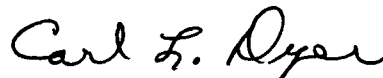


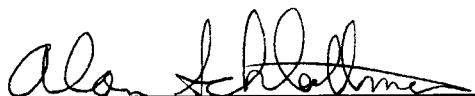
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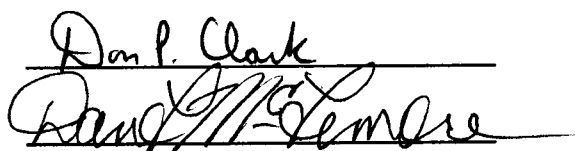
I am submitting herewith a dissertation written by Kathleen Louise Rees entitled "Estimation of the Income and Price Elasticities of U.S. Demand for Apparel Imports from Mexico and the Rest of the World in Aggregate and by MFA Fiber Classifications." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Human Ecology.



Carl L. Dyer, Major Professor

We have read this dissertation
and recommend its acceptance:





Accepted for the Council:



Associate Vice Chancellor
and Dean of The Graduate School

Estimation of the Income and Price Elasticities of U.S. Demand for
Apparel Imports from Mexico and the Rest of the World
in Aggregate and by MFA Fiber Classifications

A Dissertation
Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

Kathleen Louise Rees

December 1993

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ABSTRACT

The purpose of this research was to estimate the income and price elasticities of U.S. demand for apparel imports from Mexico and the rest of the world in aggregate and by fiber categories commonly used in bilateral negotiation of trade agreements under the Multifiber Arrangement. In addition, elasticities of demand were also estimated for aggregate 9802 and Special Regime imports from Mexico, categories which have been afforded preferential tariff and quota treatment.

Secondary data from a variety of government and industry sources were used to estimate U.S. demand for apparel imports. Monthly time series data for the period January, 1983, through September, 1991, were used to estimate U.S. demand for aggregate apparel imports and imports of cotton, man-made, and wool fibers from both Mexico and the rest of the world. Time series data used in estimating U.S. elasticities of demand for 9802 and Special Regime apparel imports from Mexico covered the time period January, 1983, through December, 1989. Two single equation, double log-linear models were used to estimate the elasticities of demand. Ordinary least squares and generalized least squares regression techniques were employed in the estimation process.

Based on the economic theory of consumer demand, U.S. demand for apparel imports was hypothesized to be a function of disposable consumer income, relative prices, and a proxy variable representing consumer tastes and preferences. Results of the empirical analysis, in general, supported *a priori*

expectations, and most parameter estimates were of the anticipated signs and statistically significant. The findings of this research contributes to empirical study of U.S. demand for apparel imports and will be of value in further analysis of U.S. trade policy as negotiation of the Uruguay Round of the General Agreement on Tariffs and Trade proceeds, discussion of elimination of the Multifiber Arrangement continues, and implementation of the North American Free Trade Agreement is undertaken.

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CHAPTER I

INTRODUCTION

This dissertation is primarily concerned with estimating the income and price elasticities of U.S. demand for apparel imports from Mexico and the rest of the world. Three current events have prompted renewed interest in U.S. trade in textiles and apparel. One, ongoing discussions regarding significant liberalization of U.S. tariffs on textiles and apparel imposed under the auspices of the General Agreement on Tariffs and Trade (GATT) have suggested that tariff levels be reduced as much as 50 percent, thereby opening the U.S. market to increased textile and apparel imports. Second, it has been proposed that the Multifiber Arrangement (MFA) be phased out, which in effect would eliminate the existing framework for bilateral negotiation and imposition of quantitative restrictions on textile and apparel imports from developing nations, with the return of regulation of international trade of textiles and apparel to GATT. Finally, the recent negotiation of a free trade agreement between the United States, Canada, and Mexico, the North American Free Trade Agreement (NAFTA), has been considered by some to be the first significant effort to liberalize trade in textiles and apparel between the United States and a developing country, and this has resulted in interest regarding potential increases in production sharing and importation of textiles and apparel from Mexico.

Structure of the Apparel Industry

Apparel production is highly labor intensive, requiring an unskilled or semi-skilled labor force. Training requirements and costs for most assembly tasks are minimal, and due to both the characteristics of the fabrics used in apparel production and the need for dexterity in handling such tasks, automation of assembly processes has been limited (Dickerson, 1991; Fitzpatrick, 1983; Leigh, 1990). In addition, apparel manufacturing has traditionally employed simple and relatively inexpensive technology. In contrast to other types of industry, the initial establishment of apparel production facilities requires comparably little capital investment or outlay, with the basic requirements for assembly typically involving only sewing and pressing equipment and a labor supply.

With the barriers to entry for apparel production being quite low, developing nations possessing excess labor supplies and wages significantly lower than those paid in developed nations have, historically, moved into manufacturing through apparel assembly in order to enhance economic growth and development. Thus, apparel production has traditionally been one of the first sectors into which developing countries have entered when initiating strategies of industrial development (Dickerson, 1988; Dickerson, 1991; Fitzpatrick, 1983). In many developing countries, apparel assembly has been undertaken to provide for both domestic demand and export production, as well as to provide foreign exchange (Dickerson, 1988; Dickerson, 1991; Wolff, et. al., 1987).

Import Penetration of the Domestic Apparel Market

According to the United States Department of Commerce, annual imports of apparel have risen from \$8.7 billion to \$32.95 billion, an increase of approximately 300 percent, during the past ten years. With the steady growth in imports, the U.S. apparel market has been overtaken by imported apparel. Currently, imports comprise over 66 percent of the apparel available within the domestic market (American Textile Manufacturers Institute, 1993), with the United States being the primary market of interest for many foreign apparel exporters (Barrett, 1993b; Wolff, et. al., 1987). Figure 1.1 and Table 1.1 illustrate the penetration of the domestic apparel market by imports between 1974 and 1992.

With a substantial and rapid increase in imports, the apparel sector has become one of the largest components of the U.S. merchandise trade deficit. Figure 1.2 and Table 1.2 present the growth in the U.S. apparel trade deficit during the past 20 years. By 1992, the trade deficit for apparel, alone, had increased to \$28.86 billion, accounting for over 34 percent of the total U.S. deficit in merchandise trade (American Textile Manufacturers Institute, 1993).

The majority of the imported apparel entering the United States originates in developing countries (Fitzpatrick, 1983; Dardis & Sul, 1983; Edwards, 1989; Tucker & D'Andrea, 1993). Currently, the primary foreign suppliers of apparel (Standard Industrial Classification 23) are China, Hong Kong, South Korea, Taiwan, and Mexico (see Figure 1.3 and Table 1.3). These five countries jointly

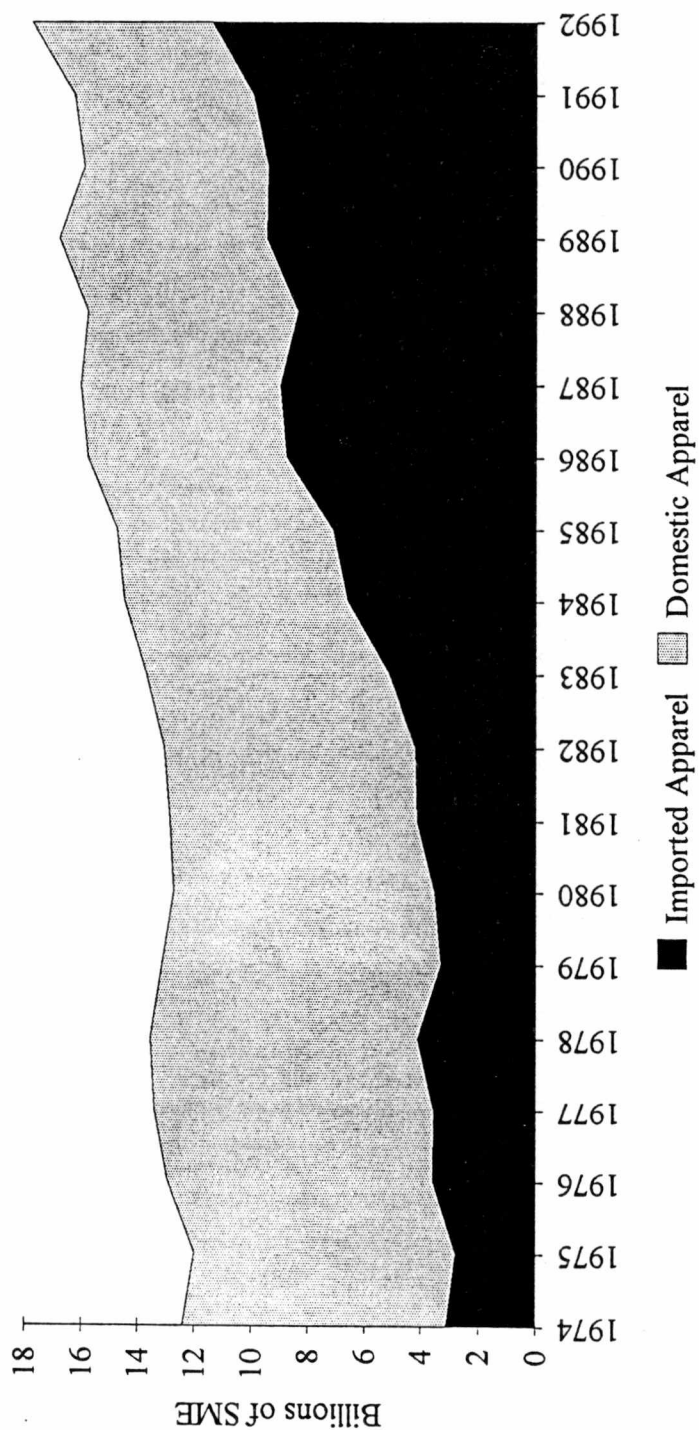


Figure 1.1 Penetration of imported apparel within the U.S. market, 1974-1992

Adapted from:

American Textile Manufacturers Institute. (1993, September). Textile Hi-Lights. Washington, DC: American Textiles Manufacturing Institute, Incorporated. p. 24.

Table 1.1 Penetration of Imported Apparel within the U.S. Market, 1974-1992

Year	U.S. Apparel Market	Imported Apparel	Domestic Apparel	Percentage Imports
1974	12.417	3.123	9.294	25.1
1975	12.006	2.801	9.205	23.3
1976	12.947	3.610	9.337	27.9
1977	13.415	3.570	9.845	26.6
1978	13.560	4.144	9.416	30.6
1979	13.146	3.334	9.812	25.4
1980	12.746	3.548	9.198	27.8
1981	12.882	4.160	8.721	32.3
1982	13.077	4.232	8.846	32.4
1983	13.716	5.178	8.538	37.8
1984	14.500	6.655	7.846	45.9
1985	14.771	7.165	7.606	48.5
1986	15.801	8.797	7.004	55.7
1987	16.069	9.019	7.050	56.1
1988	15.808	8.400	7.408	53.1
1989	16.825	9.507	7.318	56.5
1990	16.240	9.465	6.775	58.3
1991	16.051	9.985	6.066	62.2
1992	16.247	11.419	5.828	66.2

Notes: Data are in billions of square meter equivalents. Apparel imports include both finished garments and the estimated volume of imported yarn and fabric used in apparel assembled domestically.

Source: American Textile Manufacturers Institute. (1993, September). Textile Hi-Lights. Washington, DC: American Textiles Manufacturing Institute, Incorporated. p. 24.

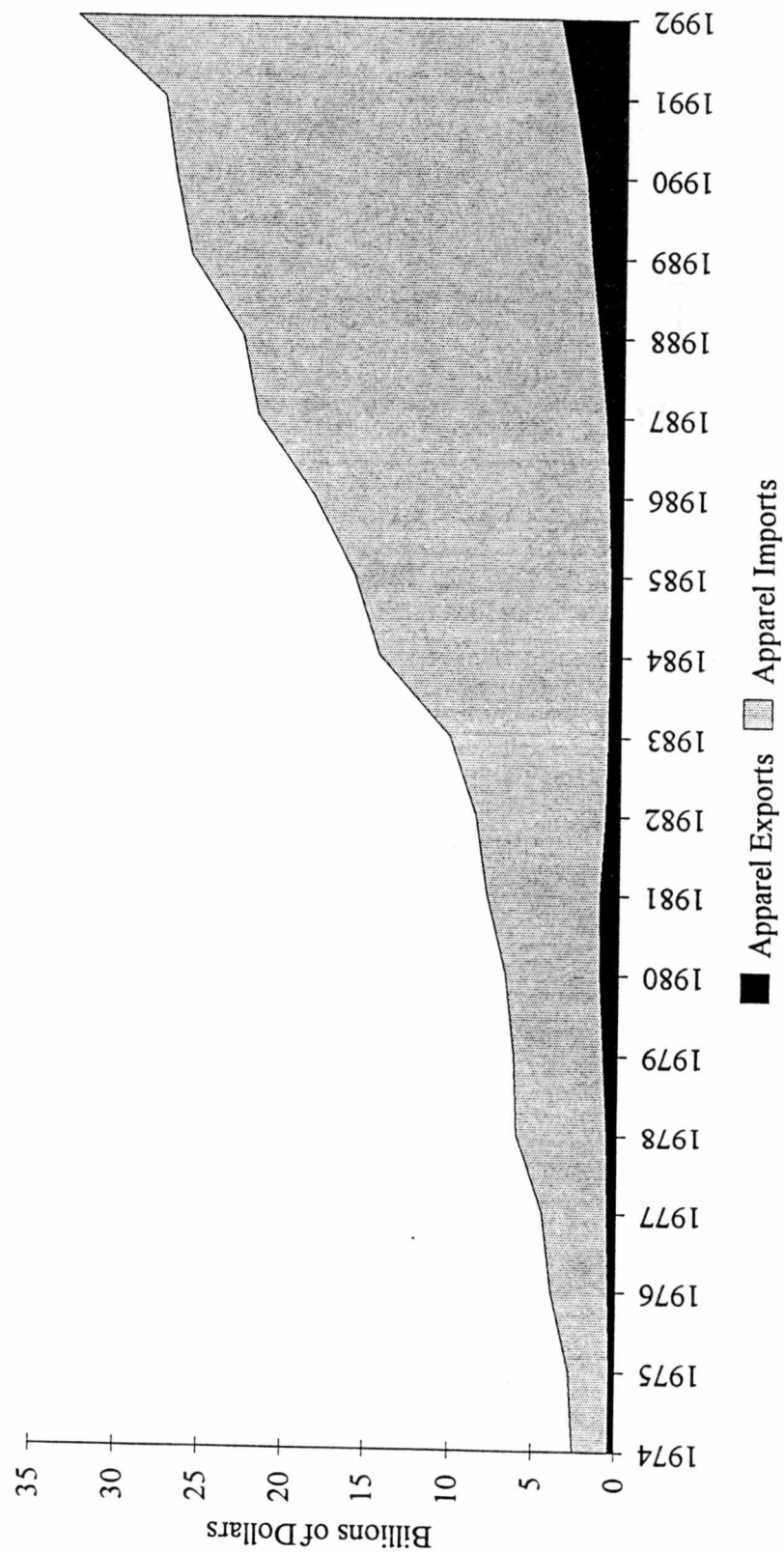


Figure 1.2 U.S. apparel trade deficit, 1974-1992

Adapted from:

American Textile Manufacturers Institute. (1993, June). Textile Hi-Lights. Washington, DC: American Textiles Manufacturing Institute, Incorporated. p. 25.

Table 1.2 U.S. Apparel Trade Deficit, 1974-1992

Year	Apparel Imports	Apparel Exports	Trade Deficit
1974	2,517	400	2,117
1975	2,826	403	2,423
1976	3,938	510	3,428
1977	4,493	608	3,885
1978	6,108	677	5,431
1979	6,291	931	5,360
1980	6,849	1,202	5,647
1981	8,008	1,232	6,776
1982	8,703	953	7,750
1983	10,292	818	9,474
1984	14,513	807	13,706
1985	16,056	755	15,301
1986	18,554	900	17,654
1987	21,960	1,132	20,828
1988	22,877	1,575	21,302
1989	26,026	2,087	23,939
1990	26,977	2,481	24,496
1991	27,699	3,215	24,484
1992	32,951	4,093	28,858

Notes: Data are millions of U.S. dollars. Import values are cost, insurance, and freight (C.I.F.) values; export values are free along ship (F.A.S.) values.

Source: American Textile Manufacturers Institute. (1993, June). Textile Hi-Lights. Washington, DC: American Textiles Manufacturing Institute, Incorporated. p. 25.

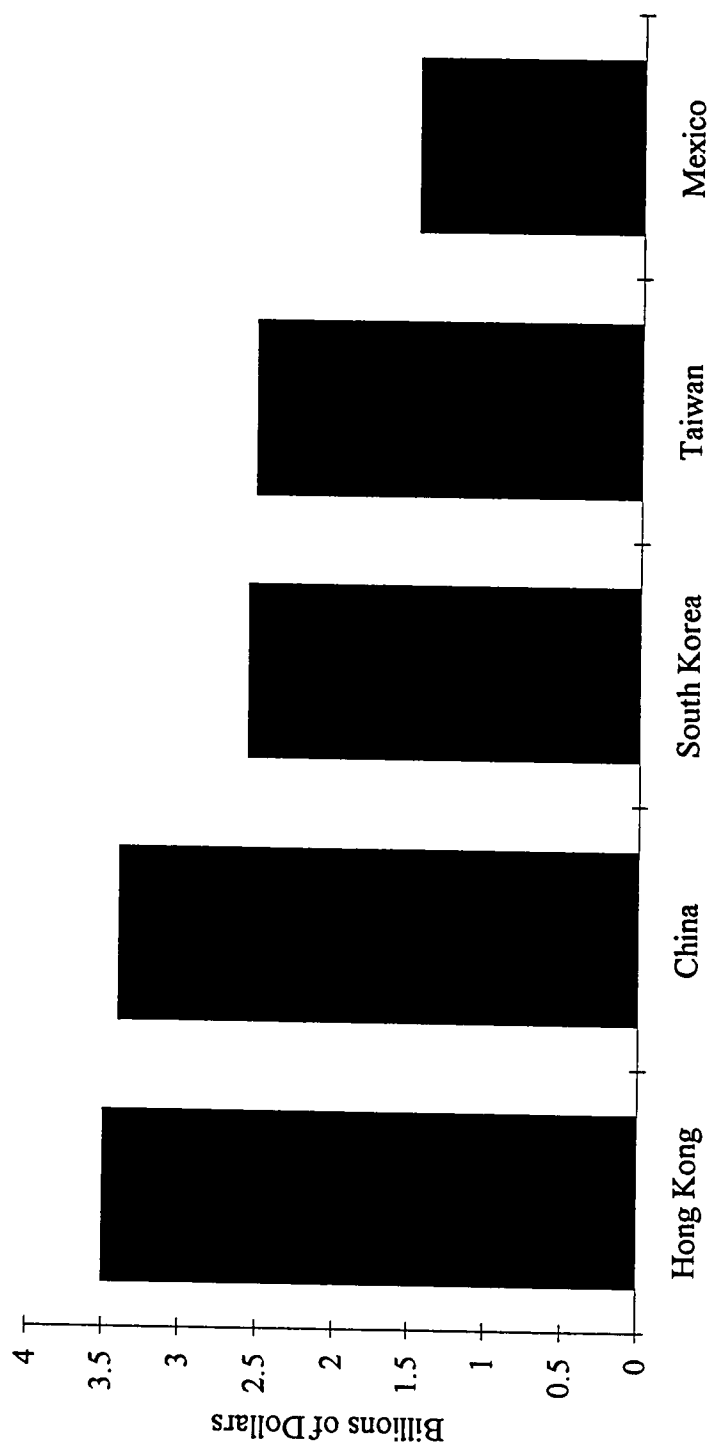


Figure 1.3 Primary foreign suppliers of apparel to the U.S. market, 1992

Adapted from:

Tucker, J., & D'Andrea, M. (1993). Apparel and fabricated textile products. U.S. industrial outlook '93. Washington, DC: U.S. Department of Commerce. p. 32-7.

Table 1.3 Primary Foreign Suppliers of Apparel to the U.S. Market, 1992

Country	Value	Share of Total Apparel Imports
Hong Kong	3.503	13.8%
China	3.411	13.5%
South Korea	2.581	10.2%
Taiwan	2.539	10.0%
Mexico	1.476	5.8%

Notes: Data are billions of U.S. dollars. Data reflect U.S. imports within Standard Industrial Classification (SIC) 23, which includes apparel and other textile products.

Source: Tucker, J., & D'Andrea, M. (1993). Apparel and fabricated textile products. U.S. industrial outlook '93. Washington, DC: U.S. Department of Commerce. p. 32-7.

accounted for 53.3 percent of U.S. imports of this classification in 1991 (Tucker & D'Andrea, 1993).

While Far Eastern countries have traditionally been the major suppliers of imported apparel (Cline, 1990; Dardis & Sul, 1983), production has more recently begun to shift to the Caribbean countries and Mexico, primarily due to special tariff and quota concessions afforded imports from these countries through U.S. Tariff Schedule Items 9802 and 9802.00.80.10 and the Special Regime program (Barker, 1991; Edwards, 1989; Tucker & D'Andrea, 1993). Growth in imports has been especially great for Mexico, with U.S. apparel imports from this country alone increasing by more than 230 percent since 1987 (Barrett, 1992b; Hufbauer & Schott, 1992). Figure 1.4 illustrates the growth in apparel imports from Mexico between 1985 and 1991; the accompanying data is presented in Table 1.4.

Protection of the Domestic Apparel Industry

Continued growth in apparel imports from developing countries has been viewed by some within the industry as threatening. Because the textile and apparel sector has, historically, comprised one of the largest sectors of domestic manufacturing employment and has possessed significant political clout, it has aggressively lobbied for, and received, preferential treatment designed to protect the industry from imports. It has traditionally been among the most highly regulated and protected sectors of the domestic economy (Cline, 1990; Destler, 1992; Dyer, Rees, & Hathcote, 1993).

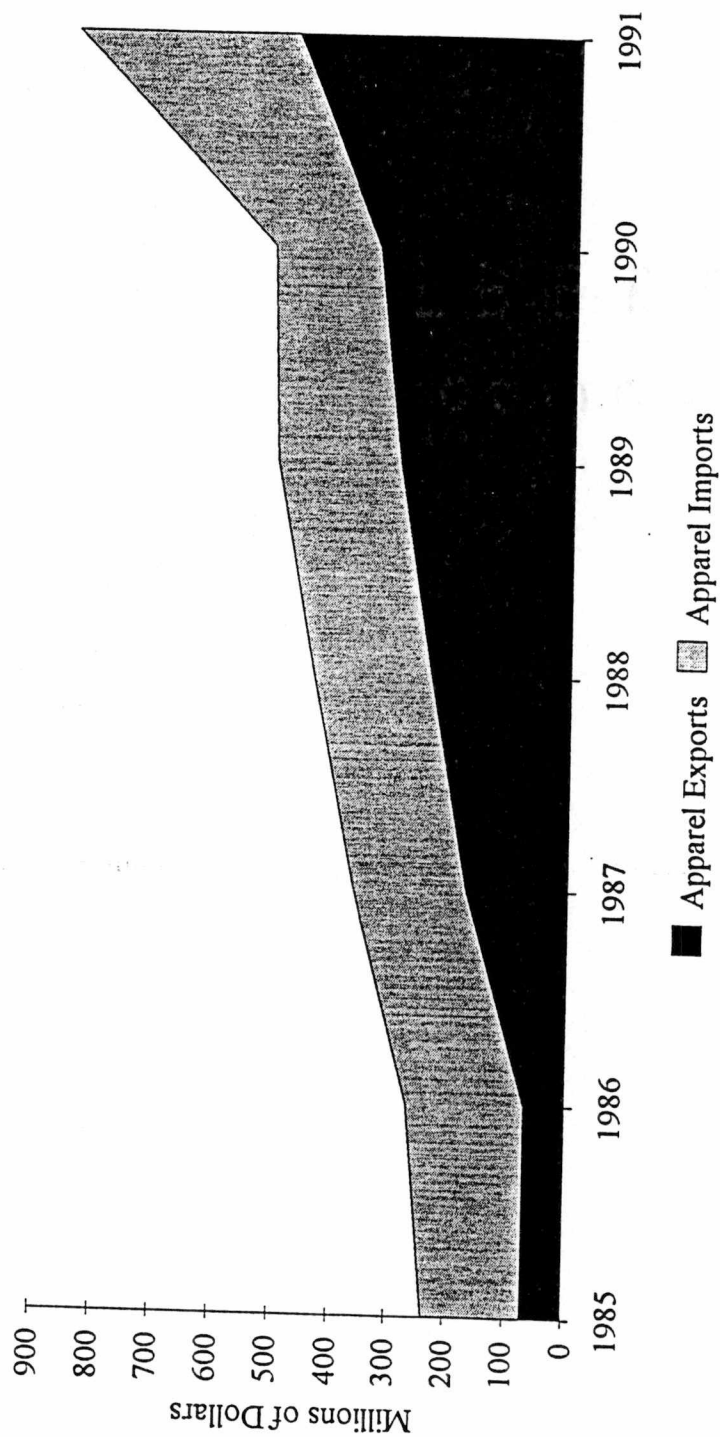


Figure 1.4 U.S apparel trade with Mexico, 1985-1991

Data sources: Hufbauer, G. C., & Schott, J. J. (1992). North American free trade: Issues and recommendations. Washington, DC: Institute for International Economics. p. 265.

