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Are Apparel Trade Restrictions Regressive?

Consumer welfare losses from apparel trade restrictions are estimated across different household income levels using Hicksian Equivalent Variations. The 1980-1992 Consumer Expenditure Survey, the 1980-1992 Consumer Price Index, and the 1990 ACCRA Cost of Living Index were used. For price differences under 45 percent, consumer welfare loss from higher apparel prices due to trade restrictions is greater as a percent of total expenditures for wealthy households than for poor households. Apparel trade restrictions, therefore, have a progressive effect.

Since the Multi-Fiber Arrangement in 1974, the textile and apparel industry has received more comprehensive and persistent protection than any other industrial sector (Cline 1990). According to Hufbauer and Elliott (1994), tariffs and quantitative import restrictions in place in 1990 cost American consumers about $70 billion, more than 1 percent of Gross Domestic Product (GDP). More than a third, $24 billion, of these consumer costs were attributable to textiles and apparel alone (Hufbauer and Elliott 1994).

Currently, trade liberalization programs are underway. The World Trade Organization (WTO) Agreement on Textiles and Clothing provides for the phased liberalization and elimination over the transition period of quotas on textiles and apparel imported from WTO member countries. This agreement was approved as part of the Uruguay Round Agreements Act by the U.S. Congress in December, 1994, and went into effect on January 1, 1995. Also, the North American Free Trade Agreement (NAFTA) has created new opportunities for United States' textile and clothing market.

Despite this trend toward free trade, the U.S. Committee for the Implementation of Textiles and Apparel (CITA) notified the Dominican

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The Journal of Consumer Affairs, Vol. 32, No. 2, 1998
0022-0078/0002-1 1.50/252

Republic, Colombia, Costa Rica, El Salvador, Honduras, Thailand, and Turkey that their exports of underwear to the U.S. have been protested by U.S. manufacturers (Turck 1995). This move is considered to be a prelude to negotiation for reductions of such imports, which increased nearly 90 percent during 1992-1994. The U.S. also notified Jamaica, Honduras, and El Salvador that it plans to limit their exports of nightwear (Turck 1995). Vosko (1993) examined the extent to which trade between Canada and the U.S. was liberalized in textiles and apparel goods under the NAFTA and demonstrated that while moderate liberalization was achieved in textile trade, protectionism was increased in apparel trade.

Restrictions of the supply of imports tend to raise their prices, and as the prices of imports rise, the prices of competing domestic goods tend to rise in response (Cline 1990; Dardis 1988; Scott and Lee 1996). It is well known that such price increases cause losses in consumer welfare. Past studies have assessed aggregate consumer welfare loss due to trade restrictions in the apparel industry. Clearly, trade restrictions reduce the efficiency of the economy. As Smith (1998, 441) and others have pointed out, however, equity may also be an important goal in assessing policies. Smith (1998, 441) lists three specific equity goals: equalizing the distribution of power, altering income distribution, and reducing uncertainty. Various interest groups, such as labor unions, use equity concerns to argue against trade liberalization (AFL-CIO 1996; Burtless 1995; Freeman 1995, 17).

In terms of equity, the question of which consumer groups suffer more welfare loss should also be of interest, especially the relative impact on different income groups. There are at least two reasons to believe that the welfare loss is different for different income groups. First, it is suggested in past literature that the price of low-value apparel products tends to be affected more by apparel trade restrictions than high-value apparel products (Bergsten 1972; Christerson 1994; Christerson and Appelbaum 1995). Because low-income consumers are usually buyers of low-value apparel products, they are likely to be affected more by apparel trade restrictions. Second, because consumers with different levels of income respond to price changes in apparel differently, consumer welfare loss due to the same apparel price increase can also vary across consumers with different income levels.

While it is self-evident that low-income households get hurt more by the greater increase in low-value apparel products caused by apparel trade restrictions, it is not obvious how consumer welfare loss differs between

low- and high-income consumers due to their different responses to price changes. The purpose of this study is to investigate consumer welfare loss due to high apparel prices with trade restrictions across households with different levels of per capita income.

