of global competitors such as India and Pakistan in exporting relatively cheaper textiles and apparel to the U.S. following the January 2005 abolition of the MFA, must be a troubling source of concern to U.S. cotton, textiles and apparel producers and the relatively poor Southeastern U.S. rural communities in which they are located. Those communities are distressed by job losses and relatively low incomes prospects, stemming from earlier plant closures. Coupled with a low tax base, the communities would continue to be hard-pressed in maintaining public services such as spending on local education. Nevertheless, regardless of feckless efforts by interest groups and industry lobbyists to redefine the problem facing the industry complex, it appears to be driven by international trade fundamentals.

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Appendix: A

Linneman (1966) and Bergstrand (1985, 1989) assume that a generic import demand equation for a specific commodity can be derived that allows for imperfect substitution in consumption between trading countries, by maximizing a constant elasticity of substitution (CES) utility function (U_{ij}) subject to income constraints in the importing country as follows:

$$U_j = (\sum_{i=1}^{N} X_{ij}^{\theta_j})^{1/\theta_j} \tag{1}$$

Where:

X_{ij} = the quantity of a commodity imported from country i to country j (and N is the number of exporting countries).

It is assumed that a commodity can be differentiated by country of origin such that in the exponent, $\theta_j = (\sigma_j - 1)/\sigma_j$, where σ_j, is the CES among imports. Consumption expenditures are limited by the income constraints (Y_j) of importing country *j* as:

$$Y_j = \sum_{i=1}^{N} \bar{P}_{ij} X_{ij} \text{ ; Where } \bar{P}_{ij} = P_{ij} T_{ij} C_{ij} / E_{ij} \qquad (2)$$

Where:

P_{ij} = the unit price of country i's commodity sold in country j's market;
T_{ij} = $1 + t_{ij}$ where t_{ij} is import tariff rates on j's imports;
C_{ij} = the transport cost of shipping i's commodity to country j; and
E_{ij} = the spot exchange rate of country j's currency in terms of i's currency.

By using the Lagrangian function to maximize utility (equation 1) subject to income constraint (equation 2), deriving the first order conditions and solving generates the import demand equation as:

$$X_{ij}^d = Y_j P_{ij}^{-\sigma j} T_{ij}^{-\sigma j} C_{ij}^{-\sigma j} E_{ij}^{-\sigma j} (\sum_{i=1}^{N} \bar{P}_{ij}^{1-\sigma_j})^{-1} \qquad (3)$$

Where: X_{ij}^d = the quantity of i's export to country j; and all other variables are as previously defined.

The model of trade supply equation is derived from a firm's profit maximization procedure in exporting countries. The total profit function of the producing firms is given as follows:

$$\Pi_i = \sum_{j=1}^{N} P_{ij} X_{ij} - W_i R_i \qquad (4)$$

Where:

P_{ij} = the export price of i's commodity paid by importing country j;
X_{ij} = the amount of i's commodity imported by country j;
W_i = country i's currency value of a unit of R_i;
R_i = the resource input used in the production of the commodity in country i.

R_i is allocated, assuming imperfect substitution in factor inputs for producing the export commodity, through a constant elasticity of transformation (CET) production defined as:

$$R_i = [(\sum_{i=1}^{N} X_{ij}^{\phi_i})^{1/\phi_i}]^{1/\delta_i} \tag{5}$$

Where in the exponent, ϕ_i is the parameter on the production function for each exporting country indicating production with fixed factor proportions, and $\delta_i = (1 + \gamma_i)/\gamma_i$ and γ_i is the CET among exporters. Furthermore, we assume that income is a limiting factor in producing textile and apparel in the exporting countries. Therefore, $Y_i = W_i R_{i,}$ where Y_i is the allocated income. Substituting equation 5 into equation 4, maximizing the resulting profit function, and solving yields the export supply equation as follows:

$$X_{ij}^s = Y_i P_{ij}^{\gamma_i} (\sum_{i=1}^{N} P_{ij}^{1+\gamma_i})^{-1} \tag{6}$$

General equilibrium conditions require demand to equal supply. Therefore:

$$X_{ij}^d = X_{ij}^s = X_{ij} \tag{7}$$

Where X_{ij} is the equilibrium or actual quantity of the commodity traded from country i to country j. By equating equation 3 to equation 6, the commodity specific gravity equation is derived as in a reduced form as follows (where all the variables have previously been defined):

$$X_{ij} = Y_i^{\frac{\gamma_j}{\sigma_j+\gamma_i}} Y_j^{\frac{\sigma_j}{\sigma_j+\gamma_i}} T_{ij}^{-\frac{\gamma_i\sigma_j}{\sigma_j+\gamma_i}} C_{ij}^{\frac{\gamma_i\sigma_j}{\sigma_j+\gamma_i}} E_{ij}^{\frac{\gamma_i\sigma_j}{\sigma_j+\gamma_i}} (\sum_i^N P_{ij}^{1+\gamma_i})^{-\frac{\sigma_j}{\sigma_j+\gamma_i}} (\sum_j^N \bar{P}_{ij}^{1-\sigma_j})^{-\frac{\gamma_i}{\sigma_j+\gamma_i}} \tag{8}$$