Barrett, (1992). NAFTA draws mixed reviews. Daily News Record, 22(156), 4.

Table 1.4 U.S. Apparel Trade with Mexico, 1985-1991

Year	Apparel Imports	Apparel Exports	Trade Deficit
1985	237	70	167
1986	270	70	200
1987	366	174	192
1988	438	238	200
1989	504	296	208
1990	514	336	178
1991	851	481	370

Note: Data are millions of U.S. dollars.

Sources: Barrett, J. (1992). NAFTA draws mixed reviews. Daily News Record, 22(156), 4.

Hufbauer, G. C., & Schott, J. J. (1992). North American free trade: Issues and recommendations. Washington, DC: Institute for International Economics. p. 265.

The primary means by which the industry has been shielded from imports from low wage, developing countries have been (1) *ad valorem* tariffs designed to increase the price of imported apparel to a level more competitive with the domestic price and (2) quotas, which impose quantitative restrictions on the volume of foreign apparel which can enter the domestic market (Dickerson, 1991). Protection for the industry has been promulgated through a series of international arrangements, including both multilateral agreements negotiated within the framework of the General Agreement on Tariffs and Trade and bilateral agreements negotiated under the Multifiber Arrangement.

The General Agreement on Tariffs and Trade

International apparel trade has been regulated through the General Agreement on Tariffs and Trade since it was initially formed in 1947. Today, GATT serves as a forum for multilateral negotiation of the rules by which international trade among the 115 member nations, and nonmember nations which support GATT decisions and agreements, will be conducted. The primary aims of GATT have been to foster nondiscriminatory treatment among trading parties and to liberalize international trade through the gradual reduction of tariffs imposed for the expressed purpose of protecting domestic markets from disruption by excessive levels of imports (Cohen, 1989; Dickerson, 1991).

The framework developed within GATT has specified that international trade negotiations be multilateral, rather than bilateral, with all contracting parties

being granted the same terms of trade through the most-favored-nation principle. In addition, the rules set forth by GATT have disallowed the use of non-tariff barriers (such as quotas) by signatory countries in protecting their domestic industries from imports, specifying that tariffs should be employed, instead (Cohen, 1989; Dickerson, 1991). GATT has, however, supported the formation of regional trading blocs designed to reduce barriers to trade (such as that proposed through the North American Free Trade Agreement), provided such alliances are not to the disadvantage of other trading partners outside the bloc (Dickerson, 1988; Dickerson, 1991).

The degree of protection that the apparel sector has sought, received, and maintained under GATT is readily apparent in reviewing the tariff rates applicable to apparel imports over time. The average nominal tariff rate for U.S. apparel imports prior to the Kennedy Round (1962) was 25 percent, while the average tariff rate imposed on all U.S. imports of manufactured goods was only 11.5 percent. Following the Kennedy Round, the average nominal tariff rate for apparel imports increased to 27 percent. Negotiation of the Tokyo Round (1987) resulted in a decrease in the average nominal tariff rate assessed on apparel imports, to 22.5 percent, while the average nominal tariff for U.S. imports of all manufactures fell to 6.5 percent. Maintenance of relatively high tariff rates reinforces protection of the domestic industry in continuing to restrain imports and reveals the degree of threat perceived by the domestic apparel sector from the increasing volume of apparel from competitive foreign suppliers (Cline, 1990).

Currently, negotiations within the Uruguay Round of GATT have focused on significant decreases in the tariff rates applied to U.S. imports of apparel, in order to provide further access to the market for foreign country suppliers. Proposals of cutting U.S. tariff rates by 40 to 50 percent for the most sensitive sectors (i.e., the categories on which tariff rates are in excess of 15 percent or categories for which imports from European Community countries comprise 10 percent or more of aggregate U.S. imports) have been proposed in order to move the round of negotiations to completion (Barrett, 1993a; Ostroff, 1993; U.S. Textiles Averts, 1993).

While the General Agreement on Tariffs and Trade has unequivocally specified that negotiation of international trade agreements be multilateral and that tariffs, rather than quantitative restraints, be utilized in regulation of trade to protect import sensitive sectors, it has granted exceptions to these basic rules. One of the largest and most important exemptions has been afforded the textile and apparel sector through the formation and implementation of the Multifiber Arrangement (Dickerson, 1991).

The Multifiber Arrangement

In addition to tariff protection offered under GATT, the textile and apparel sector has been granted further protection through the establishment, in 1974, of the Arrangement Regarding International Trade in Textiles, more commonly referred to as the Multifiber Arrangement (MFA). The framework

established through the MFA departs from GATT provisions disallowing both bilateral negotiation of trade agreements which violate the most-favored-nation principle and the imposition of quantitative restrictions on trade rather than utilization of tariff barriers. Under the MFA, bilateral quotas have been negotiated and are imposed on approximately 80 percent of foreign textiles and apparel entering the U.S. market from developing countries, which can typically produce apparel at lower costs due to existing wage and production cost differentials. Such protection has been actively sought by both the United States and the European Community in order to avoid disruptions of their domestic markets by rising levels of imports (Cline, 1990; Cohen, 1989; Dickerson, 1991).

The precedent for formation of the MFA can be traced to the mid-1950s, when industry concern initially began regarding the increase in textile and apparel imports from Japan and other Asian countries. A five-year, voluntary export restraint agreement was originally instituted in 1957, limiting Japanese exportation of cotton textiles to the United States (Cohen, 1989; Cline, 1990). This was followed, in 1961, by a second bilateral agreement to further constrain imports of both cotton textiles and apparel from Japan (Cohen, 1989). While these agreements were effective in restraining growth of imports from one foreign supplier, other Far Eastern countries (such as Hong Kong) began aggressive industrial and economic development which included exportation of textile and apparel products to the U.S. and other developed countries (Cohen, 1989; Cline, 1990; Dickerson, 1991).

By the 1960s, the developed countries shared a common concern regarding increased levels of textile and apparel imports from developing countries (Cohen, 1989). Enactment of the Short-Term Arrangement Regarding International Trade in Cotton Textiles (STA) in 1961, resulted from an international conference of the major textile-importing countries, as an effort to constrain the growth of imports for 64 categories of cotton textile products. It was feared that increased imports would cause injury, or threaten market disruption, to the established industries within the developed countries (Cline, 1990; Cohen, 1989). The STA remained in effect (with a five year extension) from October, 1961, through October, 1967 (Cohen, 1989). The Short-Term Arrangement subsequently became the Long-Term Cotton Textile Arrangement (LTA) which, with two extensions in 1967 and 1970, limited cotton imports from developing countries through December of 1973 (Cohen, 1989; Cline, 1990; Dickerson, 1991).

The Short-Term Arrangement and the Long-Term Arrangement limited only textile and apparel imports of cotton. With cotton imports constrained, foreign suppliers of textiles and apparel began to expand export production by shifting, instead, to the use of man-made fibers which were not subject to import constraints under the STA and LTA (Cohen, 1989; Cline, 1990; Dickerson, 1991). To protect the domestic market from rapidly growing imports of alternative fibers, in 1971, the United States negotiated bilateral agreements with the major supplier countries of Hong Kong, Japan, Malaysia, South Korea, and Taiwan, restraining

imports of textiles and apparel of cotton, wool, and man-made fibers (Cohen, 1989).

In 1974, the Arrangement Regarding International Trade in Textiles superseded the LTA, and remained in effect from January of 1974, through December of 1977. The original Multifiber Arrangement (MFA I) has subsequently been amended, and it has been renewed three times. The MFA currently serves as both the framework under which textile and apparel trade among signatory countries is regulated and the underlying authority for negotiation of bilateral textile and apparel trade agreements. Through such agreements, contracting parties are enabled to impose quantitative restraints (i.e., quotas) on product categories and groups of categories from individual supplier countries (Cohen, 1989; Cline, 1990; Dickerson, 1991).

The original intent of the MFA was to protect the textile and apparel industries within developed countries from potential disruption, while gradually liberalizing trade within the sector. Over time, however, growth of quota allocations for major suppliers has gradually declined from the 6 percent growth rate originally instituted to only 1 percent or less per year for the largest supplying countries, and the number of restricted categories has increased (Cline, 1990). Under pressure from developing countries, however, the Punta del Este agreement, as part of the Uruguay Round of GATT negotiations, has outlined the phaseout and elimination of the MFA over a ten year period and reintegration of

textile and apparel trade under traditional GATT rules (Barker, 1991; GiaQuinta, 1989; James, 1991; Rosenthal, 1990).

Effects of Trade Restraints Imposed on Apparel Imports

Tariff and quota restrictions have aggressively been sought by producing interests within the textile and apparel sector in order to protect the industry from excessive levels of imports entering the domestic market from developing countries possessing comparative advantages resulting from lower wage rates and governmental support through subsidized production and provision of additional incentives for export production. Protection of the apparel industry, therefore, has been considered essential in protecting the domestic market from potential disruptions which could occur through continual growth of imports and import surges and resultant erosion of employment and wages within the domestic industry (Cline, 1990; Destler, 1992).

While the imposition of trade barriers under GATT and the MFA have served to protect domestic producers and have enabled maintenance of relatively high levels of employment within the textile and apparel sector, the effects of both tariffs and quotas have been considered disadvantageous to consumers, importers, retailers, and the general welfare of the economy. The utilization of tariffs and quotas has diminished the volume and variety of apparel traded and increased prices paid for both domestic and imported apparel. Such protection has further been cited as fostering increased inefficiency of production within the United

States and reducing the quality of domestic production within a less competitive environment (Bergsten, 1972; Dardis, 1988; Dickerson, 1991).

Impact of the Imposition of a Tariff

Figure 1.5 illustrates the initial effects of the imposition of an *ad valorem* tariff; this model will also be used to discuss the effects of a quantitative restraint, or quota, imposed on imported apparel. Embodied in the model are the basic assumptions that domestic and imported apparel are homogenous goods and that the world supply of apparel to the domestic market is perfectly elastic. Domestic consumer demand for apparel is indicated by DD and domestic supply by SS. In the absence of trade barriers, the world supply to the domestic market would be $P_w S_w$, and the price paid by domestic consumers for apparel would be P_w . Under the free trade scenario, therefore, the quantity of apparel demanded and consumed would be $0Q_4$. At this price, domestic producers would be able and willing to supply $0Q_1$, while foreign producers would furnish Q_1Q_4 (Dardis, 1988; Grimwade, 1989).

With the imposition of an *ad valorem* tariff ($P_w P_w^T$) on imported apparel, the world supply would shift to $P_w^T S_w^T$, and the price of apparel would also be increased, by the amount of the tariff, to P_w^T . At the higher price, consumer demand for apparel would decrease to $0Q_3$, reflecting consumer inability or unwillingness to pay the increased price for apparel (Dardis, 1988; Hirshleifer, 1984). While the price increase resulting from the tariff decreases the quantity of

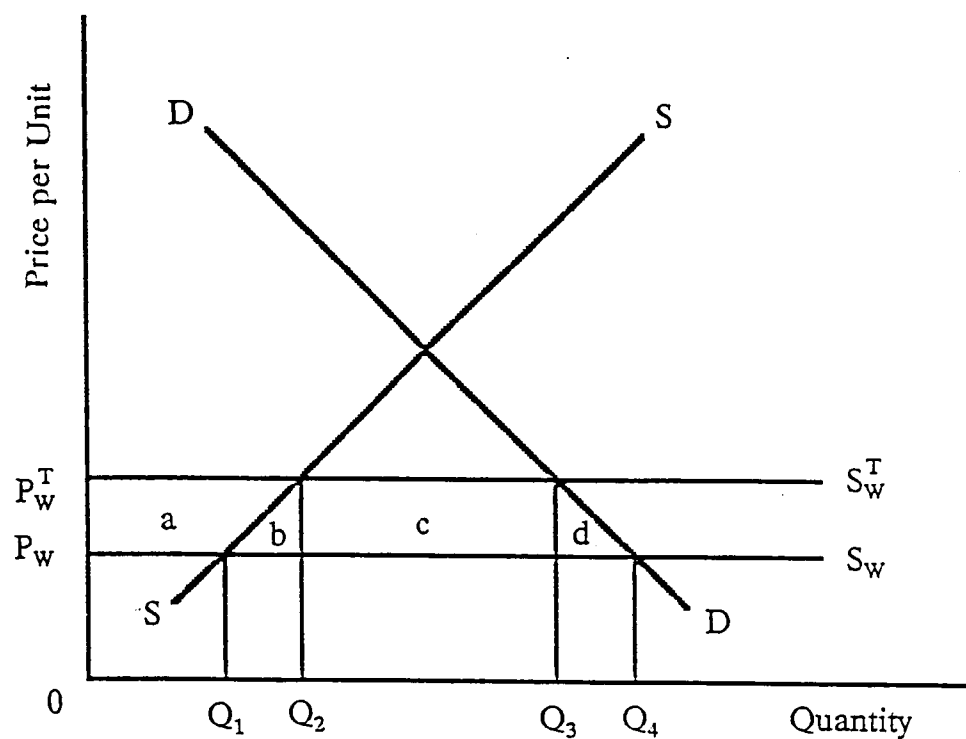


Figure 1.5 Impact of the imposition of a tariff or quota on domestic demand for apparel

Adapted from: Grimwade, N. (1989). International trade: New patterns of trade, production, and investment. New York: Routledge. p. 26.

apparel that consumers demand, domestic production expands. At the higher price, domestic producers are able and willing to supply a greater quantity of apparel. The quantity of domestically produced apparel, therefore, would increase to OQ_2 , and the quantity supplied by foreign producers would diminish to Q_2Q_3 (Dardis, 1988; Grimwade, 1989).

The imposition of a tariff not only alters the quantity of apparel demanded and supplied and the price paid, but also affects consumer and producer welfare. The resultant price increase causes a loss of consumer surplus equivalent to areas a, b, c, and d. A portion of this loss, area a, is a transfer from domestic consumers to domestic producers, and becomes a gain of domestic producer surplus. Area c comprises the transfer from domestic consumers to the domestic government in the form of tax revenue accrued through collection of the tariff on imported apparel. The two triangular areas, b and d, illustrate the welfare loss that results when the tariff is imposed, and both represent deadweight losses to the economy. Area b represents the deadweight production loss which occurs when domestically produced apparel, which is less efficiently produced, replaces imported apparel produced at a lesser cost. The deadweight loss in area d consists of the consumption efficiency loss which occurs when lower priced imported garments are no longer available within the market, due to the price increase resulting from the tariff (Dardis, 1988; Grimwade, 1989; Hirshleifer, 1984).

Impact of the Imposition of a Quota

When a quantitative restraint, such as a quota implemented through bilateral negotiation within the framework of the MFA, is also imposed on apparel imports from developing countries, the quantity of apparel supplied and consumed within the domestic market is further reduced, and the price paid by consumers for both domestic and imported apparel is, again, increased. Domestic producers, given the increased protection afforded by the quota, are able to provide a larger share of apparel within the market, while the quantity imported is further diminished (Dardis, 1988; Hirshleifer, 1984).

While the mechanism by which a tariff limits imports is a change in price which increases the cost of the imported good for the consumer and, therefore, makes it more comparable to that of the domestically produced good, a quota establishes the maximum quantity of a good that can be imported. As a tariff increases the price of the imported good and reduces the quantity demanded, a quantitative restriction which limits the volume of imported apparel that can enter the domestic market also decreases the quantity supplied, raises the price of the imported good, and decreases the quantity demanded.

The imposition of a quota on apparel imports, as illustrated in Figure 1.5, would reduce the quantity imported from Q_1Q_4 , the quantity that would be imported with no trade restraints, to Q_2Q_3 . With the volume of imports constrained at this level, the price would increase to P_w^T . Domestic production would increase, as with the imposition of a tariff, and the loss of consumer

surplus, transfer and gain of domestic producer surplus, and deadweight efficiency losses would be equivalent (Dardis, 1988; Hirshleifer, 1984).

With a quota, however, area c no longer represents a transfer from domestic consumers to the domestic government, but rather comprises the scarcity rent which results from establishment of the quota. The beneficiary of the scarcity rent is dependent upon the manner in which the quota is administered and to whom the quota is allocated. If the quota is auctioned by the domestic government, the benefit of the quota remains with the domestic government. More commonly, however, quotas are allocated to producers and exporters within the foreign country to which the quota has been assigned (as with voluntary export restraints), and the producers or exporters gain the profit accrued from the quota. The loss of revenue which occurs when the quota is assigned to the exporting country in this manner, therefore, results in a greater welfare loss to the domestic economy than that which occurs when a tariff is employed in restraining imported apparel (Dardis, 1988; Hirshleifer, 1984).

Thus, while the implementation of tariff and quota barriers has served to protect the domestic industry and employment within the sector, it also has imposed welfare burdens on both U.S. consumers and the general economy, as well as impeding levels of trade which otherwise would have existed. It has been estimated that tariffs and quotas imposed on textile and apparel imports have resulted in increased consumer costs of \$6.65 billion (Hufbauer, Berliner, & Elliot, 1986), \$8.5-11.0 billion (Hickock, 1985), \$10.4 billion (De Melo & Tarr,

1992) \$13 billion (Dardis, 1988), to \$20.34 billion (Cline, 1987) annually while protecting 234,900 (Cline, 1987) to 640,000 (Hufbauer, Berliner, & Elliot, 1986) jobs within the domestic industry. This amounts to approximately \$42,000 (Hufbauer, Berliner, & Elliot, 1986) to \$87,000 (Cline, 1987) annually per job saved, or an estimated increased cost of \$200 (Laird & Yeats, 1990) to \$500 (Magnusson, 1993) per U.S. family per year for apparel.

Restraints imposed on trade of textiles and apparel, therefore, have significantly increased the price paid by consumers for both domestic and imported apparel, limited consumer choice and the variety of apparel available within the market, and diminished the volume of apparel that would otherwise be consumed. Restraint of trade and protection of domestic production have also, in some instances, decreased the efficiency of production relative to the level which would be required within a more highly competitive, free trade environment in which only the most efficient production would be maintained (Bergsten, 1972; Dardis, 1988; Dickerson, 1991).

The reduction or elimination of existing trade barriers would be expected to yield an expansion in the volume and variety of apparel traded and a decrease in the price of apparel for the consumer - or larger markups and profit margins for U.S. retailers (Dickerson, 1991). As trade within the textile and apparel industry is liberalized, as proposed within the current Uruguay Round of GATT negotiations, including abolition of the MFA and return of oversight of textiles and apparel trade to GATT with tariff barriers gradually replacing existing

bilaterally negotiated quotas, as well as the enhancement of free trade through implementation of NAFTA, consumer and economic welfare should be enhanced.

Preferential Treatment of Apparel Imports Through Special Tariff Classifications

Although the majority of offshore production for the U.S. market has, historically, been undertaken in the Far East, the implementation of U.S. tariff classifications 9802.00.80 and 9802.00.80.10 and the Special Regime has resulted in a shift in outsourcing of apparel production to the Caribbean Basin and Mexico (Barker, 1991; Edwards, 1989; Tucker & D'Andrea, 1993). Preferential tariff and quota treatment, as well as accelerated turnaround time, decreased shipping costs, lower wage rates, and proximity to the U.S. market have fostered production sharing and a geographic relocation of offshore assembly of apparel (Craig & Dupont, 1989; McCray & Gonzalez, 1989).

Item 9802.00.80 (807)

Item 807 of the Tariff Provision Schedule of the United States, as part of the United States Tariff Code, was adopted in 1984. As part of an effort to aid in the economic development of the Caribbean nations and Mexico, it extended special tariff considerations to apparel imported by the United States from these nations (Cohen, 1989; Lazarus, 1992). In 1989, Item 807 was recoded as

9802.00.80 of the Harmonized Tariff Schedule of the United States (HTUS 9082) (Dickerson, 1991).

Under the 9802 program, garment pieces which are cut in the United States, of fabric originating or produced anywhere in the world, can be sent offshore, primarily to low wage countries, for assembly. When the garments are subsequently reimported by the United States, applicable duties are imposed only on the value which has been added to the garments. For apparel production, the primary value added in assembly typically consists of labor wages, and the applicable tariffs imposed under the program are approximately half the rate which would otherwise be imposed on imported apparel. Thus, apparel imported under the 9802 program receives preferential tariff treatment, while applicable quotas remain in effect (Cohen, 1989; Dickerson, 1991; Lazarus, 1992).

Item 9802.00.80.10 (807A)

In 1986, Item 807A (subsequently recoded HTUS 9802.00.80.10 in 1989) was enacted as an enhancement of the original 807 program. Item 807A created the Special Access Program for apparel assembled within Caribbean Basin countries and provided additional incentive for incorporation of U.S. intermediate goods in apparel production undertaken offshore. Under the 9802.00.80.10 program, apparel assembled within the Caribbean is eligible for enhanced quota levels, referred to as guaranteed access levels (GALS), provided the garments are produced of fabric pieces woven (or knitted) and cut (or formed) in the United

States. Upon subsequent reimportation, the assembled garments are subject to applicable duties, again at reduced rates, imposed only on the value added in the assembly process (Cohen, 1989; Dickerson, 1991; Lazarus, 1992). Under the 9802.00.80.10 classification, applicable tariff rates can be as low as 8.5 percent for apparel containing at least 50 percent U.S. content (Ostroff, 1991).

Special Regime

Mexico was not included as one of the countries eligible for participation in the original 807A program. To support apparel trade with Mexico and to provide enhanced entry to the Mexican market for U.S. producers, the Special Regime was enacted in 1989 (Jacobs, 1988a). Under the Special Regime, garment pieces cut or formed in the United States of domestically produced fabric can be shipped to Mexico for assembly. Upon reimportation, the duty assessed, again, applies only to the value added in the assembly process. For most categories, apparel imported under the Special Regime remains subject to applicable quotas, but is given access to enhanced quota allocations when domestic content is used (Bailey & Eicher, 1991; Jacobs, 1988a; Jacobs, 1988b; Jacobs, 1990).

Apparel trade under the Special Regime, 9802, and 9802.00.80.10 classifications has gained increased importance. The majority of the growth in apparel imports in recent years has occurred for countries exporting garments within these categories. In 1992, combined imports under these provisions comprised over 14% of total U.S. apparel imports (Tucker & D'Andrea, 1993).

In addition, offshore production in the Caribbean and Mexico has been closely linked to the domestic textile and apparel industry by encouraging incorporation of U.S. components in imported apparel. The well being of the domestic industry, therefore, has been determined, in part, by enhanced trade through utilization of these categories. The importance of these categories to the domestic textile industry is readily apparent in noting that U.S. exports of apparel totaled \$2.9 billion in 1991, with nearly \$1.5 billion being cut garment pieces which were shipped offshore for assembly under the 9802.00.80, 9802.00.80.10, and Special Regime programs for subsequent reimportation to the U.S. market (Ostroff, 1992).

U.S. Apparel Trade with Mexico

With discussion of a free trade agreement and negotiation of the North American Free Trade Agreement, apparel trade with Mexico has come to the forefront. NAFTA has been hailed by Hufbauer & Schott (1993) as the first significant U.S. effort to liberalize textile and apparel trade. Currently, Mexico is the fifth largest foreign supplier of apparel to the U.S. market, with Mexican imports in recent years accounting for approximately 3 percent of MFA apparel imports entering the domestic market (Wu, 1991) and nearly 6 percent of Standard Industrial Classification 23 (Tucker & D'Andrea, 1993).

Mexico has been one of the primary suppliers of apparel shipped under the 9802 and Special Regime categories (Arpan, de la Torre, & Toyne, 1981; Tucker

& D'Andrea, 1993; U.S. International Trade Commission, 1991). In 1992, Mexico was the second largest supplier of 9802 imports to the U.S. market (Tucker & D'Andrea, 1993). The vast majority of apparel entering the United States from Mexico, approximately 90 percent, enters under Item 9802 and the Special Regime (Antoshak & Leitzell, 1991; Hufbauer & Schott, 1992). The American Apparel Manufacturers Association has estimated that 85 percent of U.S. exports of apparel to Mexico, \$481 million in 1991, were garment pieces shipped as part of the 9802 and Special Regime programs (Ostroff, 1992). In addition, approximately 90 percent of total apparel imports from Mexico originate in the *maquiladoras*, and are, therefore, manufactured through production sharing arrangements which combine Mexican apparel assembly and U.S. textile production (Hufbauer & Schott, 1992).

Apparel Production in Mexico

Mexico followed a traditional developmental strategy as it began industrialization. Apparel production has been one of the early and significant users of *maquila* operations originally established during the 1960s to enhance economic development of Mexico (Anderson, 1990; Fernandez-Kelley, 1983; Grunwald, 1990-91). With a sizable unskilled labor force, proximity to both U.S. suppliers and the U.S. market, and preferential access to the U.S. market through Item 9802 and the Special Regime, Mexico has become *a Taiwan in the U.S. backyard* (Craig & Dupont, 1989, 107).

Outsourcing of apparel assembly through production sharing arrangements has played an important role in Mexico's industrial development. The nation's most abundant factor is its large and rapidly growing labor force. Mexico possesses a large pool of individuals aged 17-25, the primary age group used by apparel assembly contractors (Lloyd, 1992; McCray & Gonzalez, 1989; Peak, 1993), and this labor force is predominantly unskilled and semi-skilled, readily lending itself to the needs of apparel assembly and production (Craig & Dupont, 1989; Reed, 1993). At the beginning of the 1990s, the Mexican apparel industry employed approximately 600,000 workers, making it one of the most important sectors within Mexican manufacturing (Carlsen, 1990) and the second largest segment of the *maquila* industry (Green, 1990).

Competitive Advantages of Apparel Production in Mexico

In addition to possessing an abundant labor force, Mexico's advantage in apparel production is further enhanced by the low wage rates existing within this sector. Mexico's wage rates have been cited as being among the lowest in the world (Cooper, 1991; Friedman, 1992). For apparel production, Mexico's published wage rate is \$1.01 - \$1.15 per hour (Cedrone, 1993), compared to \$7.00 in the United States (U.S. Department of Commerce, 1992) or \$2.00 - \$5.00 for apparel assembly workers in competitive Far Eastern supplying countries of Hong Kong, Singapore, Taiwan, and South Korea (Fralix & Off, 1993; Wu, 1991). In addition, devaluation of the peso, as well as stringent wage legislation have

resulted in Mexico's effective wage rate declining over time, while those in other countries have gradually increased (Magnier, 1989; McCray & Gonzalez, 1989; Shaiken, 1993). It has been estimated that, accounting for differences in labor and operating costs, U.S. firms can save approximately \$15,000 per worker per year by locating production in Mexico (Magnier, 1989).

Production savings and differences in wage rates should be judiciously considered, however, due to differences in productivity which exist between U.S. and Mexican workers in apparel production. It has been estimated that Mexican apparel assembly workers are approximately 80 to 85 percent as efficient as their U.S. counterparts (Black, 1991b). Despite productivity differences, interest in outsourcing apparel production to Mexico has been stimulated within both the United States and other competing apparel producing countries, due to the existing wage differential and Mexico's proximity to the U.S. market.

Mexico's geographic proximity to the United States has enhanced transfer of and access to managerial and technical assistance for production facilities, as well as easing transportation, distribution, and logistics of outsourcing apparel (Jacobs, 1988a; McCray & Gonzalez, 1989; Mongelluzzo, 1991). Apparel firms producing in Mexico have been able to increase quality control and decrease both transportation costs and turnaround time (Craig & Dupont, 1989; Mongelluzzo, 1990). It has been estimated that the average turnaround time for apparel sourced in Mexico, destined for the Northwestern region of the United States, is approximately 90 days, compared to 150 days for apparel produced and shipped

from the Far East (Wilhelm, 1991). These considerations are especially important for apparel, given its limited life cycle and high value-to-weight ratio (Craig & Dupont, 1989). In addition, as factories in Mexico become more technologically advanced, employing and implementing the capacity for multinational firms to engage in quick response (QR), it is anticipated that outsourcing apparel assembly to Mexico will further expand (Lande, 1991; Nelson, 1992).

Apparel Agreement Negotiated under NAFTA

As discussions of a North American Free Trade Agreement began, the U.S. apparel industry expressed concern regarding the potential effects that a free trade agreement could have on the welfare of the industry. Two issues of primary interest for the domestic industry were the phaseout period for eliminating tariffs and quotas on apparel trade between the United States and Mexico and the content requirements established under the rules of origin.

Due to fear of potential damage to the domestic industry resulting from structural transfer of labor to Mexico, the apparel industry initially requested an extended phaseout period to allow the industry sufficient time for readjustment. In addition, in order to protect the interests of domestic textile and apparel producers, stringent rules of origin and ample provision for enforcement were also sought (Jacobs, 1991; Lawrence, 1992).

With enactment of NAFTA, trade barriers on apparel imports from Mexico will be phased out over a ten year period. For apparel meeting the rules of origin

established under NAFTA, existing tariffs and quotas on imports will be eliminated upon implementation of the treaty. For apparel not conforming to the rules of origin, tariffs and quotas will gradually be eliminated during the ten year phaseout period (Hufbauer & Schott, 1993; Miller & Walsh, 1992). Because the majority of apparel currently imported from Mexico is 9802 and Special Regime goods, it has been estimated that 99 percent of U.S. tariffs imposed on Mexican imports will be removed within the five years (Impact of NAFTA, 1993; Miller & Walsh, 1992).

For apparel currently subjected to quota restrictions, quotas will remain in effect for six years for apparel which does not meet the established rules of origin. Quota restraints will be removed at the end of the sixth year for most categories. The primary exceptions to this are men's and boy's suit coats and suits of wool. For these categories, quotas will remain in effect for the full ten year period provided for implementation of the treaty (Barrett, 1992b; Impact of NAFTA, 1993; Miller & Walsh, 1992).

The rules of origin negotiated as part of NAFTA have been cited by some industry leaders as the most important aspect of the agreement for the domestic textile and apparel industry, while importers and retailers have asserted that they are excessively restrictive and protective of domestic producers (Barrett, 1992a; Barrett, 1992b; McNamara, 1992). The basic rule of origin negotiated under the agreement is more stringent than the single substantial transformation rule typically imposed on apparel imports (Jacobs, 1991). Under NAFTA, apparel

must be subjected to a triple transformation, requiring that the garment be produced within North America from the yarn forward, in order to receive full access to and benefit of preferential treatment afforded by the agreement (Hufbauer & Schott, 1993; Lawrence, 1992; North American Free, 1993).

Apparel currently produced and imported under the Special Regime meets the triple transformation requirement and, therefore, will immediately be eligible for free trade under NAFTA (Barrett, 1992b; Impact of NAFTA, 1993; NAFTA to Create, 1993).

As negotiated, the rules of origin were a compromise agreement, and provisions for exceptions were included. Trade between the United States and Mexico of sweaters manufactured of man-made fiber, for example, will be subjected to a more stringent, fiber-forward rule. Under this rule, the man-made fiber used in producing the yarn must be of North American origin, and the yarn must be spun and the sweater produced within one of the three signatory countries in order to qualify for preferential treatment under NAFTA (Barrett, 1992b; Impact of NAFTA, 1993; Miller & Walsh, 1992; North American Free, 1993).

In contrast, men's dress shirts of specified cotton and cotton/polyester blends, as well as brassieres and apparel made of silk, linen, Harris Tweed, velveteen, and some fine-wale corduroy - all fabrics not typically produced within the United States or Mexico - will be subjected only to a single transformation rule, which requires that a change which alters the tariff classification of the

garment must occur within one of the NAFTA countries. For these categories, therefore, the item need only be cut or knit to shape and sewn or otherwise assembled within North America to qualify for preferential treatment (Barrett, 1992b; Impact of NAFTA, 1993; Miller & Walsh, 1992; North American Free, 1993).

Linings for tailored clothing and coats will be subjected to still another variation of the rules of origin, a fabric forward rule, which requires only the fabric to be manufactured within North America. The yarn and fibers used to produce the fabric may be of foreign origin and imported from supplying countries outside North America (Barrett, 1992b; Impact of NAFTA, 1993; Miller & Walsh, 1992; North American Free, 1993).

While the rules of origin negotiated as part of NAFTA are important to serve as deterrents to transshipment of apparel from countries outside of North America, provisions to allow flexibility for apparel manufacturers and to prevent potential short supply problems for some types of garments were also included within the agreement. In specified categories, limited quantities of apparel which have been assembled within North America, but which do not meet NAFTA content rules, can be imported and receive preferential treatment. Tariff rate quotas were established to allow predetermined quantities of non-qualifying apparel of cotton, wool, and man-made fibers to be imported by each of the three signatory countries. Preferential tariff rates will be applied to qualifying imports

under this system (Hufbauer & Schott, 1993; Impact of NAFTA, 1993; Miller & Walsh, 1992; North American Free, 1993).

As with the rules of origin, exceptions to the tariff rate quota system were also negotiated in the interest of protecting the domestic industry. Imports of apparel in 14 categories, including garments made of blue denim, oxford cloth, certain cotton and man-made circular knits, and man-made fiber sweaters, were denied access to tariff rate quotas for trade between the United States and Mexico. Full tariffs, at the most-favored-nation rate will be applied to apparel of these categories in the same manner that they are to be applied to all other non-qualifying apparel (Hufbauer & Schott, 1993; Impact of NAFTA, 1993; Miller & Walsh, 1992; North American Free, 1993).

Summary

Currently, world discussion has centered on the reduction of tariffs under GATT and the phaseout of the existing quota system under the MFA in order to enhance global trade. In addition, the United States and Mexico have completed negotiation of the North American Free Trade Agreement which, upon passage by the U.S., Canadian, and Mexican governments, will reduce and ultimately eliminate existing trade barriers between and among the three member nations.

Proposed liberalization of trade has created concern within the U.S. apparel industry regarding diminished levels of domestic production and the resultant loss of domestic employment (Black, 1991a; Lloyd, 1992). Within the

U.S. industry, however, some apparel producers have considered expanding production in Mexico to be an important strategy for establishing or maintaining a competitive position in the international industry (Boyd & Ortiz, 1988; McNamara, 1993; Wu, 1991). It has been proposed that engaging in production on a continental scale will enable the domestic industry to better position itself against competitors within the European Community and the Pacific Rim (Kantor, 1993; Masur, 1991). With enforcement of stringent rules of origin, it is likely that greater security will be provided for some sectors of domestic employment, especially if apparel products manufactured in Mexico continue to contain a significant level of U.S. textile components.

Among those who will also profit from the liberalization of apparel trade, are consumers in the United States. Consumers will benefit as existing trade barriers are lifted on imported apparel, and freer trade should provide enhanced access to a greater quantity and variety of products and products that are more competitive, or lower, in price. This is especially true for lower income consumers, who, as shown by Hickock (1985) and Dardis (1988), have typically borne a large portion of the costs of trade regulation imposed on apparel imports.

Statement of the Problem

The purpose of the present study is to estimate the elasticity of demand for U.S. apparel imports in aggregate and by fiber category from Mexico and the rest of the world. With current interest in enactment of the North American Free

Trade Agreement which will reduce and ultimately eliminate existing trade barriers imposed on apparel trade between the United States and Mexico, as well as proposals within the Uruguay Round of GATT negotiations regarding both reduction of tariffs imposed on apparel imports and elimination of the protective quota system imposed through the MFA, consumer demand for apparel imports merits empirical scrutiny.

Elasticities of demand are of primary importance in the estimation of the potential effects of liberalization of trade policy in textiles and apparel. Income and price elasticities of demand are requisite in forecasting both the consumer and economic welfare effects of proposed policies regarding the structure of tariffs and quotas to be implemented in international trade and the effects on the volume of imports entering the domestic market from individual foreign supplying countries. Within the literature, however, estimates of country-specific income and price elasticities of U.S. demand for apparel imports are rare. This is true for Mexico and has resulted in a void in the process of analyzing the potential effects of NAFTA. No study has been published which estimates the income and price elasticities of U.S. demand for apparel imports from Mexico, nor have estimates of the elasticities of demand for 9802 and Special Regime apparel imports from Mexico been found in the literature. In addition, no empirical analysis has been undertaken to estimate the elasticities of demand for apparel by MFA fiber classification, one of the criteria by which bilateral quotas have been negotiated and patterns of international trade established.

Because further analysis of the potential effects of proposed liberalization in international trade policies is, in part, dependent upon estimates of the income and price elasticities of domestic demand for apparel imported from Mexico and the rest of the world, the present study was designed to:

1. estimate the income and price elasticities of U.S. demand for apparel imported from Mexico, including both aggregate imports and imports entering under the designated MFA classifications of cotton, wool, and man-made fibers, which are also classifications specifically addressed within the rules of origin negotiated under the textile and apparel section of NAFTA,
2. estimate the income and price elasticities of U.S. demand for combined 9802 and Special Regime apparel imports from Mexico, which serve as a model for apparel imports from Mexico which will immediately qualify under the rules of origin specified through NAFTA, and
3. estimate the income and price elasticities of U.S. demand for apparel imports in aggregate and by specific MFA fiber classifications from the rest of the world.

The findings of this study will hold implications for domestic consumers, foreign and domestic apparel producers, retailers, and policy makers.

Organization of the Dissertation

Chapter I presented an overview of the contemporary apparel industry, including background regarding international expansion of production and regulation. The stated objectives of the study were also included in this chapter. Chapter II presents the theoretical framework and review of empirical research relevant to U.S. demand for apparel and imports. In addition, Chapter II contains the hypothesized relationships between the variables examined in estimating the elasticities of U.S. demand for apparel imports from Mexico and the rest of the world. The models, methodology, data, and data sources employed in the research are described in Chapter III. Results of the analysis will be presented and discussed in Chapter IV. Chapter V includes a discussion of the implications of the findings, limitations of the present research, and suggestions related to future research which might be conducted regarding U.S. demand for apparel imports.

CHAPTER II

CONCEPTUAL FRAMEWORK AND REVIEW OF LITERATURE

The present study is based on the economic theory of consumer demand and builds on previous research which has estimated elasticities of consumer demand for apparel and imports. The underlying premises of consumer demand theory and a review of selected empirical research are presented and discussed in Chapter II. Based on theoretical concepts and findings of previous research, the hypotheses which were developed to estimate U.S. demand for apparel imports from Mexico and the rest of the world are presented at the conclusion of the chapter.

Economic Theory of Consumer Demand

The economic theory of consumer demand provides the underlying theoretical framework upon which the present study has been based. Economic theory of demand proposes that, in aggregate, the quantity demanded of a good is dependent on the number of consumers, disposable income, the price of the good in question, prices of substitute and complement goods, and consumers' tastes and preferences for the good (Eastwood, 1985; Wu & Pontney, 1967). In aggregate, the per capita quantity of domestic apparel (Q_d) demanded, therefore, is a function of per capita disposable personal income (Y), the price of domestic apparel (P_d), the price of imported apparel (P_i), and consumer tastes and

preferences (T). The per capita quantity of imported apparel (Q_i) demanded, likewise, is a function of per capita disposable personal income (Y), the own price of imported apparel (P_i), the price of domestic substitute or complement apparel (P_d), and consumer tastes and preferences (T).

The demand relationship for apparel, including both domestic and imported apparel, is symbolically represented by:

$$Q_d = f_d(Y, P_d, P_i, T) \quad (2.1)$$

$$Q_i = f_i(Y, P_i, P_d, T) \quad (2.2)$$

where:

$$\frac{\partial Q_d}{\partial Y} > 0 \text{ (normal goods), } \frac{\partial Q_d}{\partial P_d} < 0, \frac{\partial Q_d}{\partial P_i} > 0, \text{ and } \frac{\partial Q_d}{\partial T} \geq 0, \quad (2.3)$$

$$\text{and } \frac{\partial Q_i}{\partial Y} > 0, \frac{\partial Q_i}{\partial P_i} < 0, \frac{\partial Q_i}{\partial P_d} > 0, \frac{\partial Q_i}{\partial T} \geq 0. \quad (2.4)$$

A direct relationship would be expected to exist between disposable income and the quantity demanded for a normal good, with an increase in disposable income resulting in an increase in the quantity demanded of the good. In contrast, an inverse relationship would be expected to exist between the own price of the good and the quantity demanded, with an increase (decrease) in the price of the good resulting in both a substitution effect and an income effect (i.e., the Hicksian decomposition), leading to the expectation of a decreased (increased) quantity demanded of the good. In addition, a direct relationship

would be expected to exist between the prices of substitute goods and the quantity demanded of the good in question. As prices of substitutes increase (decrease), the quantity demanded of the original good would be expected to increase (decrease), in response. Finally, changes in consumer tastes and preferences would also result in changes in the quantity demanded of the good, with the expectation that as consumer preference for the good increases, so would the quantity demanded (Eastwood, 1985; Wu & Pontney, 1967).

Elasticity of Demand

Elasticity of demand provides a measure of the change in the quantity demanded of a good in response to changes in income, changes in the price of the good itself, changes in the prices of alternative goods (i.e., substitutes or complements for the good in question), and changes in consumers' tastes and preferences for the good. Because elasticities of demand are not bound to units of measure, they are useful in comparing demand for goods both over time and across categories (Eastwood, 1985).

Income Elasticity of Demand

The concept of income elasticity of demand correlates consumer demand for a good and disposable income. It serves, therefore, as a measure of the relationship between changes in the consumer's income and the quantity demanded of the good in question (Eastwood, 1985; Wu & Pontney, 1967).

$$\text{Given the basic demand equation, } Q_i = f(Y, P_i, P_d, T), \quad (2.2)$$

where:

Q_i = the quantity of good i demanded,

Y = disposable consumer income,

P_i = price of good i ,

P_d = price of alternative good d , and

T = consumer tastes and preferences,

the income elasticity of demand is symbolically expressed as:

$$\frac{\% \Delta Q_i}{\% \Delta Y},$$

which indicates the percentage change in demand or consumption of good i , relative to the percentage change in consumer income. The mathematical equivalent of this expression is:

$$e_{iy} = \frac{\partial Q_i}{\partial Y} \cdot \frac{Y}{Q_i}, \quad \text{where: } 0 \leq e_{iy} \leq 1 \quad (2.5)$$

For normal goods, e_{iy} is positive, indicating that as income (Y) increases (decreases), the quantity of the good (Q_i) demanded increases (decreases), as well. When e_{iy} equals one, the special case of unity exists, and changes in demand are exactly proportional to changes in income. In cases where e_{iy} exceeds one, the good in question is termed a luxury good, because changes in the

quantity demanded of the good exceed changes in consumer income. In contrast, when ϵ_{iy} is negative, income and the quantity demanded of the good in question move in opposition, and the good is termed an inferior good. Due to the lesser desirability of an inferior good, the quantity demanded of the good decreases as the consumer's income increases, because the consumer is able and willing to purchase more desirable goods, instead. When ϵ_{iy} either approaches zero or is equal to zero, the good is referred to as a neutral good, and changes in income will produce little or no change in the quantity of the good demanded (Eastwood, 1985; Wu & Pontney, 1967).

Price Elasticity of Demand

Price elasticity of demand provides a measure of the correlation between changes in prices of goods and the quantity demanded of the good in question. Price elasticity can relate to changes in the price of the good itself, as well as to changes in prices of other goods (i.e., prices of complementary or substitute goods) and the quantity demanded of the good in question. When the change in price is of the good in question, the elasticity is termed direct- or own-price elasticity, while when the change in price is that of an alternative good, the elasticity is referred to as a cross-price elasticity (Eastwood, 1985; Wu & Pontney, 1967).

The direct-price elasticity is represented symbolically as:

$$\frac{\% \Delta Q_i}{\% \Delta P_i},$$

which expresses the percentage change in the quantity demanded or consumed of good i relative to the percentage change in the price of good i . Mathematically, this relationship is expressed as:

$$\epsilon_{ii} = \frac{\frac{\partial Q_i}{Q_i}}{\frac{\partial P_i}{P_i}} = \frac{\partial Q_i}{\partial P_i} \cdot \frac{P_i}{Q_i}, \quad \text{where: } \epsilon_{ii} \leq 0 \quad (2.6)$$

According to consumer demand theory, a negative relationship typically exists between an increase in the price of a given good and the quantity demanded of the good, except for specific cases such as goods which are perfectly inelastic or Giffen goods. The direct-price elasticity for a good, therefore, is most often less than or equal to zero.

The price elasticity of the good in question is termed inelastic, when the own-price elasticity is within the range of zero to negative one (i.e., when $0 > \epsilon_{ii} > -1$). Within this range, the absolute value of the percentage change in the price of the good exceeds the absolute value of the percentage change in the quantity demanded, and the quantity of the good demanded, therefore, is not

responsive to changes in the price of the good. Demand for a good is termed perfectly inelastic when ϵ_{ij} equals zero (Eastwood, 1985; Wu & Pontney, 1967).

In contrast, the price elasticity of the good is defined as elastic, when the direct-price elasticity is less than negative one (i.e., when $-1 > \epsilon_{ij} > -\infty$). In this case, the absolute value of the percentage change in the quantity demanded exceeds the absolute value of the percentage change in the price of the good, and the quantity of the good demanded is responsive to changes in the price of the good (Eastwood, 1985; Wu & Pontney, 1967).

Two special cases exist for own-price elasticity of demand. When the direct-price elasticity of a good equals negative one (i.e., when $\epsilon_{ij} = -1$), the price elasticity of the good is described as being unitary. In this case, the absolute value of the percentage change in price and the absolute value of the percentage change in quantity demanded are exactly equal. In cases for which the direct-price elasticity of the good equals negative infinity (i.e., $\epsilon_{ij} = -\infty$), the direct-price elasticity is termed perfectly elastic, and the quantity demanded of the good is extremely sensitive to changes in the price of the good (Eastwood, 1985; Wu & Pontney, 1967).

According to economic theory, demand for a good is also affected by changes in prices of other goods demanded or consumed. Cross-price elasticity of demand measures the percentage change in the quantity demanded of a good as it

relates to the percentage change in the price of another good(s). The cross-price elasticity of demand is represented as:

$$\frac{\% \Delta Q_i}{\% \Delta P_d},$$

and expresses the percentage change in the quantity demanded of good i relative to the percentage change in the price of good d. Mathematically, this relationship is expressed as:

$$\epsilon_{i,d} = \frac{\frac{\partial Q_i}{Q_i}}{\frac{\partial P_d}{P_d}} = \frac{\partial Q_i}{\partial P_d} \cdot \frac{P_d}{Q_i}, \quad \text{where:} \quad \epsilon_{i,d} \begin{matrix} \geq \\ < \end{matrix} 0 \quad (2.7)$$

When the cross-price elasticity of demand is negative, (i.e., $\epsilon_{i,d} < 0$), the change in the price of good d and the quantity demanded of good i are inversely related, and the two goods are referred to as gross complements. In this case, an increase (decrease) in the price of good d will result in a decrease (increase) in the quantity demanded of good i, as the two goods are consumed simultaneously. In contrast, when the cross-price elasticity of demand is positive, (i.e., when $\epsilon_{i,d} > 0$), the two goods are referred to as gross substitutes. Because good i can be consumed in leu of good d, an increase (decrease) in the price of good d will enable the consumer to shift demand from good d to good i, thereby resulting in a

decrease (increase) in the quantity of good d demanded and a corresponding increase (decrease) in the quantity of good i demanded (Eastwood, 1985).

The present study will use the relationships described above in estimating and evaluating the elasticities of U.S. demand for apparel imports from Mexico and the rest of the world. Based on the theoretical concepts of demand, domestic and imported apparel would be expected to be either normal or luxury goods and price elastic. Apparel imported from Mexico and the rest of the world are further expected to be substitutes for each other and for domestic apparel.

Income Elasticity of Demand for Apparel and Imports

A number of empirical studies have been undertaken to estimate the income elasticity of demand for apparel. The studies have varied in underlying assumptions, variables included, measurement of variables, time periods included, and methodologies. Direct comparisons between and among findings, therefore, are limited. The magnitude of the income elasticities estimated in the studies reviewed, however, ranged from less than one to more than six. Elasticities estimated for domestic apparel tended to be somewhat lower than many of the income elasticities estimated for imported apparel or aggregated categories that included apparel. For the majority of studies, long-run income elasticities in excess of one were obtained. This would indicate that both domestic and imported apparel have, by definition, typically been considered luxury goods for U.S. consumers.

Houthakker and Taylor (1970) investigated consumer demand for apparel within the United States as part of their seminal analysis of national consumption expenditures. Per capita consumption expenditure for apparel was used in the study, based on the premise that expenditure provides a more realistic measure of consumer demand than disposable income. The researchers supported this contention with the explanation that consumers, over the short run, possess greater control over expenditures than over earnings. Using ordinary least squares regression (OLS) and a dynamic model which included a lagged dependent variable, Houthakker and Taylor estimated a short-run income elasticity of apparel expenditures of 1.1423 and a long-run elasticity of 0.5131.

The short-run income elasticity of demand estimated by Houthakker and Taylor (1970) is comparable to that estimated by Almon, Buckler, Horowitz, and Reimbold (1974), who also used OLS regression to estimate the income elasticity of demand for apparel within the United States. In the 1974 study, cross-sectional data from the 1960 Survey of Consumer Expenditures were used, and an income elasticity of 1.19 was estimated.

Horton and Hafstrom (1985) estimated current and permanent income elasticities of demand across six consumption categories, including apparel, in an attempt to determine the effects of changes in income on expenditure patterns for female-headed and two-parent families. Cross-sectional data for the study were taken from the 1972-73 Consumer Expenditure Survey. The income variables included by Horton and Hafstrom were current income (total income plus transfer

payments less income taxes) and permanent income (created through the use of the current income figure as an instrumental variable).

Two double-logarithmic models of expenditure were estimated, using generalized least squares regression for the current income model and two stage least squares regression for the permanent income model. The results of the data analysis indicated no significant differences in the current or permanent income elasticities of demand for apparel between the two groups studied. The estimated current income elasticities for the female-headed and two-parent families were 0.6881 and 0.7034, respectively. The permanent income elasticity produced for the female-headed family group was 1.5857, while that for the two-parent family group was 1.3134 (Horton & Hafstrom, 1985).

One of the studies of U.S. demand for imports often cited is that undertaken by Houthakker and Magee (1969), who used double logarithmic equations and OLS regression, citing the "limited success" of simultaneous equations in modeling international trade, in estimating the income elasticity of demand for imports. The researchers utilized both static and dynamic models in their study. Annual time series data covering the period 1951-1966 were used in the analysis, and an index of GNP in constant dollars was used as a proxy for income. The results of the initial phase of analysis, in which the static model was estimated, yielded an estimated income elasticity of demand for aggregate imports of 1.51. Although the researchers estimated separate demand equations for 15 individual countries as part of their study, demand for imports from Mexico was

not estimated, while Mexican demand for U.S. exports was included as part of the study.

In the second phase of their study, Houthakker and Magee (1969) disaggregated U.S. imports into five categories and employed a dynamic model, which used moving averages of income and relative prices, in estimating the short- and long-run elasticities of demand. For this portion of the study, quarterly data for 1947-1966 were used. Apparel imports were included in the finished manufactures category, and the short-run income elasticity estimated for this category was 0.292. The long-run income elasticity of demand for finished manufactures was estimated to be 2.63.

Krein (1967) also estimated the U.S. income elasticity of demand for imports and based his research on a ten nation "world" model. As part of a preliminary study, which used quarterly data covering 1954-1964, real gross national product (GNP) was used as the income measure, and apparel imports were, again, included within the finished manufactures category. The income elasticity estimated for this category was 2.35.

Building on the initial study, Krein subsequently estimated a disaggregated import demand function to determine the income and relative price elasticities of demand for a variety of commodities. Quarterly data spanning the time period Quarter 1, 1964, through Quarter 1, 1970, were used in the analysis, and the coefficients were estimated using a double-logarithmic, single equation model. Real GNP was, again, used as the proxy for income. Two fiber

categories, cotton products and man-made fiber textile products, were included in the analysis. The estimated income elasticity of demand for the cotton category was 1.45, and that for the man-made fiber category was 6.86 (Krein, 1973).

The income and price elasticities of aggregate demand for imports for ten industrialized countries, including the United States, were estimated by Goldstein, Khan, and Officer (1980). The data utilized in their study covered the time period 1951-1973. The income variable included in the estimated equation was a ratio of current real income to a trend value of real income. Two double log-linear equations which included alternative price variables were estimated using OLS regression and Cochrane-Orcutt corrections for autocorrelation. The income elasticities of demand generated were 3.032 and 2.098.

Shiells, Stern, and Deardorff (1986) further studied U.S. demand for imports by disaggregating total imports. Several apparel classifications were included among the 122 Standard Industrial Classification (SIC) categories of imports for which expenditure elasticities were estimated. The data analysis covered the time period 1962-1978, and U.S. gross domestic purchase was used as the independent variable which served as the expenditure measure. The researchers employed a more complex two-stage process of expenditure allocation than had previously been used, in which consumers were assumed to initially apportion total expenditures among alternative product categories, then subsequently allocate expenditures to either domestic or imported goods, based on

the relative price differential of the goods. Therefore, expenditure and price elasticities of demand were generated simultaneously across product categories.

The expenditure elasticities of demand estimated for apparel categories within the Shiells, Stern, and Deardorff (1986) study included 2.773 for men's clothing (SIC 232) and 1.872 for men's sweaters (SIC 236). For the women's clothing categories, the coefficients produced were 1.900 for women's clothes (SIC 233) and 1.972 for women's lingerie (SIC 234); both parameters, however, failed to be statistically significant (Shiells, Stern, & Deardorff, 1986).

As part of a study of the effects of imports on the U.S. textile and apparel industry, Johnston (1988) formulated an import demand model designed to estimate the income and price elasticities of U.S. demand for aggregate apparel imports. The model was a double log-linear, single equation model, which included an income measure, relative prices, and alternative lags of the dependent variable (square yard equivalent volume of apparel imports) as a proxy for consumer tastes and preferences. The income variable included in Johnston's study was aggregate disposable personal income. Monthly time series data spanning 1974-1987 were used in estimating the model, and analysis of the data was undertaken using both ordinary least squares and generalized least squares regression. The income elasticities of demand for apparel imports were estimated to be 1.8998 and 4.2027, when one-month and six-month lagged variables, respectively, were included in the model.

Chadwick and Dardis (1993) estimated the elasticity of U.S. demand for apparel imports from developed and developing countries using seemingly unrelated regression and a single equation import demand model. The dollar value of apparel imports from each of the two regions, deflated by the corresponding import price index, served as the measure of the dependent variable, and domestic apparel expenditure was used as one of the explanatory variables. Annual data for the period 1974-1988 were used in the analysis. The expenditure elasticity estimated for apparel imports from developed countries was 1.2, and that estimated for imports from developing countries was 2.72.

The only study found within the literature which included apparel imports from Mexico within estimates of world regions was Hathcote (1989). In the research, U.S. per capita demand for imports of six apparel categories and 12 world regions was estimated. Apparel imports from Mexico were included within the Latin American region. The income elasticities of demand were estimated for the time period 1972-1984 using a double log-linear model and OLS regression. The income elasticities of demand for imported apparel ranged from 1.20 to 14.3, with the majority of the parameter estimates between 1.2 to 4.84. For the Latin American region, the income elasticities found to be statistically significant at the .05 level were 1.57 (skirt category), 1.66 (shirt category), 2.27 (suits/coats), and 5.20 (slacks), all categories in which Mexico accounts for a sizable portion of exports.

Price Elasticity of Demand for Apparel and Imports

Most of the studies discussed in the previous section also included estimates of the price elasticities of consumer demand. Again, across studies, considerable variation in measurement of price variables was found. Some studies included a measure of relative prices, while others used established or created price indexes for the countries included. Some researchers used unit prices in the analyses, while others considered this a potential source of bias. Therefore, as with estimates of income elasticity, limitations to direct comparisons of the elasticities exist.

In the studies reviewed, the estimated cross-price elasticities of demand were typically greater than three, indicating sensitivity to changes in prices of competing goods. More variation was found to exist among the direct-price elasticities of demand, but the majority were slightly above or below unity, and the long-run elasticities tended to be more negative than the short-run estimates. For studies which incorporated relative price as the price measure, the own-price elasticities tended to be lower in absolute value, which supports the concept proposed by Murray and Ginman (1976) that use of a relative price measure constrains movement of the two, separate prices and results in downward bias of the absolute value of the price elasticity of imported goods.

Houthakker and Magee estimated the price elasticity of U.S. demand for imports as part of their 1969 study. The researchers included a relative price measure, created using the price index of imports divided by the U.S. wholesale

price index, as the price variable. An own-price elasticity of demand of -0.54 was estimated for aggregate imports when the static model of demand was estimated.

Total imports were disaggregated by commodity classes in the second phase of the research, and the dynamic demand model, which incorporated moving averages of prices and income, was used to estimate the coefficients. In the second phase of analysis, the short-run price elasticity of -0.203 was estimated for total imports, while the long-run price elasticity of demand for imports was estimated as -0.88. For the finished manufactures category, which included apparel, price elasticities of -0.450 and -4.05 were estimated for the short-run and long-run periods, respectively (Houthakker & Magee, 1969).

Buckler and Almon (1972) used a 180 sector input-output model to determine medium-range price elasticities of U.S. demand for imports. Annual time series data (time period not specified) and OLS regression were used in the estimation process. German and Japanese export price indexes, as well as U.S. Department of Commerce unit value indexes for five commodity categories, were used to provide proxies for foreign prices, and domestic output deflators were used as proxies for domestic prices. Results of the estimation produced an average weighted price elasticity of -1.97 and an estimated price elasticity of U.S. demand for imported apparel of -3.77.

The researchers further utilized the estimated elasticities (with 1970 as the base year) to forecast imports for 1980. Their projection was that apparel imports would increase to \$3.3 - \$3.7 billion (Buckler and Almon, 1972). In actuality,

however, U.S. apparel imports increased at a significantly greater rate during the 1970s than had been the case prior to this time. Actual apparel imports (C.I.F. value) for 1980 exceeded the forecast by almost 100 percent, with U.S. apparel imports reaching \$6.8 billion (American Textiles Manufacturers Institute, 1989).

Price and Thornblade (1972), in a study designed to provide income and price elasticities of demand for goods disaggregated by product category and country of origin, included both the ratio of foreign price of the imported good to the domestic wholesale price index and the ratio of foreign price of the imported good to the weighted average of the prices of imports supplied from the rest of the world. The categories of imports used in the study were disaggregated at the three-digit Standard International Trade Classification (SITC) level. In this study, the relative prices did not appear robust in explaining demand for imports across countries. Of the 37 reported cases estimated, only ten produced direct-price coefficients which were statistically significant and of the correct, negative sign, and estimation of cross-price elasticities produced only five coefficients which were both statistically significant and of the anticipated negative value. In discussing the lack of agreement between their estimations and *a priori* expectations, the researchers contended that this may have resulted from lack of inclusion of appropriate explanatory variables and the level of disaggregation of the data compared to previous studies which examined imports in aggregate by country.

Kreinin (1973) estimated the relative price elasticities of cotton and man-made fiber products as part of a study of disaggregated imports. A Paasche unit value index was created for each of the product categories included, with the domestic price represented by the U.S. wholesale price index. The relative price elasticity of demand estimated for imports of cotton products was -1.17, and that for man-made fiber textile products was -0.99. In an earlier study undertaken by Kreinin (1967), designed to estimate U.S. demand elasticities for four groups of imported products from a ten-nation world, apparel was included within the finished manufactures category. A relative price index of the import price divided by the U.S. wholesale price index was used as the price measure. Regression analysis, using a double-logarithmic model produced an estimated price elasticity of -4.7.

In modeling personal per capita consumption expenditures within the United States, Almon, Buckler, Horowitz, and Reimbold (1974) estimated the price elasticity of apparel as -0.9087. Taking the analysis one step further, the researchers estimated the price elasticity of U.S. demand for world imports of apparel as -3.77, as reported in the 1972 study by Buckler and Almon. This estimate seems inordinately high in absolute value and is probably the result of concentration on price alone within the equation estimated; income was not included in the model analyzed in this phase of the study.

A comprehensive study by Stone (1979) included estimates of price elasticities of demand for disaggregated imports for the United States, the

European Economic Community, and Japan. Imports were disaggregated by Standard International Trade Classifications, with apparel included as SITC 841. The analysis utilized a single equation, log-linear model, which was estimated using both ordinary least squares regression and two-stage least squares regression. Each equation was estimated twice, once using separate domestic and imports prices and a second time using a relative price, in order to test for effects of bias resulting from the use of a relative price, as was proposed by Murray & Ginman (1976). The analysis using a relative price for apparel produced an estimated price elasticity of -1.24 for U.S. demand for aggregate apparel imports. The researcher concluded that, for the majority of categories included in the study, the parameters were not biased by using a relative price rather than separate prices.

Goldstein, Khan, and Officer (1980) distinguished tradable and nontradable goods in estimating the own-price elasticity of U.S. demand for imports. Using a double-log, single equation model of demand, the direct-price elasticity of demand estimated, when including separate prices for traded and nontraded goods, was -1.119. Estimation of the second model, which included prices of both imports and nontraded goods relative to the price of traded goods, produced a direct-price elasticity of -0.679. The decline in the absolute value of the parameter estimated when a relative price was used is, again, of particular interest in view of Murray and Ginman's (1976) contention that the use of a relative price in estimating elasticities of demand for aggregated categories constrains movement of the

separate price components, and thereby results in downward bias of the value of the estimated import price parameter.

Pelzman and Martin (1981) estimated the demand for textile imports (SITC 22) using quarterly time series data for 1964 through 1977. A relative price measure was created as the import unit value index divided by the U.S. textile wholesale price index. Using OLS regression, the price elasticity estimated was -0.22. This estimate was used in computing a long-run price elasticity of demand of -0.33. The researchers attributed the low absolute value of the price elasticity to "the distorting effects of the quantitative restrictions imposed on textile imports" (p. 420).

Shiells, Stern, and Deardorff (1986), estimated own- and cross-price elasticities of U.S. demand for 122 categories of imports disaggregated at the three-digit Standard Industrial Classification level for the time period 1962-1978. The price measure used in the study was the unit price (i.e., value of imports divided by quantity). Using two-stage least squares, corrections were made for measurement error bias introduced through correlation of the unit price and the error term.

The price elasticities estimated for the men's clothing category (SIC 232) were not statistically significant, and the signs of the parameter estimates were reversed, with the cross-price elasticity of demand estimated as -2.625 and the own-price elasticity estimated as 0.378. The researchers attributed the reversal of the signs of the coefficients to the possibilities of lack of variation in the

exogenous variables, misspecification of the model, and inability of the unit value used to capture the true price changes (Shiells, Stern, & Deardorff, 1986).

Estimated cross- and own-price elasticities of demand for men's coats (SIC 231) were 4.254 and -1.462, respectively, and those for the mens' sweaters category (SIC 236) were 4.361 and -2.451. For women's clothing (SIC 233), the estimation process produced a cross-price elasticity of demand of 6.630 and an own-price elasticity of -3.369. The analysis of apparel category 238 (apparel NEC) yielded estimated coefficients of 3.971 for the cross-price elasticity and -3.352 (not statistically significant) for the direct-price elasticity (Shiells, Stern, & Deardorff, 1986).

Using log-linear models of U.S. demand for aggregate world imports of apparel, Johnston (1988) estimated the relative price elasticity of demand using the unit price of aggregate MFA apparel imports divided by the U.S. consumer price index (CPI) for apparel as a proxy for domestic price. For the time period 1974-1987, the direct-price elasticity of demand was estimated to be -0.3324 when a one-month lagged dependent variable representing consumer tastes and preferences was included in the estimation equation. When a lag of six months was used for the trend variable, the own-price elasticity estimated decreased to -0.4067.

Hathcote (1989), using a single equation, log-linear model of U.S. per capita demand for apparel imports, estimated the relative price elasticities of demand for six apparel categories across 12 countries and world regions. Annual

data for the time period 1972-1984 were used in the analysis. For the apparel categories (suits/coats, dresses, shirts, skirts, slacks, and sweaters) included in the study, the price elasticities estimated ranged from -0.12 to -5.60, with the majority of the parameter estimates being between zero and -1. Apparel imports from Mexico were aggregated within the Latin American region. For this region, own-price elasticities of demand estimated and found to be statistically significant at the 0.10 level were -0.26 (suits/coats) and -0.33 (sweaters).

Direct-price elasticities of U.S. demand for apparel imports from developed and developing countries were also estimated by Chadwick and Dardis (1993). The measures of relative prices used in this study were the unit price indexes of imported apparel from developed and developing countries divided by the producer price index for domestically produced apparel. Relative price lagged one time period (one year) was also incorporated as an independent variable, in order to determine the impact of previous price levels on consumer demand. Analysis of the data (using seemingly unrelated regression) produced direct-price elasticities of -0.61 and -2.35 for developing and developed countries, respectively. The researchers concluded that the lagged relative price produced a more satisfactory estimate of own-price elasticity for the developing countries in aggregate, while the current relative price produced a better estimate of direct-price elasticity of demand for apparel imports originating in developed countries.

Influence of Consumer Tastes and Preferences on Demand

The importance of including a variable representing consumer tastes and preferences has been well documented by Deaton and Muellbauer (1980). Inclusion of a measure representing consumer tastes and preferences is also important in properly specifying the model used to statistically analyze consumer demand, because omission of the relevant variable would result in bias of the parameter estimates. A direct measure of consumer tastes and preferences, however, is not typically available. Therefore, studies of demand for apparel imports have sometimes included the lagged value of the dependent variable as a trend measure and proxy for consumer tastes and preferences. Inclusion of a lagged dependent variable, in addition to measures of income and prices, has been shown to enhance the explanatory capability of the model, which may actually result from the dependent variable being autocorrelated and not because it serves as an accurate proxy for consumer tastes and preferences, and to provide a measure of consistency between the short- and long-term estimates.

As part of an investigation of the elasticity of substitution, Hickman and Lau (1973) tested alternative static and dynamic models. The dynamic model incorporated a trend term, in order to account for changes in consumer tastes and preferences over time and to correct misspecification of the basic equilibrium model. Analysis revealed that, for the dynamic model which included the trend variable, the average price elasticity of demand estimated was reduced in magnitude, and the range of the elasticities estimated for the countries included in

the study diminished, as well. The differences between the equilibrium and dynamic models were greater when estimating long-run elasticities. In addition, the researchers concluded that elasticities produced using the dynamic model seemed to be more realistic, or plausible, than those produced by the static model.

Houthakker and Taylor's (1970) study of U.S. consumer demand included clothing among the 82 categories of personal consumption expenditures. The researchers incorporated a lagged dependent variable in the dynamic model of consumer demand, in order to test for effects of consumer consistency of demand over time. Demands for women's and men's apparel were estimated separately, and it was found that the lagged proxy variable exerted significant influence on consumption of women's clothing, but not men's apparel.

Pelzman and Martin (1981) included a lagged dependent variable in specifying the partial equilibrium model used to estimate the effects of imports on U.S. employment in textiles. The initial phase of the analysis involved estimating the elasticities of demand for textile imports, Standard Industrial Classification 22, as a function of relative price, domestic textile production, and import demand lagged one time period. A double log-linear model was developed to estimate the parameters. Using OLS regression, the estimated parameter for the lagged dependent variable was 0.34.

Proxy trend variables were also incorporated in models developed by Johnston (1988) to estimate consumer demand for apparel imports. The

variables, created by lagging the dependent variable of quantity (square yard equivalents) of apparel imports, were designed to serve as proxies for consumer tastes and preferences, as well as the influence of fashion on consumption. Alternative forms of the variables were included, using lag structures of both one and six months. The coefficient estimated for the one-month lag was 0.5573, indicating a positive relationship between past and current demand for imported apparel. The longer lag structure of six months produced an estimated elasticity of -0.1508, with the sign the reverse of that anticipated for a nondurable good.

Chadwick and Dardis (1993) also included a trend variable (the lagged value of the dependent variable) in their analysis of U.S. apparel imports from developed and developing countries, in order "to account for the learning curve, habit, and long term shifts in supply" (p. 165). The trend variable was found to exert significant influence on demand for imported apparel from both developed countries and developing countries, with respective estimates of 0.75 and -0.29 generated. The sign of the parameter estimated for the developed countries was positive, as expected, while that for the developing countries was negative. The researchers concluded that the positive sign of the trend variable for the developed countries resulted from the influence of consumer consistency and the absence of import restraints on apparel imports from these countries. The negative influence of the trend variable on U.S. demand for apparel imports from developing countries was attributed to the influence of constraints imposed by the Multifiber Arrangement on imports from primary developing country suppliers.

Hypotheses

Based on economic theory previously discussed, the variables which are influential in determining the quantity of apparel imports demanded are the number of consumers within the market, disposable per capita personal income, price of domestic apparel, price of imported apparel, and consumer tastes and preferences. It would be expected that the quantity of imported apparel demanded would increase as the population increases. Because apparel is assumed to be a normal good, it would also be expected that an increase in disposable income would yield an increase in the demand for apparel imported from both Mexico and the rest of the world, based on the increased purchasing power of U.S. consumers.

A negative relationship would be expected to exist between the relative prices of apparel imports and domestically produced apparel, because apparel imported from Mexico and the rest of the world would serve as substitutes for apparel produced in the United States. In the case of apparel imports from Mexico, a positive relationship would also be expected to exist between the relative price of apparel imported from the rest of the world and the price of domestically produced apparel. Because apparel imported from the rest of the world would serve as a substitute for both domestic and Mexican apparel, it would be rational to expect that an increase in the relative prices of apparel imported from the rest of the world and U.S. apparel would result in an increase in the volume of apparel imported from Mexico.

Incorporating the role of consumer tastes and preferences, it would further be expected that the volume of apparel imported during the previous time period (serving as a proxy for consumer tastes and preferences) would exert a positive influence on the volume imported during the current time period, due to consumer and market consistency. A positive relationship, therefore, would be anticipated between the proxy variable and the demand for imported apparel.

Based on existing theory and previous research, the following alternative hypotheses are proposed and will be used in estimating U.S. demand for apparel imports from Mexico; the null form of each hypothesis will be tested:

- H₁: Per capita U.S. demand for apparel imports from Mexico is a function of per capita U.S. disposable income, the relative price of apparel imported from Mexico, the relative price of apparel imported from the rest of the world, and consumer tastes and preferences for apparel imported from Mexico.
- H₂: The income elasticity of U.S. demand for apparel imports from Mexico is greater than zero.
- H₃: The own-price elasticity of U.S. demand for apparel imports from Mexico is less than zero.
- H₄: The cross-price elasticity of U.S. demand for apparel imports from Mexico is greater than zero.
- H₅: A positive relationship exists between the proxy for consumer tastes and preferences and U.S. demand for apparel imports from Mexico.

The following alternative hypotheses relative to U.S. demand for apparel imports are proposed, and the null form of each hypothesis will be tested in estimating the parameters for the rest of the world:

H₆: Per capita U.S. demand for apparel imports from the rest of the world is a function of per capita U.S. disposable income, the relative price of apparel imported from the rest of the world, and consumer tastes and preferences for apparel imported from the rest of the world.

H₇: The income elasticity of U.S. demand for apparel imports from the rest of the world is greater than zero.

H₈: The own-price elasticity of U.S. demand for apparel imports from the rest of is less than zero.

H₉: A positive relationship exists between the proxy for consumer tastes and preferences and U.S. demand for apparel imports from the rest of the world.

Summary

In this chapter, the underlying theoretical concepts of consumer demand which serve as the framework for this dissertation were discussed. Selected empirical studies which guided development of the present study were also reviewed. The chapter concluded with presentation of the hypotheses which will be used in estimating U.S. demand for apparel imports. Chapter III will discuss

the specification of the models and methods used to empirically analyze U.S. demand for apparel imports from Mexico and the rest of the world. In addition, a description of the data used in the analysis and the sources of the data will be included.

CHAPTER III

METHODOLOGY AND DATA DESCRIPTION

Specification of the functional form to be used in estimating U.S. demand for apparel imports is discussed in this chapter. In addition, the models developed for estimating the income and price elasticities of demand for apparel imports from Mexico and the rest of the world are described. A description of the data used in the analyses and the sources of the data are also included. Finally, the statistical methods that were employed in the data analysis are discussed.

Specification of Functional Form

Within the literature, there has been considerable discussion regarding the appropriate functional form which should be used for specification and estimation of import demand equations. The form selected is based on both economic and statistical considerations. The linear form of an import demand equation assumes both an income elasticity that regresses toward unity and a declining price elasticity of demand as income rises. The log-linear form, in contrast, assumes constant elasticity of both income and price relative to the demand for imports (Boylan, Cuddy, & O'Muircheartaigh, 1980; Leamer & Stern, 1970). The use of a log-linear demand function also allows direct estimation of the income, own-price, and cross-price elasticities of demand and has been shown, empirically, to be

superior to linear specifications in estimating import demand elasticities in certain situations (Khan & Ross, 1977; Boylan, Cuddy, & O'Muircheartaigh, 1980).

The specification of the functional form is an important methodological consideration, because the form selected influences the statistical estimation of the demand function. Khan and Ross (1977) and Murray and Ginman (1976) have proposed that the effect that the explanatory variables appear to exert may be significantly influenced by the functional form used in the estimation process. The selection of the appropriate functional form is also pivotal in ensuring that the parameters estimated are both unbiased and consistent. Misspecification of the functional form can result in misspecification of the error term, which results in loss of the desirable properties of the coefficients estimated (Kmenta, 1986).

Several studies have been undertaken to compare the linear and log-linear specifications of import demand functions. Khan and Ross (1977) tested alternative specifications of the functional forms traditionally employed in estimating aggregate import demand, using both equilibrium and dynamic models. The researchers estimated aggregate import demand for three highly industrialized countries (United States, Canada, and Japan) using the basic specification of demand as a function of relative prices and domestic income. A Box-Cox transformation was used to determine the appropriate functional form. From their analyses, the researchers concluded that the log-linear specification was more appropriate than the linear form for estimating the aggregate import demand elasticities for all three countries when the equilibrium model was used.

The log-linear form was, also, found to be superior when dynamic models were estimated for the United States and Canada, but it was not found to be significantly better in estimating import demand for Japan.

The work of Khan and Ross was furthered by Boylan, Cuddy, and O'Muircheartaigh (1980) who compared the use of linear and log-linear functional forms in estimating aggregate import demand for three less highly developed countries within the European Economic Community than those included in the Khan and Ross study. Again, using a traditional specification of the aggregate demand equation (i.e., quantity of imports as the function of domestic real GNP and the relative price of imported goods divided by the price of domestic goods), the researchers applied the Box-Cox transformation to the import equations. For each of the three countries included in the study, the researchers, as Khan and Ross earlier had, rejected the linear form in favor of the log-linear form.

Murray and Ginman (1976) also tested the log-linear specification of the conventional aggregate import demand function. Their concern, however, focused primarily on the use of a relative price index, rather than separate import and domestic prices. As suggested by Leamer and Stern (1970), a relative price index has often been used in import demand analyses, in order to either avoid or overcome potential problems of multicollinearity between independent variables. Murray and Ginman's concern was that, for aggregated imports, the relative range of goods and the weights of prices for imported and domestic goods are unlikely to be equal, and restraining movement of the individual components included

within the structure of a relative price index could, therefore, constrain the estimated price elasticity. Comparing the estimation of an equation which included a relative price index (in the form of price of imports divided by price of domestic substitutes) with another which contained separate import and domestic prices, the researchers found the income elasticity of demand to be substantially higher and the import price elasticity to be lower, when the relative price index was used.

Based on this finding, the researchers concluded that inclusion of a relative price in the specification of an aggregate import demand equation is not appropriate and can result in an upward bias of the income elasticity and a downward bias in the influence of the domestic price effect. This, however, was not tested for disaggregated models, and the researchers conceded that their conclusions may not be applicable to disaggregated commodities (Murray & Ginman, 1976).

The appropriateness of the use of a single equation specification for import demand analysis has also been empirically tested. A seminal study undertaken by Thursby and Thursby (1984) was designed to determine the reliability of single equation models in estimating income and price elasticities of aggregate demand for imports. The researchers compared nine models and 324 equations in estimating elasticities of import demand for five industrialized countries (Canada, Germany, Japan, United Kingdom, and United States). The equations included

variations in functional form and alternative specifications of both the price and income (or activity) variables within the basic demand function:

$$Q = f(P, Y) \quad (3.1)$$

where:

Q = quantity of imports demanded,

P = price of imports relative to other goods, and

Y = income or activity variable.

To determine which of the alternative specifications was most appropriate, each estimated equation was tested for the presence of both first and subsequent orders of autocorrelation, and the regression specification was examined to determine misspecification through the omission of variables, inappropriate functional form, and correlation of regressors and error terms. The specifications least often rejected, and, therefore, considered preferable for estimating elasticities of import demand, were those which produced unbiased, consistent, and efficient estimators (Thursby & Thursby, 1984).

Comparisons of the results of the tests on the alternative models and specifications led the researchers to conclude that the log-linear specifications were superior to the linear specifications for estimating import demand. In addition, models which incorporated dynamic behavior through inclusion of a lagged dependent variable were most often accepted. The specification which yielded the highest acceptance rate for estimation of demand elasticities using U.S. data was:

$$Q_t = f(P_{1t}, P_{2t}, Y_t, Q_{t-1}) \quad (3.2)$$

where:

Q = quantity of imports,

P_1 = real price of imports,

P_2 = real price of other goods,

Y_t = real gross domestic product in time period t , and

Q_{t-1} = quantity of imports lagged one time period.

In addition, from comparisons of single equation models and simultaneous equation models, the researchers concluded that the more simple models were preferred, on the contingency that they produced consistent, unbiased estimates of the demand elasticities, due to the relative ease of estimation of the single equation models (Thursby & Thursby, 1984).

Models of U.S. Demand for Apparel Imports

For the present study, two single equation, double log-linear models were used to estimate the income and price elasticities of U.S. demand for apparel imports from Mexico and the rest of the world. The models were used to estimate demand for both aggregate apparel imports and imports disaggregated by the primary categories of cotton, wool, and man-made fibers specified in bilateral import arrangements negotiated under the Multifiber Arrangement, as well as combined 9802 and Special Regime apparel imports from Mexico. The notation

incorporated in specification of the models utilizes M and the subscript m to represent Mexico and R and the subscript r to represent the rest of the world.

Model of U.S. Demand for Apparel Imports from Mexico

The basic demand function used to analyze U.S. demand for apparel imports of cotton, wool, and man-made fiber, as well as aggregate and combined 9802 and Special Regime imports from Mexico was:

$$LQ_{imt} = \beta_0 + \beta_1 LY_t + \beta_2 LPM_{it} + \beta_3 LPR_{it} + \beta_4 LQ_{imt-1} + \epsilon_t \quad (3.3)$$

where:

LQ_{imt} = the natural logarithm of the per capita volume of apparel of category i imported from Mexico per time period t,

LY_t = the natural logarithm of U.S. per capita disposable income per time period t,

LPM_{it} = the natural logarithm of the import price of apparel of category i imported from Mexico (U.S. dollars per SME) divided by the domestic price of apparel (expressed as the proxy of the U.S. producer price index for apparel) per time period t,

LPR_{it} = the natural logarithm of the import price of apparel of category i imported from the rest of the world (U.S. dollars per SME) divided by the domestic price of apparel (expressed as the proxy of the U.S. producer price index for apparel) per time period t,

LQ_{int-1} = the natural logarithm of the instrumental variable created as a proxy for consumer tastes and preferences in time period t expressed as the predicted volume of apparel imports of category i from Mexico lagged one time period, and

ε_t = the random error term in time period t .

In estimating the coefficients of the parameters (i.e., the income and price elasticities) economic theory, as previously discussed, leads to the expectation that β_{1t} , β_{3t} , $\beta_{4t} > 0$ and $\beta_{2t} < 0$.

Model of U.S. Demand for Apparel Imports from the Rest of the World

The model used to estimate U.S. demand for apparel imports of cotton, wool, and man-made fibers, as well as aggregate apparel imports from the rest of the world was:

$$LQ_{it} = \beta_0 + \beta_1 LY_t + \beta_2 LPR_{it} + \beta_3 LQ_{it-1} + \varepsilon_t \quad (3.4)$$

where:

LQ_{it} = the natural logarithm of the per capita volume of apparel of category i imported from the rest of the world per time period t ,

LY_t = the natural logarithm of U.S. per capita disposable income per time period t ,

LPR_{it} = the natural logarithm of the lagged import price of apparel of category i imported from the rest of the world (U.S. dollars per

SME) divided by the domestic price of apparel (expressed as the proxy of the U.S. producer price index for apparel) per time period t ,

LQ_{irt-1} = the natural logarithm of the proxy for consumer tastes and preferences in time period t expressed as the volume of apparel of category i imported from the rest of the world lagged one time period, and

ε_t = the random error term in time period t .

The proxy for the price of apparel imported from the rest of the world used in the numerator in PR_{it} was lagged three months to compensate for market adjustment to the customs import price. The relative price of apparel imports from Mexico was omitted from the demand model for the rest of the world, because it was considered to be an irrelevant variable. It is unlikely that imports from Mexico, being very small relative to those from the rest of the world, would exert significant influence on the demand for imports from the rest of the world. Guided by economic theory previously discussed, it is expected that β_{1t} and $\beta_{3t} > 0$, and $\beta_{2t} < 0$.

Description of Data and Data Sources

Monthly time series data from a variety of secondary sources were used in estimating the elasticities of demand. The majority of the data was taken from

government documents, with additional data supplied by industry sources. The data used in the analysis of demand for apparel imports within the MFA fiber categories covered the time period January, 1983, through September, 1991. Data used in the estimation of demand for 9802/Special Regime apparel imports from Mexico spanned the period January, 1984, through December, 1989.

Volume of Apparel Imported from Mexico and the Rest of the World

The volume of apparel imported from Mexico and the rest of the world for each of the three MFA fiber categories was measured in square meter equivalents (SME), a unit of measure commonly used to quantify apparel imports across product categories. Prior to the U.S. government's conversion from the Standard Industrial System to the Harmonized System in January of 1989, apparel imports were measured in square yard equivalents (SYE). All import volume data prior to January, 1989, therefore, was converted from SYE to SME using the conversion factor of 0.83612736. The volumes of apparel imported in each of the three major fiber categories of cotton, wool, and man-made were summed to yield the aggregate volume of apparel imported from Mexico per time period. The volume of apparel imported from the rest of the world was determined by subtracting the volume imported from Mexico from the world total by fiber category. The volumes of apparel imports from the rest of the world for the three fiber categories were subsequently summed to create the aggregate volume of apparel imported per time period.

The monthly import volume data were taken from the American Statistical Index publication of United States General Imports of Cotton, Wool, and Man-made Fiber Textiles by Major Subgroups in Equivalent Square Yards/Equivalent Square Meters, TQ 2496, compiled by the United States Department of Commerce, Office of Textiles and Apparel. Import volume was converted to a per capita basis using U.S. Census Bureau resident population data for each time period.

Value of Apparel Imported from Mexico and the Rest of the World

The U.S. dollar value of apparel imported from Mexico and the rest of the world used in the study was the customs value taken from the American Statistical Index publication, United States General Imports of Cotton, Wool, and Man-made Fiber Textiles by Major Subgroups in Equivalent Square Yards/Equivalent Square Meters, TQ 2496, compiled by the United States Department of Commerce, Office of Textiles and Apparel. The values of apparel imports from Mexico for the three major fiber categories were summed to create the total value of apparel imported from Mexico per time period. The value of apparel imported (by fiber type) from the rest of the world was determined by subtracting the value of apparel imports from Mexico from the world total for each category. The total value of apparel imports from the rest of the world was created by summing the values of apparel imports from the rest of the world in the three major fiber categories per time period.

Price per SME of Apparel Imported from Mexico and the Rest of the World

The volume and value of cotton, wool, and man-made fiber apparel imports were used to compute the price per unit (SME) of apparel imported from Mexico and the rest of the world. The price of apparel imports for each category was the unit price, which was calculated by dividing the customs value of each category by the number of SME imported in the respective category per time period. The unit price for aggregate imports from both Mexico and the rest of the world was calculated by dividing the summed value of the three major fiber categories by the summed volume of the three categories.

Volume of 9802/Special Regime Apparel Imports from Mexico

The volume of combined 9802 and Special Regime apparel imports from Mexico was measured in square meter equivalents. Again, prior to January, 1989, the volume of the imports was measured in square yard equivalents; therefore, the data for January, 1984, through December, 1988, were converted from SYE to SME using the conversion factor of 0.83612736. Volume data for 9802/Special Regime apparel imports from Mexico was compiled by and secured from the American Textile Manufacturers Institute (ATMI); the original source of the data was the U.S. Department of Commerce. The volume of imports was converted to a per capita basis, using U.S. Census Bureau resident population data for each time period.

Value and Price of 9802/Special Regime Apparel Imports from Mexico

The customs value (in U.S. dollars) of apparel imports from Mexico was used to measure the value of combined 9802 and Special Regime apparel imports. The data were compiled by and secured from the American Textile Manufacturers Institute; the original source of the data was the U.S. Department of Commerce. Price per unit was calculated by dividing the value of the imports by the volume imported per time period.

U.S. Disposable Income

The measure of U.S. disposable income used in the study was aggregate personal disposable income in constant 1987 dollars. Disposable income data published by U.S. Department of Commerce, Bureau of Economic Analysis, was taken from Business Statistics, 1963-91. Disposable income was converted to a per capita basis, using U.S. Bureau of the Census resident population data for each time period.

U.S. Resident Population

U.S. Bureau of the Census monthly estimates of the U.S. resident population data were used to convert import volume and disposable personal income to per capita bases. Estimates of the U.S. resident population were taken from Current Population Reports: Population Estimates and Projections (Series P-25), published by the U.S. Department of Commerce, Bureau of the Census.

U.S. Apparel Price

The U.S. apparel producer price index (Series WPUO381) was used as a proxy for the price of domestic apparel, because a reliable price per SME for domestic production was not available. It was assumed that movement of the apparel producer price index would be very similar to movements in prices of apparel at the wholesale level and, therefore, comparable to the use of customs value for apparel imports. The apparel producer price index data was acquired from the U.S. Department of Labor, Bureau of Labor Statistics. The base year of the data was 1982.

Data Analysis

Ordinary least squares (OLS) regression was used in preliminary estimation of the demand equations, and generalized least squares (GLS) analysis was used to estimate the income and price elasticities of demand for each category of apparel imports from Mexico and the rest of the world. Version 6.07 of SAS was used for data analysis and estimation of the elasticity parameters.

Because monthly time series data were used in the estimation process, it was anticipated that seasonal effects could emerge in the analysis, thereby increasing the likelihood of encountering problems of autocorrelation of the error term which could result in loss of efficiency in the parameter estimates. Particular care, therefore, was taken to test the assumptions of OLS regression. Diagnostics were run to determine the presence of collinearity, heteroscedasticity, and

autocorrelation of the error term. Because the models had been carefully specified, it was unlikely that collinearity would exist, and the use of time series data, rather than cross sectional data, would also limit the likelihood of encountering problems of heteroscedasticity.

The procedure used to test for collinearity among the independent variables included in each of the equations estimated followed that prescribed by Belsley, Khun, and Welsch (1980), and the collinearity diagnostics included in the COLLIN option of PROC REG were used to test for the presence of collinearity. The output was examined to determine if condition numbers in excess of 30 were produced, which would indicate the existence of a collinear relationship between pairs or groups of independent variables. In cases for which the condition index exceeded 30, the variance proportions were examined to determine if the index of the relationships between independent variables approached 0.70, indicating the presence of collinearity. For this study, collinearity between the intercept and an independent variable was not considered to be problematic, because this condition would not affect the parameter coefficients estimated.

Although it would be assumed that, using time series data, the independent variables would be homoscedastic, the Park-Glejser method was used to verify this assumption. Each independent variable included in each of the estimated equations was regressed on the appropriate squared residual, in order to verify that a significant relationship did not exist. If a significant relationship were found to exist, thereby indicating the existence of heteroscedasticity, the

nonconstant variance would be corrected using the appropriate weighted least squares routine (Glejser, 1969).

The most likely violation of the underlying assumptions of ordinary least squares regression in the present study was that of independence of the error terms over time. Using monthly time series data, it was very likely that the error terms would be serially correlated as the result of seasonal influences on the demand for apparel. The traditional means used to test for autocorrelation of the error term, the Durbin-Watson test statistic, was deemed inappropriate for this study. Durbin (1970) and Kmenta (1986) have shown that the inclusion of a lagged dependent variable (such as the proxy variable for consumer tastes and preferences included in the present study) renders the Durbin-Watson statistic unreliable. In addition, it was suspected that autocorrelation beyond the first order could be present. Therefore, tests for the presence of autocorrelation were undertaken through the twelfth order.

To test for the presence of autocorrelation of the error terms, the residuals produced in the original OLS estimation of each equation were lagged through the twelfth order and regressed on the residual. When a significant relationship revealed the presence of autocorrelation, PROC AUTOREG was used to correct the autocorrelation problem, with the order, or orders, of autocorrelation specified. Through this procedure, Yule-Walker estimates were generated and used to test the hypotheses included in the study.

While this procedure typically would produce parameter estimates which possess the desirable asymptotic properties and estimates which have nonbiased standard errors, the inclusion of a lagged dependent variable as one of the independent variables has been shown to render the Yule-Walker estimates less reliable. Therefore, as suggested by Johnston (1972) and Fuller (1978), an instrumental variable was created and used in the final estimation process. The instrumental variable used in the generalized least squares estimation of the parameters for Mexico was the predicted value of the lagged dependent variable for each of the five categories included in the study.

The predicted values were produced by regressing both the actual value and the lagged value of each of the independent variables on per capita volume of apparel imports from Mexico. The predicted values, therefore, were substituted for the actual lagged values of the dependent variable representing consumer tastes and preferences in each equation. For the equations used to estimate U.S. demand for apparel imports from the rest of the world, inclusion of the instrument created collinearity problems. Therefore, the parameters in these cases were estimated with the actual lagged values of the dependent variable.

Summary

Discussion of the functional form and specification of the models used to estimate the elasticities and to test the proposed hypotheses have been presented in this chapter. In addition, a description of the data and the sources of the data,

as well as the methods employed in the data analysis were included. The results of the data analysis and elasticities of U.S. demand estimated for apparel imports from Mexico and the rest of the world are reported and discussed in Chapter IV.

CHAPTER IV

EMPIRICAL RESULTS AND DISCUSSION

The purpose of this dissertation was to estimate the income and price elasticities of U.S. demand for apparel imports from Mexico and the rest of the world. This chapter begins with a description of apparel imports from Mexico and the rest of the world during the time period covered by the study and concludes with a presentation of the elasticities of demand estimated, the results of the hypotheses tested, and discussion of the findings.

Description of Apparel Imports from Mexico and the Rest of the World

In aggregate, U.S. apparel imports of cotton, man-made, and wool fibers from Mexico and the rest of the world increased from approximately 3.23 billion square meter equivalents in 1983, to almost 5.41 billion SME in 1990, an increase of 67 percent. Table 4.1 and Table 4.2 present the volume of apparel imported from Mexico and the rest of the world, respectively, for the years covered by the study. The increase in value of apparel imports was even more dramatic, however, with the aggregate value of imports from Mexico and the rest of the world increasing from nearly \$8.19 billion in 1983, to over \$19.92 billion in 1990, an increase of 143 percent. Table 4.3 and Table 4.4 present the value of apparel imports from Mexico and the rest of the world between 1983 and 1990.

Table 4.1 Volume of U.S. Apparel Imports from Mexico by Fiber Type, 1983-1990

Year	Aggregate	Cotton	Man-made	Wool
1983	50.14	15.97	33.44	0.73
1984	71.86	24.41	46.51	0.94
1985	91.68	23.32	67.38	0.98
1986	96.53	32.76	62.85	0.92
1987	133.93	56.95	76.21	0.77
1988	157.90	67.30	89.50	1.10
1989	172.31	72.95	98.41	0.95
1990	170.85	74.64	95.40	0.81

Data are millions of SME.

Source: U.S. Department of Commerce.

Table 4.2 **Volume of U.S. Apparel Imports from the Rest of the World by Fiber Type, 1983-1990**

Year	Aggregate	Cotton	Man-made	Wool
1983	3,183.63	1,139.26	1,943.34	101.03
1984	3,888.38	1,425.34	2,327.93	135.11
1985	4,192.53	1,582.94	2,470.21	139.38
1986	4,800.92	1,833.09	2,816.13	151.70
1987	4,985.13	2,070.49	2,779.31	135.33
1988	4,832.00	2,085.30	2,620.80	125.90
1989	5,247.53	2,238.71	2,899.05	109.77
1990	5,236.27	2,314.17	2,828.75	103.35

Data are millions of SME.

Source: U.S. Department of Commerce.

Table 4.3 Value of U.S. Apparel Imports from Mexico by Fiber Type, 1983-1990

Year	Aggregate	Cotton	Man-made	Wool
1983	\$137.82	\$ 46.30	\$ 85.57	\$ 5.95
1984	204.12	75.56	119.99	8.57
1985	235.70	74.86	152.65	8.19
1986	266.90	101.22	158.40	7.28
1987	362.48	176.50	177.81	8.17
1988	437.90	215.10	208.40	14.40
1989	492.13	248.86	230.42	12.85
1990	500.53	263.97	225.50	11.06

Data are millions of U.S. dollars.

Source: U.S. Department of Commerce.

Table 4.4 **Value of U.S. Apparel Imports from the Rest of the World by Fiber Type, 1983-1990**

Year	Aggregate	Cotton	Man-made	Wool
1983	\$ 8,052.19	\$3,185.70	\$4,009.82	\$ 856.67
1984	10,673.88	4,236.88	5,151.59	1,285.41
1985	11,660.15	4,761.41	5,477.29	1,421.45
1986	13,813.80	5,658.12	6,545.78	1,609.90
1987	16,050.19	7,218.13	7,252.07	1,579.99
1988	16,633.10	7,425.30	7,467.20	1,740.60
1989	18,500.05	8,411.08	8,391.08	1,697.89
1990	19,422.60	9,141.96	8,634.24	1,646.40

Data are millions of U.S. dollars.

Source: U.S. Department of Commerce.

There are several explanations for the difference in the growth of apparel imports in terms of volume and value. During this time period, the volume growth of imports from major developing country suppliers, including Hong Kong, China, Taiwan, and South Korea, was constrained by quantitative import restrictions imposed through bilateral agreements negotiated under the Multifiber Arrangement (Barker, 1988). U.S. agreements negotiated during the latter 1980s limited growth of quotas for these countries to 1 percent per year. In addition, access to the U.S. market was further constrained by disallowing the transfer of quota allotments from categories for which quotas remained unused to categories for which allocations had been consumed. Thus, during this time period, quotas for many categories for these countries were truly binding (Cline, 1990).

While quotas for some countries and some categories were binding during the time period covered by the study, it is important to note that non-binding quotas are also quite restrictive. When quota allocations are not filled, a lesser quantity of imports is available in the domestic market, and prices for apparel are higher than would be the case with free trade conditions. Clark (1992) has posed that in 1989, quotas under the MFA were among the predominant non-tariff measures employed by the United States in regulating imports.

The more pronounced increase in value of apparel imports was also due, in part, to inflationary trends and the weakness of the U.S. dollar during this time period (Barker, 1988). In addition, the higher value of imports reveals the response of supplying nations to restrictions on the quantity of apparel that could

be exported, through upgrading the value of exports in order to maximize both profits and utilization of limited quota allocations (Barker, 1988; Cline, 1990).

The majority of apparel imported from both Mexico and the rest of the world during the time period included in the study was of man-made fiber. Figures 4.1 and 4.2 illustrate changes in the volume of apparel imports from Mexico and the rest of the world between 1983 and 1990. Man-made apparel accounted for approximately 60 percent of the total volume of apparel imported from Mexico and almost 57 percent of the apparel imported from the rest of the world. Cotton apparel accounted for nearly 39 percent of the aggregate import volume from Mexico and slightly more than 40 percent of that imported from the rest of the world. In contrast, wool apparel accounted for a relatively small percentage of the total volume U.S. apparel imports, comprising less than 1 percent of the apparel imported from Mexico and approximately 2.75 percent of imports from the rest of the world.

In terms of value, man-made apparel, again, comprised the largest share of imports from both Mexico and the rest of the world, as illustrated in Figures 4.3 and 4.4. Approximately 46 percent of the value of aggregate apparel imports from Mexico and almost 52 percent of the value of imports from the rest of the world were of man-made fiber. Cotton apparel accounted for slightly less than 44 percent of the value of apparel imported from Mexico and almost 46 percent of that imported from the rest of the world. Wool apparel comprised nearly 3

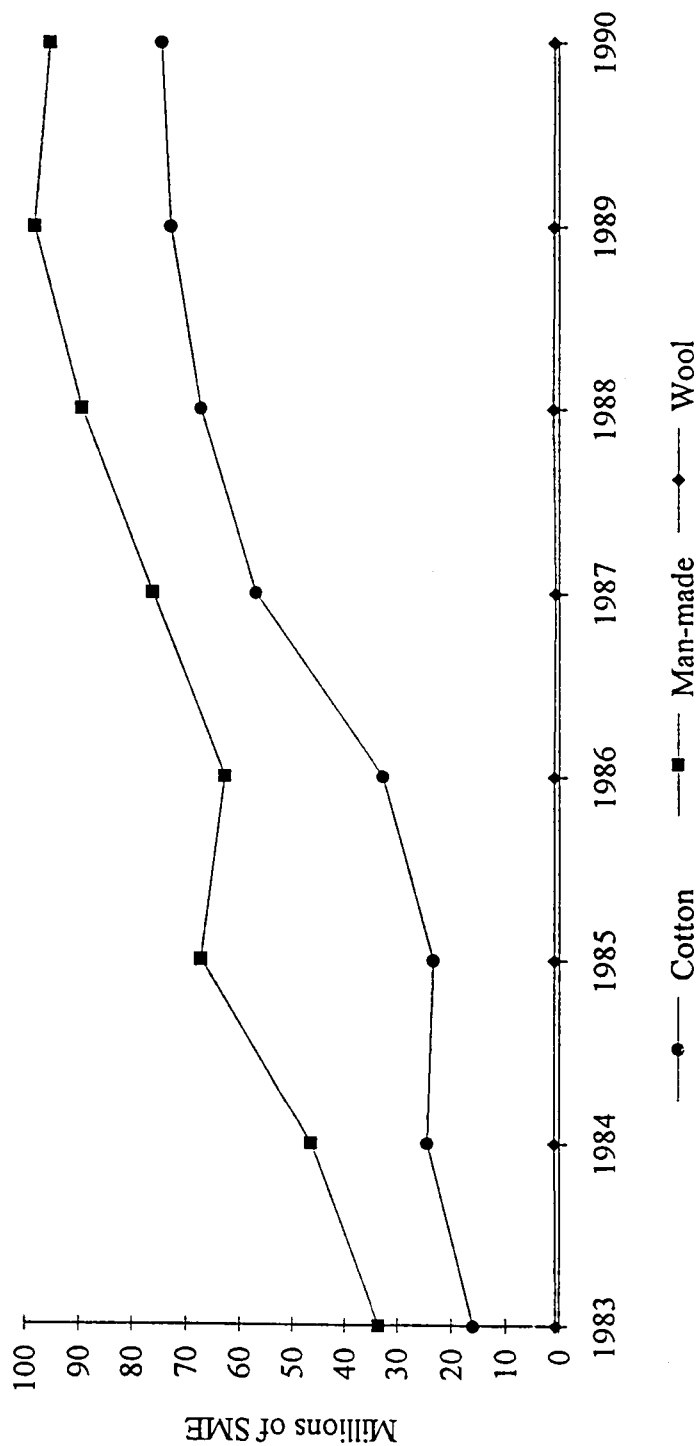


Figure 4.1 Volume of U.S. apparel imports from Mexico, in millions of SME, by fiber type, 1983 - 1990

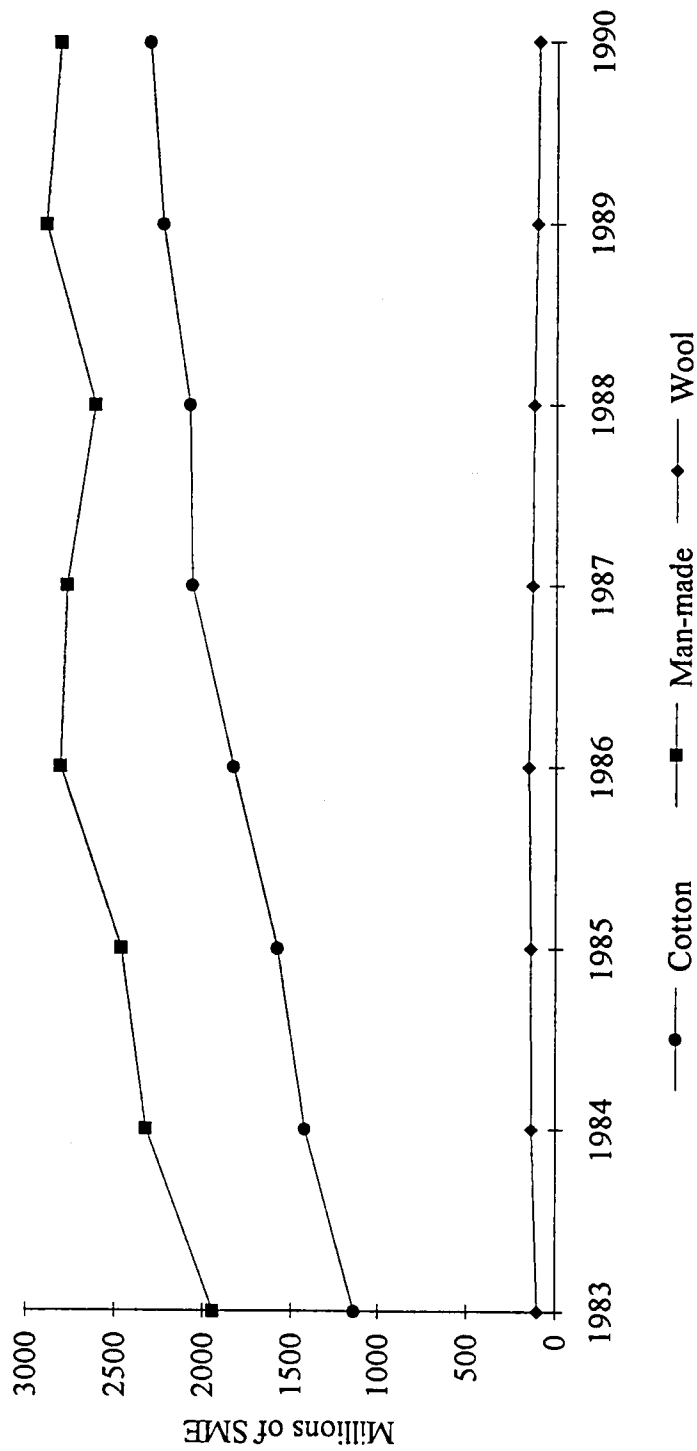


Figure 4.2 Volume of U.S. apparel imports from the rest of the world, in millions of SME, by fiber type, 1983 - 1990

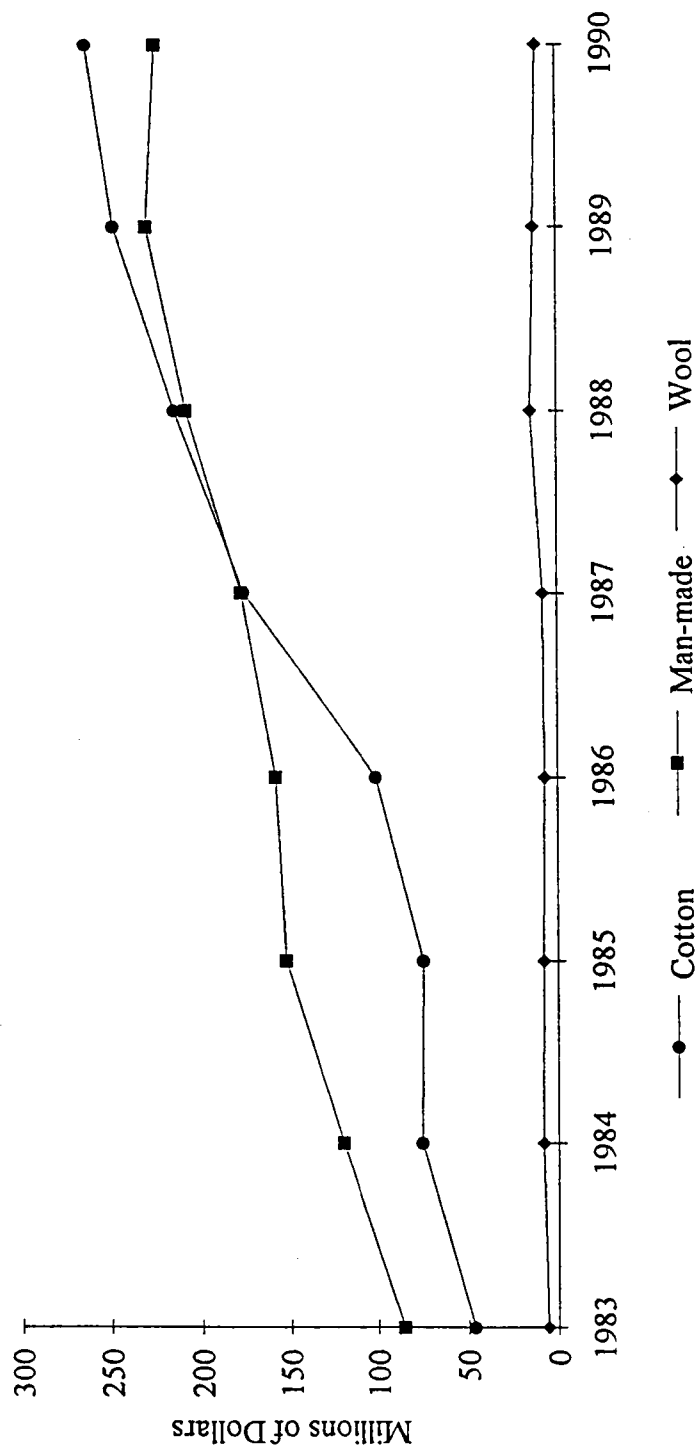


Figure 4.3 Value of U.S. apparel imports from Mexico, in millions of U.S. dollars, by fiber type, 1983 - 1990

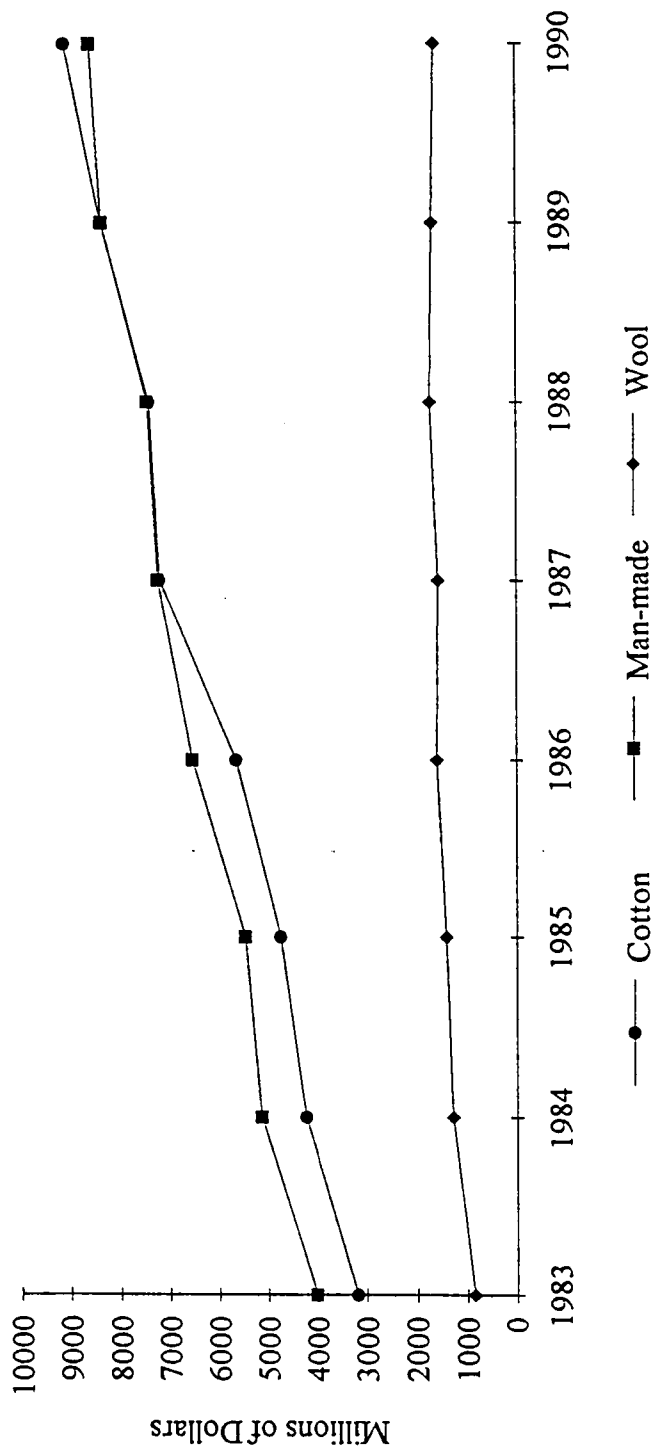


Figure 4.4 Value of U.S. apparel imports from the rest of the world, in millions of U.S. dollars, by fiber type, 1983 - 1990

percent of the value of apparel imports from Mexico and slightly more than 10 percent of the value of apparel from the rest of the world.

Mexico supplied over 2 percent of the total volume of U.S. aggregate apparel imports of cotton, man-made, and wool fibers for the years included in the study. In terms of the value of aggregate apparel imports, Mexico supplied 2.25 percent of U.S. imports. For the cotton category, Mexican imports accounted for 2.45 percent of the total volume and 2.35 percent of the value. Man-made apparel from Mexico accounted for a slightly larger percentage of the volume and value of U.S. apparel imports, with almost 2.7 percent of the volume originating in Mexico and 2.5 percent of the value. Mexican apparel imports of wool comprised a very small percentage of U.S. imports, with the volume and value of wool apparel from Mexico accounting for less than 1 percent of U.S. wool imports.

Although imports from Mexico accounted for a relatively small portion of the total volume and value of apparel imported by the United States between 1983 and 1990, the volume and value of imports from Mexico increased at a much faster rate than imports from the rest of the world. During this time period, aggregate apparel imports from Mexico increased by an average of almost 18 percent per year by volume and slightly more than 21 percent per year in terms of value. In contrast, imports from the rest of the world increased by an average of less than 8 percent by volume and almost 14 percent in value each year.

Cotton apparel imported from Mexico experienced the largest average annual growth, increasing more than 27 percent per year, on average, in volume

and almost 31 percent per year in value, compared to average growth rates of slightly less than 11 percent by volume and almost 17 percent in value per year for the rest of the world. Man-made apparel imports from Mexico increased an average of 17.55 percent per year in volume and 15.59 percent in value, in contrast to average volume and value growth rates of less than 6 percent and 12 percent, respectively, for such imports from rest of the world. The volume of wool apparel imported from Mexico increased, on average, less than 4 percent per year, while the value of Mexican wool imports increased by an average of over 13 percent. In comparison, the volume of wool apparel from the rest of the world increased, on average, only 1.33 percent and the value almost 11 percent annually.

Man-made fiber apparel from both Mexico and the rest of the world had the lowest unit price of the three fiber categories. Figures 4.5 and 4.6 illustrate the price per SME for apparel imports by fiber type for Mexico and the rest of the world; the supporting data is presented in Tables 4.5 and 4.6. For man-made imports from Mexico, the price per SME ranged from \$2.27 to \$2.58, and the price fluctuated slightly over time. The price of man-made apparel imported from the rest of the world ranged from \$2.06 to \$3.06, with a gradual, but steady, increase over time. From 1983 to 1986, the price of man-made apparel was higher for Mexico than for the rest of the world. In 1986, however, the trend reversed, and thereafter Mexico experienced a price advantage, as illustrated in Figure 4.7.

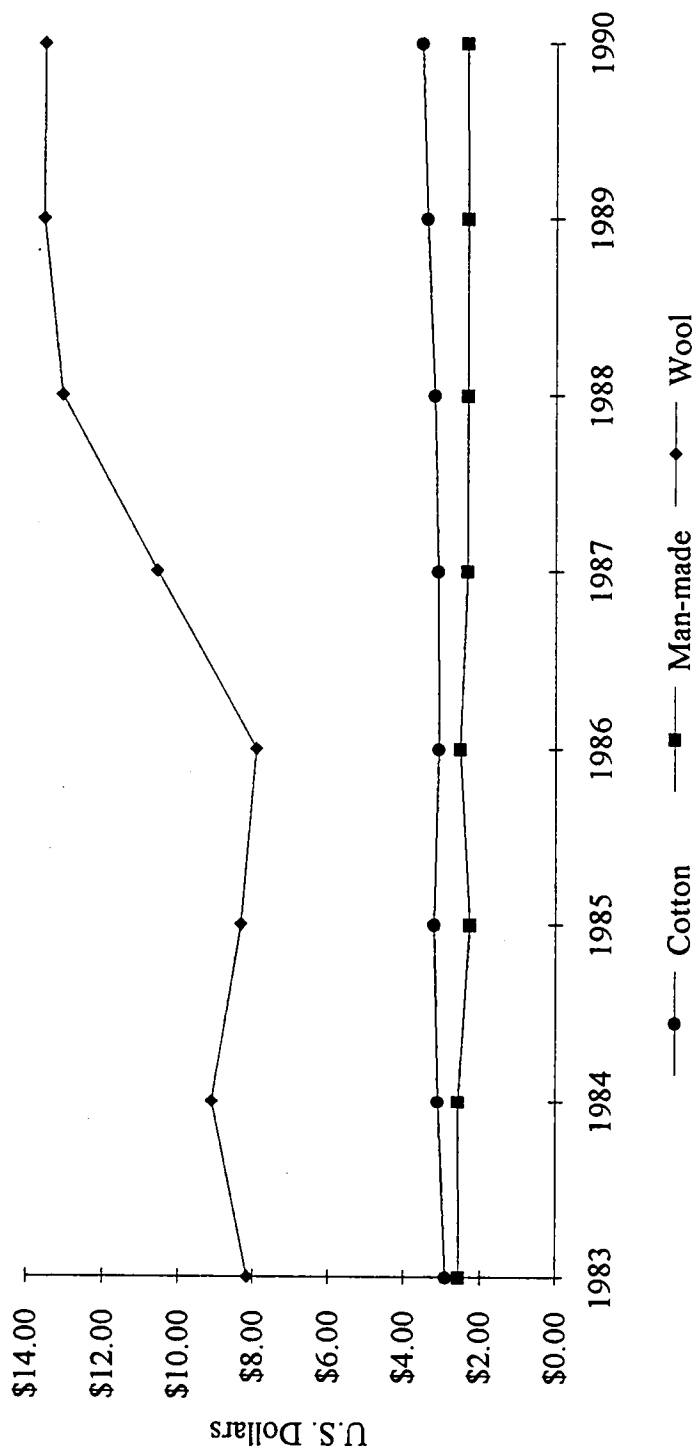


Figure 4.5 Nominal price of U.S. apparel imports from Mexico, in U.S. dollars per SME, by fiber type, 1983-1990

Table 4.5 Nominal price per SME of U.S. Apparel Imports from Mexico by
Fiber Type, 1983-1990

Year	Aggregate	Cotton	Man-made	Wool
1983	\$2.75	\$2.90	\$2.56	\$ 8.16
1984	2.84	3.10	2.58	9.12
1985	2.57	3.21	2.27	8.34
1986	2.76	3.09	2.52	7.93
1987	2.71	3.10	2.33	10.58
1988	2.77	3.20	2.33	13.09
1989	2.86	3.41	2.34	13.59
1990	2.93	3.54	2.36	13.57

Data are in U.S. dollars.

Source: U.S. Department of Commerce.

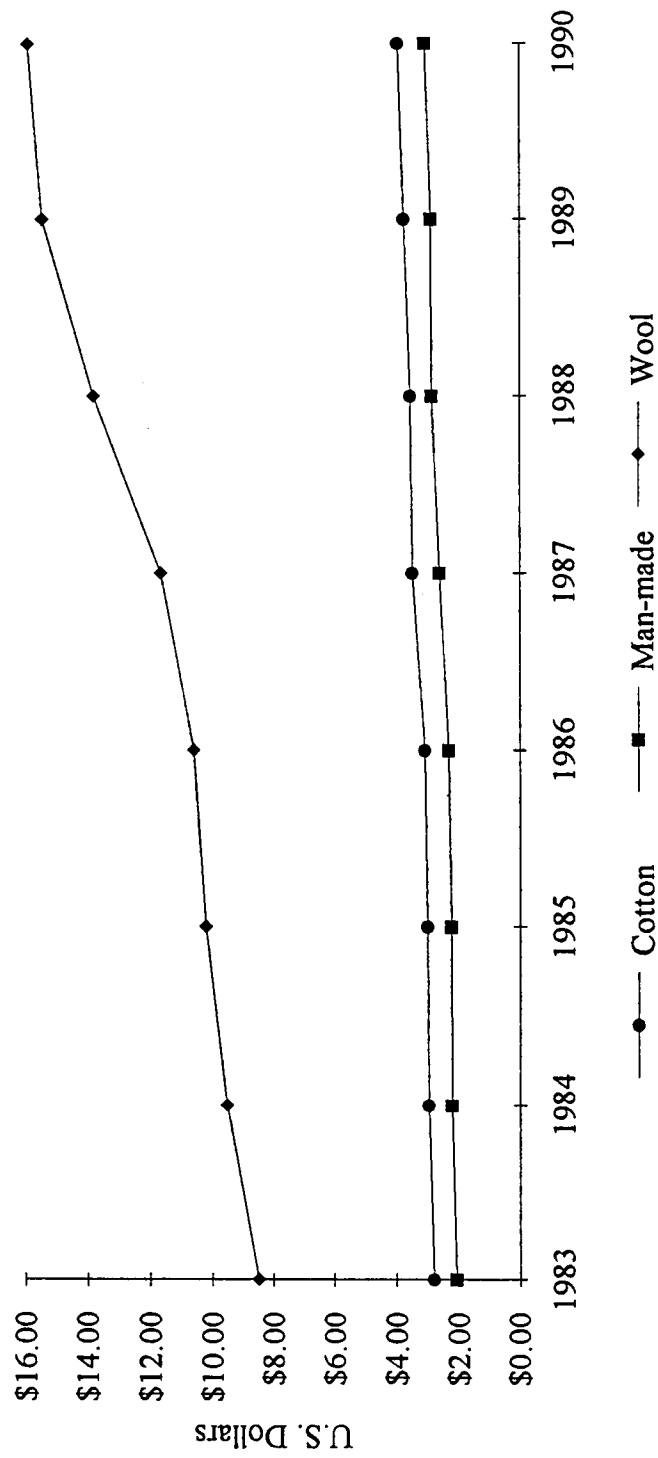


Figure 4.6 Nominal price of U.S. apparel imports from the rest of the world, in U.S. dollars per SME, by fiber type, 1983-1990

Table 4.6 **Nominal price per SME of U.S. Apparel Imports from the Rest of the World by Fiber Type, 1983-1990**

Year	Aggregate	Cotton	Man-made	Wool
1983	\$2.53	\$2.80	\$2.06	\$ 8.48
1984	2.75	2.97	2.21	9.51
1985	2.78	3.01	2.22	10.20
1986	2.88	3.09	2.32	10.61
1987	3.22	3.49	2.61	11.67
1988	3.44	3.56	2.85	13.83
1989	3.53	3.76	2.89	15.47
1990	3.71	3.95	3.06	15.93

Data are millions of U.S. dollars.

Source: U.S. Department of Commerce.

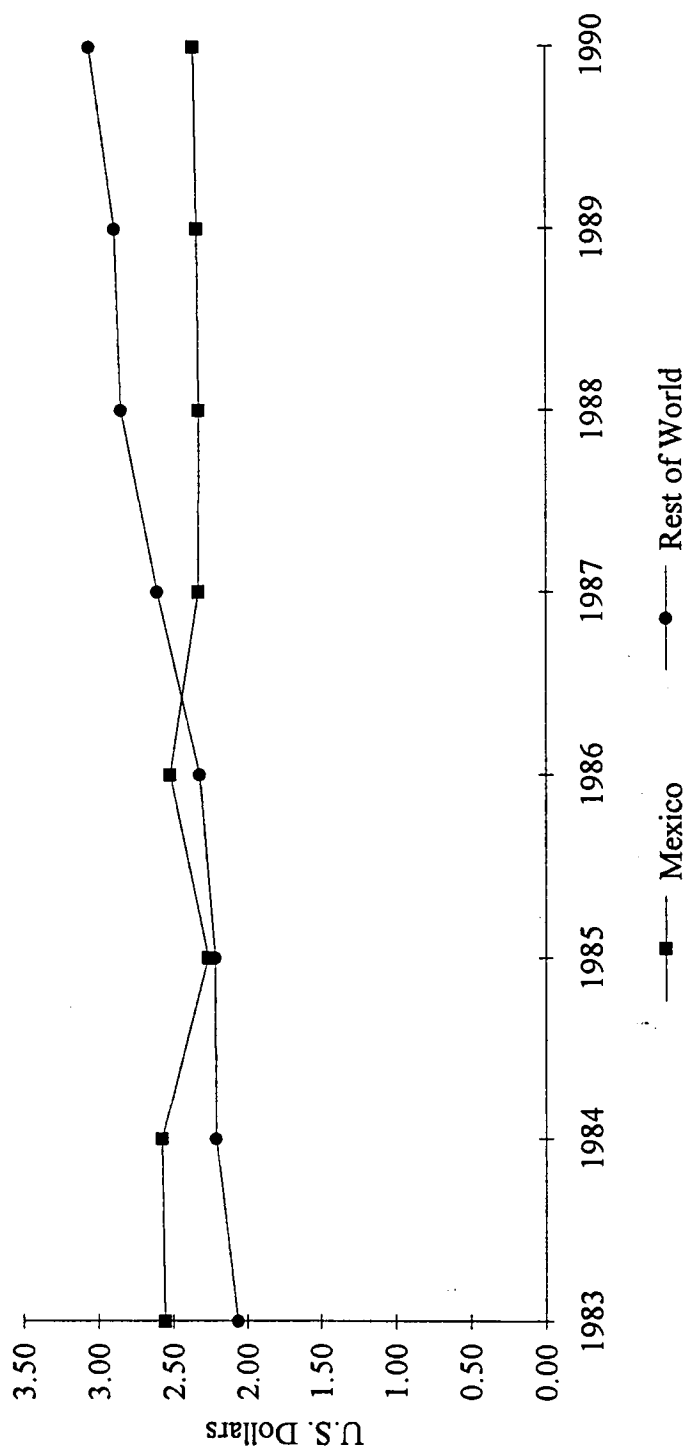


Figure 4.7 Comparison of the nominal price of man-made apparel imports from Mexico and the rest of the world, in U.S. dollars per SME, 1983-1990

The shift in price advantage corresponds with the 1986 renegotiation of bilateral agreements with the major supplying countries of Hong Kong, Taiwan, Japan, and South Korea and the bilateral negotiated with China in 1988. The terms of these agreements imposed more severe growth restraints than those which had been in effect prior to this time. In addition, the agreements also instituted aggregate limits for quotas allocations, which restricted the supplying countries in shifting exports to categories for which there were no restraints (Barker, 1988; Edwards, 1989). The major suppliers, therefore, began to upgrade apparel exports to maximize utilization of constrained quota allotments as previously discussed, which was reflected in the increased unit values of their exports.

For imports from both Mexico and the rest of the world, the price of cotton apparel was slightly higher than that for man-made apparel. The unit price of cotton apparel from Mexico ranged from \$2.90 to \$3.54, while that for imports from the rest of the world increased from \$2.80 in 1983, to \$3.95 in 1989. As with man-made apparel, the Mexican price per SME for cotton apparel was higher until 1986, when the Mexican price declined and remained below the rest of the world price, as indicated in Figure 4.8. Again, the Mexican price advantage likely resulted from the increased constraints imposed on imports from the rest of the world.

The price per SME of apparel from both Mexico and the rest of the world was highest for the wool category. The unit price for wool garments imported

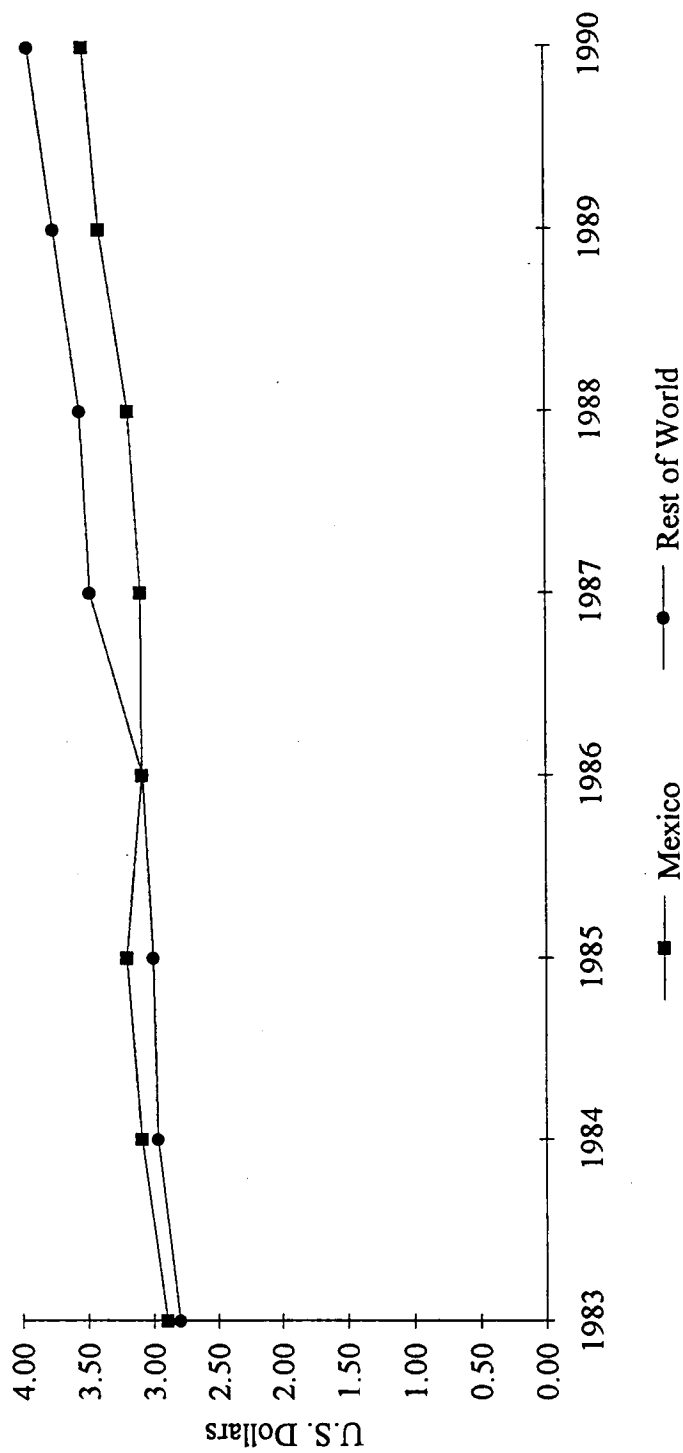


Figure 4.8 Comparison of the nominal price of cotton apparel imports from Mexico and the rest of the world, in U.S. dollars per SME, 1983-1990

from Mexico ranged from \$7.93 to \$13.59, and the price for wool apparel from the rest of the world ranged from \$8.48 to \$15.93. The Mexican price fluctuated between 1984 and 1989, while the price for the rest of the world continually rose, though at an uneven rate, over time. The price of wool apparel from Mexico was below that imported from the rest of the world throughout the time period covered in the study, as illustrated in Figure 4.9.

Analysis of U.S. Demand for Apparel Imports from Mexico

A single equation, double log-linear demand model was used to estimate U.S. demand for imported apparel from Mexico. The basic demand function used in the analysis was stated previously as:

$$Q_{im} = f(Y, PM_i, PR_i, T_{im}) \quad (4.1)$$

A double logarithmic function was used to estimate the income and price elasticities of demand. In this form, the relationship was expressed as:

$$LQ_{imt} = \beta_0 + \beta_1 LY_t + \beta_2 LPM_{it} + \beta_3 LPR_{it} + \beta_4 LQ_{imt-1} + \epsilon_t \quad (4.2)$$

where:

LQ_{imt} = the natural logarithm of the per capita volume of apparel of category i imported from Mexico per time period t ,

LY_t = the natural logarithm of U.S. per capita disposable income per time period t ,

LPM_{it} = the natural logarithm of the import price of apparel of category i imported from Mexico (U.S. dollars per SME) divided by the

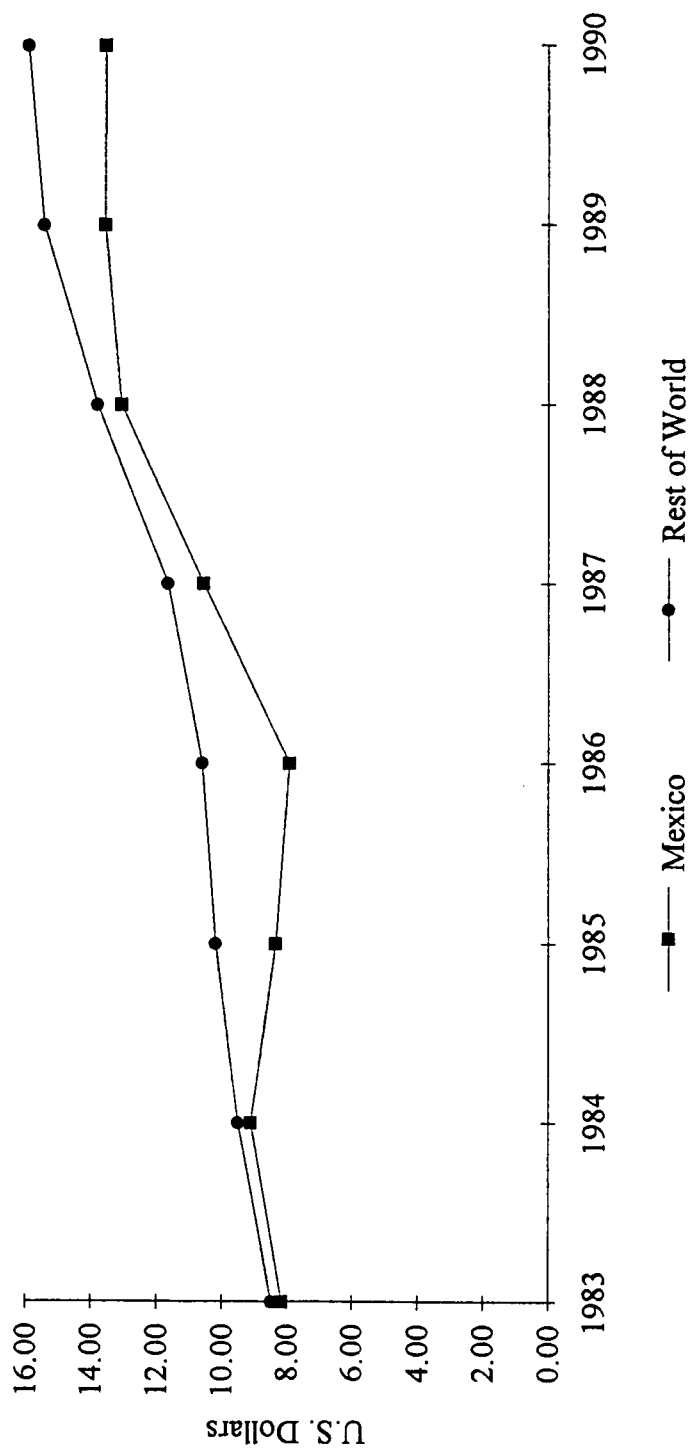


Figure 4.9 Comparison of the nominal price of wool apparel imports from Mexico and the rest of the world, in U.S. dollars per SME, 1983-1990

domestic price of apparel (expressed as the proxy of the U.S. producer price index for apparel) per time period t ,

LPR_{it} = the natural logarithm of the import price of apparel of category i imported from the rest of the world (U.S. dollars per SME) divided by the domestic price of apparel (expressed as the proxy of the U.S. producer price index for apparel) per time period t ,

LQ_{imt-1} = the natural logarithm of the proxy for consumer tastes and preferences per time period t , expressed as the predicted volume of apparel imports of category i from Mexico, lagged one time period, and

ε_t = the random error term in time period t .

In the log-linear form, the β s represent the estimates of the elasticities of demand, with β_{1t} being the estimate of the income elasticity, β_{2t} the direct, or own-price elasticity, β_{3t} the cross-price elasticity, and β_{4t} the elasticity of consumer tastes and preferences. The hypothesized signs for the parameter estimates are:

$$\beta_{1t}, \beta_{3t}, \beta_{4t} > 0 \text{ and } \beta_{2t} < 0.$$

For each category of apparel imports from Mexico, with the exception of the wool category, the test of Hypothesis 1, that a significant relationship does not exist between the volume of apparel imported from Mexico and the independent variables included in the model was rejected. The F values produced were

statistically significant at the 0.0001 level or better for each category of imported apparel, except for the wool category, for which the p value was 0.07.

In addition, the signs of the parameters estimated for each of the elasticities for each classification of apparel imports from Mexico were, in general, as hypothesized. Table 4.7 contains a summary of the estimated price elasticities of U.S. demand for apparel imports from Mexico by classification. The signs of all parameters were as anticipated, except for the direct- and cross-price coefficients estimated for the wool category, for which the signs were reversed. All parameters estimated, except those for the wool category and the proxy for consumer tastes and preferences for man-made apparel imports, were statistically significant at the 0.10 percent level or better.

Autocorrelation of the error term was found to exist for the original OLS estimation of each equation. This was most likely the result of either seasonal variation in the monthly data used to generate the parameter estimates or to misspecification of the model due to the omission of a relevant variable or variables. Correction of the autocorrelation problem was undertaken by specifying the appropriate order(s) of autocorrelation and generating Yule-Walker estimates of the parameters through generalized least squares. In order to overcome potential bias in the Yule-Walker estimates which would result from inclusion of the lagged value of the dependent variable as a proxy for consumer tastes and preferences, an instrumental variable (created as described in Chapter III) was used.

Table 4.7 Estimated Demand Elasticities for Apparel Imports from Mexico

Classification	LY_t	LPM_t	LPR_t	LQ_{t-1}
Aggregate (4.3)	4.2964 (0.0004)	-1.4778 (0.0001)	1.0494 (0.0001)	0.2218 (0.0677)
9802 (4.4)	4.4030 (0.0023)	-0.8955 (0.0001)	0.7650 (0.0057)	0.3093 (0.0245)
Cotton (4.5)	2.880 (0.0933)	-0.9025 (0.0012)	1.1677 (0.0230)	0.6264 (0.0001)
Man-made (4.6)	3.1509 (0.0048)	-1.1304 (0.0001)	0.6437 (0.0146)	0.1285 (0.2709)
Wool (4.7)	4.0540 (0.1473)	0.1805 (0.4549)	-0.4206 (0.2885)	-0.1560 (0.6570)

Equation numbers are indicated in parentheses under the classification headings.

Significance probabilities are indicated in parentheses beneath the parameter estimates.

The income elasticities of demand for apparel imports from Mexico ranged from 2.880 for cotton apparel to 4.403 for 9802 imports. Income elasticities of demand in excess of 4.0, while higher than those which have typically been estimated for aggregate apparel imports, are not outside of the range of elasticities estimated in other studies. Income elasticities of the magnitude estimated in the present study, by definition, would suggest that apparel imports from Mexico are considered luxury goods for U.S. consumers. While this would accurately describe some of the private label and fashion goods produced in Mexico for the U.S. market, a sizable portion of the imports consist of basic goods which would not typically be described as luxury goods, but as normal goods, instead.

The direct-price elasticities of demand for apparel imports from Mexico ranged from -0.896 to -1.478, while the cross-price elasticities estimated ranged from 0.644 to 1.168. These elasticities are well within the range of price elasticities estimated in other studies of U.S. demand for apparel imports. The estimated direct-price elasticities suggest that U.S. apparel imports from Mexico were price elastic for some categories (aggregate imports and man-made fiber apparel) and inelastic for others (combined 9802/Special Regime and cotton imports). The estimated cross-price elasticities indicate that Mexican imports do serve as gross substitutes for both domestically produced apparel and imported apparel sourced elsewhere in the world.

Demand for Aggregate Apparel Imports from Mexico

The parameters produced through generalized least squares estimation for aggregate apparel imports from Mexico of cotton, wool, and man-made fibers are indicated in the equation below. In the estimation process, first order positive autocorrelation of the error term was corrected, using an estimated value of -0.4201 for rho. The probabilities generated for the hypotheses are given in parentheses below the coefficients.

$$\begin{aligned} LQ_t = & -43.0946 + 4.2964 Y_t - 1.4778 LPM_t + 1.0494 LPR_t \\ & \quad (0.0004) \quad (0.0001) \quad (0.0001) \\ & + 0.2218 LQ_{t-1} \end{aligned} \quad (4.3)$$

(0.0677)

Total $R^2 = 0.8874$

Regression $R^2 = 0.7430$

The model accounted for the majority of the variation in U.S. demand for aggregate apparel imports from Mexico, as indicated by the regression R^2 of 0.7430. The income elasticity of 4.2964 suggests that for each 1 percent increase (decrease) in per capita disposable income, apparel imports from Mexico will increase (decrease) by approximately 4 percent. The estimated own-price elasticity of -1.4778 indicates that, in aggregate, apparel imports from Mexico are price elastic, and a 1 percent increase (decrease) in the price of Mexican apparel imports relative to the U.S. price will yield approximately a 1.5 percent decrease (increase) in apparel imports.

The cross-price elasticity of 1.0494 supports the assumption that apparel produced in Mexico is a substitute for apparel imported from other foreign suppliers, and it would be expected that a 1 percent increase (decrease) in the relative price of apparel imports from the rest of the world will result in a 1 percent increase (decrease) in apparel imports from Mexico. The coefficient of 0.2218 estimated for the trend variable suggests that each 1 percent increase (decrease) in apparel imports from Mexico during the previous month will produce approximately a 0.25 percent increase (decrease) in Mexican apparel imports during the current month.

The magnitude of the estimated income elasticity suggests that, across categories, apparel imports from Mexico are luxury goods for American consumers. For some apparel lines assembled and imported through production sharing operations, such as private label goods and short-run production garments, this may be a valid assumption. A large portion of the apparel imported from Mexico, however, consists of basic goods, for which an income elasticity closer to unity would be expected.

Demand for 9802 and Special Regime Apparel Imports from Mexico

The parameters estimated for combined 9802 and Special Regime apparel imports were similar to those estimated for aggregate imports from Mexico. This was as expected, because this category represents the majority, approximately 90 percent, of apparel imported from Mexico.

In estimating the parameters for 9802 and Special Regime imports, corrections were made for sixth order negative and twelfth order positive autocorrelation. Estimates of rho of 0.1774 and -0.2442 were used for the respective orders in the transformation of the data. The resulting coefficients produced through generalized least squares are given below, with the probabilities generated for the hypotheses presented in parentheses beneath each of the coefficients.

$$\begin{aligned}
 LQ_t = & - 44.1196 + 4.4030 Y_t - 0.8955 LPM_t + 0.7650 LPR_t \\
 & \quad (0.0023) \quad (0.0001) \quad (0.0057) \\
 & + 0.3093 LQ_{t-1} \quad (0.0245)
 \end{aligned} \tag{4.4}$$

Total $R^2 = 0.8562$

Regression $R^2 = 0.8594$

For the 9802/Special Regime category, the variables included within the regression model, again, explained the majority of the variation in the demand for imports during the time period covered in the analysis. The income elasticity of 4.403 suggests that a 1 percent increase in U.S. per capita disposable income will result in more than a 4 percent increase in apparel imports from Mexico. The estimated own-price elasticity of demand, -0.8955, indicates that apparel of this category is price inelastic, with a 1 percent increase in the relative price of Mexican apparel producing less than a 1 percent decrease in imports.

The cross-price elasticity estimate of 0.7650 indicates that a 1 percent increase in the relative price of apparel imports from the rest of the world would

yield approximately a 0.75 percent increase in imports from Mexico, as Mexican apparel would be substituted for apparel imports from the rest of the world. The coefficient produced for the trend variable, 0.3093, suggests that a 1 percent increase in this category of apparel imported from Mexico during the previous time period will result in slightly more than a 0.30 percent increase in Mexican apparel imports during the current time period.

Although the estimated income elasticity for 9802/Special Regime imports was very close to that produced in the analysis of aggregate imports, both price parameters were smaller than those generated in the previous analysis. The decreased responsiveness to changes in relative prices may result from 9802 imports being produced through joint U.S.-Mexican operations for U.S. apparel firms. Considering the investment made in production-sharing operations and the continuing relationships involved in such production, it is rational to expect that a more constant supply of apparel in this category may be established and maintained through Mexican production, rather than utilization of alternative offshore sources. The higher value of the parameter estimated for the proxy of consumer tastes and preferences also provides further support of such consistency of demand within the domestic market, given changes in relative prices.

Demand for Cotton Apparel Imports from Mexico

The parameters produced through generalized least squares estimation for cotton apparel imports from Mexico were as indicated in the equation below.

The probabilities generated for the hypotheses are given in parentheses beneath the coefficients. In the estimation process, corrections for positive first order and negative tenth order autocorrelation were made, using estimates of -0.5685 and 0.1535 in transforming the data.

$$\begin{aligned}
 LQ_t = & -29.3111 + 2.8802 Y_t - 0.9025 LPM_t + 1.1677 LPR_t \\
 & \quad (0.0933) \quad (0.0012) \quad (0.0230) \\
 & + 0.6264 LQ_{t-1} \quad (4.5) \\
 & \quad (0.0001)
 \end{aligned}$$

Total $R^2 = 0.9057$

Regression $R^2 = 0.7422$

The income elasticity of demand for cotton apparel was the lowest produced for any category of Mexican imports, indicating that imports of cotton were less responsive to changes in U.S. disposable income than the other categories of apparel included in the study. The own-price elasticity of demand estimated (-0.9025) was within the range estimated for the other categories and almost approaches unity. This implies that a 1 percent increase in the relative price of Mexican imports will result in nearly a 1 percent decrease in cotton apparel imports. The cross-price elasticity of demand of 1.1677 suggests that a 1 percent increase in the relative price of cotton apparel imports from the rest of the world will produce slightly more than a 1 percent increase in demand for cotton apparel imports from Mexico. The coefficient produced for the trend variable for cotton apparel, 0.6264, was larger than those produced for the other categories, suggesting that for each 1 percent increase in Mexican cotton apparel

imports during the previous month, an increase of nearly 0.63 percent would be expected during the current month.

Within the cotton category, apparel imports from Mexico primarily consist of basic goods, such as cotton trousers and playwear, sleepwear, and under garments that are produced through production sharing arrangements. The types of garments contained within this category, therefore, are more representative of those which would typically be considered normal goods. A decreased income elasticity would, therefore, be rational, because individuals are less likely to consume increasingly large amounts of these goods as income increases. Basic apparel also tends to be price sensitive, which was indicated by the increased cross-price elasticity estimated for this category.

Demand for Man-made Apparel Imports from Mexico

In estimating the elasticities of demand for man-made apparel imports from Mexico, corrections for first and twelfth order positive autocorrelation of the error term were made. An estimated value of -0.3853 for rho was used to correct the first order autocorrelation, and -0.2341 was used to correct the twelfth order autocorrelation. The parameters produced through generalized least squares estimation were as indicated in the equation below, with the probabilities generated for the hypotheses presented below the coefficients.

$$\begin{aligned}
LQ_t = & - 32.8620 + 3.1509 Y_t - 1.1304 LPM_t + 0.6437 LPR_t \\
& (0.0048) \quad (0.0001) \quad (0.0146) \\
& + 0.1285 LQ_{t-1} \quad (4.6) \\
& (0.2709)
\end{aligned}$$

Total $R^2 = 0.8387$

Regression $R^2 = 0.5913$

For man-made apparel imports from Mexico, an income elasticity of approximately three was estimated. The higher income elasticity of man-made apparel imports indicates that imports of this fiber category were more sensitive to changes in U.S. per capita disposable income than imports of cotton. In addition, the direct-price elasticity of demand for man-made apparel, -1.1304, was greater in absolute value than that estimated for cotton imports. Man-made apparel imports were found to be price elastic, and, therefore, would be expected to be more sensitive than those of cotton to changes in the Mexican price relative to the domestic price. In contrast, the cross-price elasticity was lower for imports of man-made fiber than for cotton, indicating that man-made apparel imports from Mexico would be expected to be less sensitive to changes in the relative price of similar apparel imported from the rest of the world.

The elasticity estimated for consumer taste and preferences, while of the correct sign, failed to be statistically significant. The data did not support the existence of a relationship between the predicted quantity of apparel imported during the previous time period (as a proxy for consumer tastes and preferences) and demand for man-made apparel imports during the current month.

Demand for Wool Apparel Imports from Mexico

The model used to estimate the elasticities of U.S. demand for apparel imports from Mexico produced very poor results for the wool category. Positive autocorrelation of the error term was found to exist at the first and twelfth orders, and negative autocorrelation was detected at the sixth order. Estimates of rho of -0.4375 (first order), 0.1014 (sixth order), and -0.2134 (twelfth order) were used to transform the data to correct the autocorrelation problems. The parameters produced through generalized least squares estimation for wool imports from Mexico are indicated in equation 4.7. The probabilities generated for the hypotheses are given in parentheses below the coefficients.

$$\begin{aligned} LQ_t = & - 47.4782 + 4.0540 Y_t + 0.1805 LPM_t - 0.4206 LPR_t \\ & (0.1473) \quad (0.4549) \quad (0.2885) \\ & - 0.1560 LQ_{t-1} \end{aligned} \tag{4.7}$$

(0.6570)

Total $R^2 = 0.4334$

Regression $R^2 = 0.0282$

The model estimated explained virtually none of the variation in the demand for wool apparel from Mexico, as indicated by the very small value of the regression R^2 . In addition, the value of the F statistic produced for the regression failed to be statistically significant at the .05 level; the null hypothesis for this category, therefore, failed to be rejected. The sign of the parameter estimated for the income elasticity of demand for wool apparel was of the correct sign and approximately of the same magnitude as that estimated for both the aggregate

and 9802/Special Regime classifications. As the rest of the parameters estimated, however, it failed to be statistically significant. The signs of the coefficients estimated for both the direct- and cross-price elasticities, as well as that estimated for the trend variable, were reversed.

Wool apparel accounted for a very small portion of the total imports from Mexico. It is possible that either the small volume of imports in this category or the quality of wool garments produced in Mexico (for which no measure was included in the model) relative to that of imports from the rest of the world resulted in the lack of satisfactory parameter estimates being produced. In addition, the lag structure of the proxy variable for consumer tastes and preferences may not have been appropriate for this category, due to the difference in seasonal demand for wool apparel and the relatively rapid turnaround time possible for such apparel imported from Mexico.

Analysis of Demand for Apparel Imports from the Rest of the World

A single equation, double log-linear demand model was used to estimate U.S. demand for imported apparel from the rest of the world. The basic function used in the analysis, as previously stated, was:

$$Q_{ir} = f(Y, PR_i, T_{ir}) \quad (4.8)$$

Converted to the double logarithmic function used to estimate the income and price elasticities of demand, the relationship was expressed as:

$$LQ_{ir} = \beta_0 + \beta_1 LY_t + \beta_2 LPR_{it} + \beta_3 LQ_{ir,t-1} + \epsilon_t \quad (4.9)$$

where:

LQ_{it} = the natural logarithm of the per capita volume of apparel of category i imported from the rest of the world per time period t ,

LY_t = the natural logarithm of U.S. per capita disposable income per time period t ,

LPR_{it} = the natural logarithm of the lagged import price of apparel of category i imported from the rest of the world (U.S. dollars per SME) divided by the domestic price of apparel (expressed as the proxy of the U.S. producer price index for apparel) per time period t ,

LQ_{it-1} = the natural logarithm of the proxy for consumer tastes and preferences per time period t expressed as the volume of apparel imports from the rest of the world lagged one time period, and

ε_t = the random error term in time period t .

In this equation, the β s again represent the estimates of the elasticities of demand, with β_{1t} being the estimate of the income elasticity, β_{2t} the direct, or own-price elasticity, and β_{3t} the elasticity of consumer tastes and preferences. The hypothesized signs for the parameter estimates are: β_{1t} and $\beta_{3t} > 0$ and $\beta_{2t} < 0$.

The null form of Hypothesis 6, that a relationship does not exist between the volume of apparel imported from the rest of the world and the independent

variables included in the model, was rejected for each of the categories of apparel imports from the rest of the world. The F value generated for each equation produced a p value of 0.0001 in each case. In addition, the parameters estimated for each of the categories of apparel imported from the rest of the world were as hypothesized, with the exception of the coefficient estimated for the direct-price elasticity of demand for cotton apparel, for which the sign of the coefficient was reversed. All of the parameter estimates were statistically significant at the 0.10 level or better, with the exception of the direct-price elasticity for the cotton category, which failed to be statistically significant.

A summary of the income and price elasticities of demand estimated for each category of apparel imports from the rest of the world is presented in Table 4.8. The income elasticities estimated for imports from the rest of the world ranged from 1.4402 to 1.9226, which are very comparable to estimates obtained in other studies of U.S. demand for imported apparel. The direct-price elasticities of demand ranged from -0.2722 to -0.4768, indicating that demand for each category of apparel was price inelastic. The elasticities of the proxy variable for consumer tastes and preferences ranged from 0.4845 to 0.6029.

The income and direct-price elasticities of demand for imports from the rest of the world were substantially lower than those estimated for apparel imports from Mexico. In contrast, the estimated elasticities for consumer tastes and preferences tended to be higher for the rest of the world than for Mexico.

Table 4.8 Estimated Demand Elasticities for Apparel Imports from the Rest of the World

Classification	LY_t	LPR_t	LQ_{t-1}
Aggregate (4.10)	1.8567 (0.0005)	-0.2722 (0.0861)	0.4845 (0.0001)
Cotton (4.11)	1.9226 (0.0008)	0.1456 (0.4251)	0.5008 (0.0001)
Man-made (4.12)	1.5093 (0.0059)	-0.3815 (0.0326)	0.5315 (0.0001)
Wool (4.13)	1.4402 (0.0599)	-0.4768 (0.0002)	0.6029 (0.0001)

Equation numbers are indicated in parentheses under the classification headings.

Significance probabilities are indicated in parentheses under the parameter estimates.

Such differences may reflect established, long-term trade flows between the United States and the large, primary foreign supplying countries and those being established with a more recent, growing supplier such as Mexico, which has more liberal access to the domestic market. All of the elasticities estimated, however, were well within the range of those which have been estimated in other studies of U.S. demand for world apparel imports.

Autocorrelation of the error term was found to exist for each of the equations estimated. Again, this is likely to have been the result of either seasonal influences associated with imports or the omission of a relevant variable in specifying the model. To correct for the autocorrelation, Yule-Walker estimates were generated, specifying the appropriate order or orders of autocorrelation. Instrumental variables were generated by regressing both the actual values and the values lagged one time period for each independent variable on the per capita volume of apparel imported in each of the four categories. The four equations were subsequently estimated using the predicted values for the lagged dependent variable which served as the proxy for consumer tastes and preferences. Extreme collinearity was introduced with the use of the predicted values. Therefore, the actual values for the lagged dependent variables were used in the analyses of demand for apparel imports from the rest of the world. Because inclusion of a lagged dependent variable as an independent variable can result in biasing the parameter estimates, less confidence is placed in the estimated coefficients produced in the analyses.

Demand for Aggregate Apparel Imports from the Rest of the World

The parameters produced through generalized least squares estimation for aggregate apparel imports from the rest of the world of cotton, wool, and man-made fibers are indicated in the equation below. Corrections for second and ninth order negative and twelfth order positive autocorrelation of the error term were made using estimates of rho of 0.1328, 0.1706, and -0.4026, respectively. The probabilities generated for the hypotheses are given in parentheses beneath the coefficients.

$$LQ_t = - 17.1519 + 1.8567 Y_t - 0.2722 LPR_t + 0.4845 LQ_{t-1} \quad (4.10)$$

(0.0005) (0.0861) (0.0001)

Total $R^2 = 0.6937$

Regression $R^2 = 0.6109$

The value of 0.6109 for the regression R^2 indicates that the model explained the majority of the variation in U.S. demand for aggregate imports from the rest of the world during the time period covered by the study. The estimated income elasticity of demand for apparel imports from the rest of the world was less than half those estimated for aggregate and 9802/Special Regime imports from Mexico. The estimated income elasticity of 1.8567 for world imports suggests that a 1 percent increase (decrease) in U.S. per capita disposable income will result in approximately a 2 percent increase (decrease) in aggregate apparel imports from the rest of the world.

In contrast, the own-price parameter estimated for the rest of the world was approximately one-third that estimated for aggregate and 9802/Special

Regime apparel imports from Mexico. For aggregate imports from the rest of the world, the coefficient of -0.2722 estimated for the direct-price elasticity of demand indicates that a 1 percent increase (decrease) in the relative price will yield slightly more than 0.27 percent decrease (increase) in imports. Therefore, imports from the rest of the world were found to be much less sensitive to changes in direct relative price than similar imports from Mexico.

The parameter estimate of 0.4845 for the trend variable supports the assumption of consumer consistency and indicates that a 1 percent increase (decrease) in aggregate apparel imports from the rest of the world during the previous time period would be expected to result in approximately 0.5 percent increase (decrease) in imports during the current month. The coefficient estimated for the rest of the world was over twice as large as that estimated for aggregate imports from Mexico and approximately 50 percent greater than that estimated for 9802/Special Regime imports. The increased consistency in U.S. demand for apparel from the rest of the world over time may well reflect established import arrangements with major supplying countries which continually use full quota allocations in order to maintain continued access to the U.S. market.

Demand for Cotton Apparel Imports from the Rest of the World

The parameters produced, through generalized least squares procedures, in estimating U.S. demand for cotton apparel imports from the rest of the world are

indicated in the equation below. The probabilities generated for the hypotheses are given in parentheses under the coefficients. In the estimation process, corrections for negative third order and positive twelfth order autocorrelation were made, using estimates of 0.1612 and -0.4212 for rho for the respective orders of autocorrelation.

$$LQ_t = - 18.6837 + 1.9226 Y_t + 0.1456 LPR_t + 0.5008 LQ_{t-1} \quad (4.11)$$

(0.0008) (0.4251) (0.0001)

Total $R^2 = 0.7929$

Regression $R^2 = 0.7136$

The value of the regression R^2 indicates that the model explained the majority of the variation in U.S. demand for cotton apparel imports from the rest of the world between January of 1983, and September of 1991. However, while the estimated elasticities for income and consumer tastes and preferences were within the range of those estimated for the other categories of apparel from the rest of the world, the data failed to support the existence of a relationship between own-price and quantity demanded.

The income elasticity estimated for cotton apparel was higher than those estimated for the other categories of imports from the rest of the world. The estimated income elasticity of demand of 1.9226 suggests that a 1 percent increase in U.S. per capita disposable income will produce nearly a 2 percent increase in imports of cotton apparel from the rest of the world. An income elasticity of this magnitude would, as with apparel imports from Mexico, suggest that cotton imports are, by definition, luxury goods.

The estimated elasticity of the proxy variable representing consumer tastes and preferences, 0.5008, was very close in magnitude to that estimated for cotton apparel imports from Mexico and mid-range among those estimated for other categories of imports from the rest of the world. The elasticity suggests that each 1 percent increase (decrease) in cotton apparel imports from the rest of the world during the previous time period will result in 0.5 percent increase (decrease) in cotton apparel imports during the current time period.

The sign of the coefficient estimated for the direct-price elasticity of demand was reversed from that expected, and the data failed to support the statistical significance of this parameter. Historically, importation of cotton apparel has been highly regulated, and the growth rate in quota allocations granted the major foreign supplying countries for cotton apparel were severely constrained during the time period of the study. Increasing limits on access to the U.S. market, therefore, may have rendered imports within this category insensitive to changes in relative price.

Demand for Man-made Apparel Imports from the Rest of the World

Second order negative and twelfth order positive autocorrelation were found to exist for man-made apparel imports from the rest of the world. The autocorrelation was corrected by transforming the data using estimates of 0.1252 and -0.4085 as the estimated values of ρ . The parameters produced through generalized least squares estimation for man-made apparel imports from the rest

of the world were as indicated in the equation below. The probabilities generated for the hypotheses are given in parentheses below the coefficients.

$$LQ_t = - 14.0998 + 1.5093 Y_t - 0.3815 LPR_t + 0.5315 LQ_{t-1} \quad (4.12)$$

(0.0059) (0.0326) (0.0001)

Total $R^2 = 0.6021$

Regression $R^2 = 0.4708$

The signs of the coefficients produced for the man-made category were consistent with economic theory, and each of the parameters estimated was statistically significant at the 0.05 level or better. The regression R^2 of 0.4708, while lower than those produced for other categories of apparel imports from the rest of the world, indicates that the model explained a large portion of the variation in U.S. demand for man-made apparel imported from the rest of the world.

Man-made apparel imports from the rest of the world were found to be less responsive to changes in income than those of cotton. In addition, the magnitude of the income elasticity estimated for man-made apparel imports from the rest of the world was approximately half that estimated for similar imports from Mexico during this time period. The estimated income elasticity of demand for man-made apparel imports from the rest of the world, 1.5093, indicates that a 1 percent increase in U.S. per capita disposable income will result in a 1.5 percent increase in imports.

The parameter estimated for the own-price elasticity of demand for man-made apparel from the rest of the world was also much lower than that estimated

for imports from Mexico, suggesting that rest of the world imports are not affected as greatly by changes in own price relative to the U.S. price. The coefficient of -0.3815 estimated indicates that a 1 percent increase in the relative price of man-made apparel imports from the rest of the world will yield only slightly more than a 0.33 percent decrease in apparel imports of this fiber type.

Man-made apparel imports from the rest of the world, as aggregate imports, were found to be more sensitive to consumer tastes and preferences, however, than man-made apparel imported from Mexico. The parameter estimated for the proxy variable for the rest of the world indicates that a 1 percent increase in man-made apparel imports during the previous month will result in slightly more than a 0.5 percent increase in imports during the current month. Again, this may be the result of quota utilization and established trade flows between the United States and major foreign suppliers.

Demand for Wool Apparel Imports from the Rest of the World

Preliminary analyses of wool apparel imports from the rest of the world revealed the existence of autocorrelation of the error term at the first, fifth, sixth, seventh, and twelfth orders. Estimates of rho used to correct for each of the orders, respectively, were -0.2000, 0.05781, 0.1023, 0.1568, and -0.4018. Using generalized least squares estimation, the transformed data produced the following parameter estimates for wool apparel imports from the rest of the world, with the

probabilities generated for the hypotheses given in parentheses beneath the coefficients.

$$LQ_t = -13.9000 + 1.4402 Y_t - 0.4768 LPR_t + 0.6029 LQ_{t-1} \quad (4.13)$$

(0.0599) (0.0002) (0.0001)

Total $R^2 = 0.9310$

Regression $R^2 = 0.5145$

The signs of the coefficients for wool apparel imports from the rest of the world were as expected, and the model, again, explained the majority of the variation in U.S. demand for wool apparel imports from the rest of the world. The elasticities estimated suggest that U.S. demand for imports of wool is less sensitive to changes in income and more sensitive to changes in own price and consumer tastes and preferences than the other fiber categories of apparel imports from the rest of the world. Extremely poor results of the analysis of U.S. demand for wool imports from Mexico prohibited comparisons between the two groups.

The estimated income elasticity of demand of 1.4402 was slightly lower for the wool category than for the other categories of apparel imports from the rest of the world, and the estimate indicates that a 1 percent increase in U.S. per capita disposable income will produce almost a 1.5 percent increase in imports. In contrast, the direct-price elasticity of demand estimated for wool apparel (-0.4679) was slightly higher than that estimated for the man-made category and almost twice as large as that estimated for aggregate imports from the rest of the world. An elasticity of this magnitude would suggest that each 1 percent increase

in the price of wool apparel imported from the rest of the world, relative to the U.S. price, would result in approximately a 0.5 percent decrease in imports. The coefficient estimated for consumer tastes and preferences for the wool classification, 0.6029, was the highest of all categories for the rest of the world, indicating that a 1 percent increase in wool apparel imports during the previous time period will produce a 0.6 percent increase in imports during the current period.

Summary

In this chapter, the results of the analysis of the data was reported, and the findings of the study were discussed. In most cases, the parameters estimated were as expected and conformed to the underlying theory of consumer demand. The next chapter will relate the findings of the present study to previous research and will present the conclusions drawn from the findings and the implications of the results. In addition, the limitations of the present study will be discussed, and suggested areas for future research will be identified.

CHAPTER V

CONCLUSIONS, IMPLICATIONS, AND SUGGESTIONS FOR FURTHER RESEARCH

The findings of this study were presented in Chapter IV. In this chapter, the findings will be related to previous empirical work, conclusions will be drawn from the findings, implications of the findings will be reviewed, and the limitations of the study will be discussed. In addition, areas for further research will be identified.

Conclusions

The original intent of the study was to estimate the income and price elasticities of U.S. demand for apparel imports from Mexico and the rest of the world in aggregate and by primary fiber classifications identified by the Multifiber Arrangement. In the case of Mexico, the elasticities of demand for apparel imported under preferential tariff classifications relevant to the rules of origin negotiated under the North American Free Trade Agreement were also estimated. With implementation of NAFTA having received U.S. Congressional approval and negotiation of the Uruguay Round of GATT continuing, the elasticities estimated will be valuable in further analysis of alternative policy options proposed, as well as in generating proposals for future policies.

The estimated income and price elasticities of U.S. demand for apparel imports from Mexico were, in general, as expected. The primary exception was

the wool apparel category, for which the explanatory variables provided virtually no explanation of U.S. demand for imports of this fiber type from Mexico. The failure of the data to support the existence of a relationship was likely the result of the wool category accounting for a very small percentage of total apparel imports from Mexico.

The income elasticities of demand for apparel in all of the categories for Mexico were somewhat higher than expected, although not completely outside the range which have been estimated in other studies of U.S. demand for apparel imports. The income elasticities estimated for Mexico in this study were comparable to those estimated by Johnston (1988), Kreinin (1967 & 1973), Hathcote (1989), and Chadwick and Dardis (1993) and were higher than those estimated by Houthakker and Taylor (1970), Almon, Buckler, Horowitz, and Reimbold (1974), and Goldstein, Khan, and Officer (1980).

Income elasticities in excess of three indicate that apparel imported from Mexico would be considered, by definition, luxury goods. While this may be true for some apparel items that are assembled in Mexico through 9802 and Special Regime production sharing arrangements for private label or fashion goods, it is unlikely that, given the composition of apparel imports from Mexico, this would be the case in general. Many of the apparel categories imported from Mexico are basic goods, for which an income elasticity closer to unity would be more reasonable.

The own-price elasticities of demand estimated for apparel imports from Mexico were as expected for each category, except wool apparel. It was hypothesized that the coefficients would be less than zero, indicating either inelastic demand, as the parameters estimated for 9802/Special Regime apparel imports and cotton apparel, or elastic demand, as estimated for aggregate imports and man-made apparel. The direct-price elasticities of demand for apparel imported from Mexico were similar to those of other studies and were well within the range of estimates by Kreinin (1973), Almon, Buckler, Horowitz, and Reimbold (1974), Stone (1979), and Goldstein, Khan, and Officer (1980) of world apparel imports, as well as those estimated by Hathcote (1989) for apparel imports from Latin America.

Guided by economic theory, the cross-price elasticities of demand for apparel imports from Mexico were expected to be greater than zero. It was reasonable to anticipate that domestically produced apparel, apparel imports from Mexico, and apparel imports from the rest of the world would be considered substitutes. Except for the coefficient estimated for the wool category, the demand for each category of apparel indicated a sensitivity to the relative prices of apparel imported from the rest of the world. Cross-price elasticities of demand for apparel imports are rare within the literature, however, and the majority of studies undertaken have concentrated on aggregate, world imports rather than country specific imports. Therefore, no study was found in the literature which

served as a basis of comparison for the cross-price elasticities estimated in this portion of the study.

The estimates for the proxy variable which represented consumer tastes and preferences provided mixed results. The parameters estimated were of the hypothesized positive sign for each category of apparel imported from Mexico, except wool, and were statistically significant for the aggregate, 9802/Special Regime, and cotton apparel categories. The parameters estimated in the present study were within the range of those estimated by Pelzman and Martin (1981), Johnston (1988), and Chadwick and Dardis (1993).

The parameter estimated for man-made apparel was of the correct sign, but failed to be statistically significant. Houthakker and Taylor's 1970 study of clothing demand within the United States included a similar proxy for testing the effects of consumer consistency in demand for apparel, and it was found to be significant for the women's apparel category but not for the men's category. In the present study, the majority of the apparel within the man-made category could have been menswear, and, therefore, not affected by tastes and preferences, or market consistency, to the same degree as apparel within the other categories. The coefficient estimated for the trend variable for cotton compares favorably with that estimated by Johnston (1988) for aggregate world apparel imports, while those estimated for the other categories are lower than the coefficient estimated in her study. The parameter estimates for the aggregate and 9082/Special

Regime categories were similar in magnitude to the coefficient estimated by Pelzman and Martin (1981) for U.S. demand for world textile imports.

The estimates of U.S. income elasticity of demand for apparel imports from the rest of the world were lower than those estimated for apparel imports from Mexico, and they were comparable to elasticities estimated by Horton and Hafstrom (1985), Kreinin (1973) for cotton products, Shiells, Stern, and Deardorff (1986), and Johnston (1988). The range of income elasticities estimated for apparel imports from the rest of the world in the present study were mid-range between the those estimated by Chadwick and Dardis (1993) for aggregate apparel imports from developing and developed countries.

The estimates of own-price elasticity of U.S. demand for apparel imported from the rest of the world generated mixed results. The estimates produced for the aggregate, wool, and man-made categories were of the expected sign and statistically significant, and the magnitude of the parameters indicated that the apparel imports in these categories were price inelastic. The direct-price parameter estimates in the present study were comparable to those estimated by Pelzman and Martin (1981) and Johnston (1988), as well as Chadwick and Dardis' (1993) estimate for developing countries. The estimated own-price elasticities for this study, however, were lower than those estimated by Kreinin (1973), Almon, Buckler, Horowitz, and Reimbold (1974), Stone (1979), Goldstein, Kahn, and Officer (1980), and Shiells, Stern, and Deardorff (1986).

The concept posed by Murray and Ginman (1976) regarding the downward bias of the direct-price elasticity which can result from using relative prices, rather than separate prices, has been previously discussed. It is reasonable that, in the present study, the parameters estimated do, in fact, reflect this bias.

The direct-price parameter estimated for cotton apparel imported from the rest of the world failed to be statistically significant, and the sign of the coefficient was reversed. There are two plausible explanations for this phenomenon. The first consideration is that implementation of more severe restraints on cotton apparel exports from the major foreign supplying countries during this time period rendered the relative price an ineffective determinant of the quantity of apparel within this category demanded by U.S. consumers. A second explanation for the lack of price sensitivity for cotton imports is that imported apparel accounted for the majority of the apparel available within the domestic market during the time period covered by the study. Extensive penetration of the market could result in the relative price being less of a factor determining the demand for imported apparel than it previously had been.

An alternative consideration regarding the omission of quality as a relevant independent variable in demand analyses has been suggested by Trandel (1991) and Stone (1970). Omission of a measure of quality could result in the downward bias of the price coefficient. It would be rational to expect that apparel imported from various regions of the world could differ greatly in quality, and omission of this consideration could result in estimation of biased coefficients. Barker (1988),

Cline (1990), Dickerson (1991), and Edwards (1989) have suggested that major exporting countries, have increased the quality of apparel produced for foreign markets, in order to better utilize quota allotments which increasingly restrained the volume of apparel that could be shipped to developed countries, such as the United States, since the latter portion of the 1980s.

No distinction, or measure, for upgrading import quality was included in the present study, which could have an impact on the demand for apparel within certain categories, such as cotton apparel, which have faced severe quota restraints. Barker (1988) has supported the importance of accounting for variation in quality by observing that "increasingly more affluent consumers are likely to seek out the most value for their apparel dollars, often putting quality, style, and service before price" (p. 45-3).

The estimates of the coefficients for the trend variable for apparel imported from the rest of the world tended to be higher than those estimated for apparel imported from Mexico. This may be the result of a greater commitment required on the part of buyers and importers sourcing goods from the Far East and other parts of the world that are in less proximity than Mexico, as well as the reduced flexibility involved in sourcing apparel in more distant parts of the world. The coefficients produced in the current study compared favorably with that estimated by Johnston's 1988 model incorporating a one-month lag structure. The parameters estimated in the present study were within the range of those estimated by Pelzman and Martin (1981) for textile imports and Chadwick and

Dardis (1993) for apparel imports from developed countries, being slightly higher than that estimated by Pelzman and Martin and somewhat lower than that estimated by Chadwick and Dardis.

Implications of Findings

The findings of the present study hold implications for U.S. consumers, producers, and policy-makers. As U.S. income continues to increase, it is likely that demand for apparel imported from Mexico will increase at a greater rate than the demand for apparel imported from the rest of the world. Therefore, Mexico's share of the supply of apparel to the domestic market should continue to grow. Because U.S. demand for apparel imports from Mexico is sensitive to the relative price of apparel produced domestically and that sourced from the rest of the world for several categories, it is further expected that apparel imports from Mexico will increase, based on the relative costs of production and preferential treatment afforded apparel produced in Mexico under NAFTA.

The elimination of tariffs and quotas imposed on apparel imported from Mexico would be realized as a price benefit for Mexican apparel entering the U.S. market. With this competitive advantage, and the knowledge that apparel imports from Mexico do serve as substitutes for apparel imported from the rest of the world, it is likely that production will continue to shift from the both the Far East and the Caribbean Basin to Mexico. The degree of preferential treatment and resulting benefit, however, will be moderated if the Multifiber Arrangement is

also phased out and if tariffs are continually liberalized through multilateral agreements negotiated under the General Agreement on Tariffs and Trade.

Limitations of the Study

The primary limitations in estimating the elasticities of demand for apparel imports in the present study result from the specification of the model and measurement of the variables included in the study. The quantity of apparel imported by the United States is constrained by applicable quotas imposed on some categories of apparel imported from specified countries. The quantity of apparel imported (the dependent variable in this study) is, in effect, censored by the quota restraints. The assumption that the quantity of apparel demanded responds to changes in price, therefore, becomes invalid. Limiting the movement of the dependent variable in this manner will result in bias of the parameter estimates. Because the quantity of imports is understated over time, as a result of quantitative restraints being imposed on apparel imports, the influence of changes in price is also understated.

To overcome this limitation, two alternatives are suggested. First, a quota variable could be included within the model to account for the constraining effect of quotas imposed on U.S. apparel imports. Finding an appropriate variable or measure, however, is quite prohibitive. Second, the model could be estimated using tobit regression procedures. While this type of analysis would reduce the bias of the estimates, interpretation under the more sophisticated analysis would

be much more difficult. Therefore, as a practical consideration, a more basic form of estimation was employed for the present study.

Another important limitation of the present study results from using the lagged values of the dependent variable, rather than predicted values created through the use of an instrumental variable, as the proxy measure for consumer tastes and preferences for apparel imported from the rest of the world. It has been shown that inclusion of a lagged dependent variable as an independent variable will result in the variable being correlated with the error term. Use of the lagged dependent variable as an independent variable, therefore, will bias the parameter estimates, introduce large measurement errors, and result in the loss of the desirable properties of the parameter estimates.

The presence of autocorrelation of the error terms for each of the models estimated is also indicative of an additional limitation within the present study. The existence of autocorrelation likely resulted from the omission of relevant variables. While the models included the relevant variables typically included in estimation of demand for imports, it may be important in the analysis of a single category of a good, such as apparel, to include other variables, as well. Variables such as quality differences and changes in applicable trade regulations, as well as additional or alternative lag structures may be important factors to consider in specification of models used in further study of demand for apparel imports from specific countries or world regions.

While measurement of quality may be very difficult to quantify and include in a demand model, the omission of some measure of quality may have serious implications for the world model of demand for apparel. Trandel (1991) and Tellis (1988) have suggested that omission of quality from the demand analysis not only biases the coefficients estimated by the regression, but also results in bias of the price elasticity when demand and price are correlated. In the present study, it is likely that greater diversity in quality of apparel from the rest of the world existed, while apparel imported from Mexico would tend to be more homogeneous in quality, therefore, providing a greater level of confidence in the estimates produced for Mexico than those for the rest of the world. In addition, greater downward bias in the price elasticities for the rest of the world categories would exist, accounting for the lower significance of some price parameters estimated.

The inclusion of a measure of quality will influence the parameters estimated, however, only if quality is a relevant variable. Studies of consumers' attitudes toward imported apparel have found that consumers do not recognize quality differences between imported and domestic apparel (Sternquist & Davis, 1986). In addition, technical studies of apparel quality have found few significant differences in the quality of construction and components of imported apparel, when compared to domestically produced garments (Dardis, Spivak, & Shih, 1985; Norum & Clark, 1989).

Another limitation to the study resulted from the brevity of the time period covered by the data used in the analysis. Monthly data covering the time period January, 1983, through September, 1991, while providing valuable information for recent imports of apparel to the United States, especially for imports from Mexico, may not be sufficient to capture the full effects of U.S. demand for apparel imported from the rest of the world. Because Mexico is one of the more recent foreign suppliers of importance to the U.S. market, the current time period spans the period for which apparel trade with Mexico has become more prominent. However, for U.S. imports from the rest of the world, a time period spanning from the 1970s, when world apparel imports began to comprise a significant portion of the U.S. market, may be more appropriate, or necessary, to adequately assess domestic demand.

A further limitation of the study is the inherent weakness of secondary trade data. While data from the U.S. Department of Commerce is the best available data, the reliability of foreign trade data is always somewhat questionable. Although apparel imports are to be carefully monitored and counted in order to enforce bilateral quota restrictions imposed on each category, it is possible that counts can be inaccurate or unreliable. In addition, it is sometimes difficult to ensure that the origin of the apparel entering the United States is truly that indicated, and not goods that have been transhipped through a third country.

A final limitation, or caution, should be issued related to the estimation of elasticities of demand on a per capita basis. Income and price elasticities of demand for apparel imports from Mexico and the rest of the world based on per capita quantities of apparel demanded may not be suitable for use in computational models which are designed to estimate aggregate demand.

Suggestions for Further Research

Based on the findings of the present research, additional questions regarding the nature and magnitude of income and price elasticities of demand for apparel imports are raised. Further research needs to be undertaken to estimate the elasticities of demand for apparel imported from competing foreign suppliers to the U.S. market, such as Hong Kong, China, and the Caribbean Basin countries. Country-specific estimates are rare, yet they are important components in forecasting the effects of foreign policy and multilateral decisions being made regarding liberalization of trade under NAFTA, GATT, and the MFA.

In addition, it would be of value to further disaggregate apparel imports by country of origin and apparel category, to empirically scrutinize demand and the competitive advantages of foreign suppliers of the U.S. apparel market. Analyses of this type would be of value to domestic producers, retailers, and importers in environmental scanning and development of future strategies within the global market.

Additional research to determine the effects of alternative methods of analysis and variations in specification of models used in estimating U.S. demand for imported apparel are also needed. Few studies have been undertaken to compare alternative methods and models of apparel demand. While Johnston's 1988 study of aggregate apparel imports used monthly data and both one month and six month lags of the dependent variable to model consumer tastes and preferences, and Chadwick and Dardis' 1993 study modeled alternative lag structures for prices, few other studies have designed and empirically tested alternative structures for apparel imports. Further research modeling alternative lag structures for consumer tastes and preferences, as well as study of alternative lag periods for income and price effects would provide valuable methodological guidance for future research.

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