BACKGROUND

Trade Restrictions

The textile and apparel industry has long received protection from foreign competition (Cline 1990; Chen 1994). From the late 1950s onward, tariffs were supplemented by quantitative restrictions known as voluntary export restraints (VERs). In 1957, a VER was used to restrict Japanese cotton textile exports. In 1962, these restrictions were extended to other countries under the Long Term Arrangement (LTA) on cotton textiles. Increasing imports of artificial fibers led in 1974 to an expansion of the LTA to include trade in these products. This agreement, known as the Multi-Fiber Arrangement (MFA), governed most U.S. imports of textiles and apparel during 1974-1994. Under the MFA, bilateral agreements established textile and apparel quotas without compensation, which is contrary to the general prohibition against their use under the General Agreement on Tariffs and Trade (GATT). As a result, a series of discriminatory bilateral quotas restricted exports by most developing countries (Trela and Whalley 1990).

The MFA was replaced by the Uruguay Round Agreement on Textiles and Clothing (ATC), which entered into force on January 1, 1995, as part of the World Trade Organization (WTO) agreements (ITC 1997a, 1997b, 1997c). Under the ATC, textiles and apparel will be gradually integrated into the GATT regime—they will be brought under GATT discipline and be subject to the same rules as goods of other sectors. As WTO countries integrate their textile and apparel trade into the GATT regime, they are obligated to eliminate quotas on imports of such items from other WTO countries. The GATT integration process will occur over a 10-year period.

In 1996 the U.S. had quotas on textiles and apparel from 46 countries (ITC 1997c). Of these countries, 37 are WTO members whose shipments are subject to the terms of the ATC. For Mexico and Canada, the North American Free Trade Agreement (NAFTA) provides for the eliminationn of limits on "nonoriginating" textiles and apparel by 2004.

Import Sources

Apparel production is highly labor-intensive (Christerson 1994; Christerson and Appelbaum 1995). The intricate nature of cutting and sewing apparel makes it difficult to introduce labor-saving technology. In addition, fashion trends in industrialized countries over the last 20 years have moved from an emphasis on practicality, simplicity, and standardization to individuality, freedom of expression, and a breakdown of clear conventional standards of dress (Gereffi 1994). This trend toward style and individuality has forced manufacturers to offer a wider variety of styles and colors, which makes automation more difficult, labor costs more important, and offshore sourcing to low-wage areas more attractive. In the last 30 years, low-wage areas, particularly in East Asia, have become a major force in apparel production for export (Christerson 1994; Christerson and Appelbaum 1995). At the same time, the production of apparel in low-wage Asian nations for export to the U.S. has caused the apparel industry in the U.S. to call for government protection (Dicken 1992).

Despite the growth of low-wage production in the Third World, high-wage European nations continue to excel in apparel exports (Christerson 1994; Christerson and Appelbaum 1995). In 1987, Italy was the number one apparel exporter in terms of value, accounting for 12 percent of total world exports. West Germany, France, and Italy combined accounted for almost 20 percent of world apparel exports in terms of dollar value. Christerson (1994) explained these contradictory geographic forces in the apparel industry. For low-value products that tend to compete on cost, labor costs are a significant determinant of trade flows, thus, causing production to be dispersed to low-wage areas. For high-value products, which tend to compete on quality, fashion, and quick delivery, production for export takes place near quality fabric suppliers and final markets, which tend to be in higher-wage areas. Because most of the bilateral quotas restricted exports by low cost developing countries (Trela and Whalley 1990), trade restrictions influence the prices of low-value products to a greater extent.

Apparel Price and Import Changes in the U.S.

Table 1 provides data on consumer price changes in apparel, import price changes, the value of imports, and import penetration ratios. The Bureau of Labor Statistics (BLS) reports both the Consumer Price Index

TABLE 1
Price Changes of Apparel and Total Value of Imported Apparel

Year	Consumer Price Index	Imported Price Index	Total Value of Imports	Import Penetration Ratio
1980	90.9	—*	—	18.4
1981	95.3	—	—	19.5
1982	97.8	—	—	19.9
1983	100.2	—	—	21.6
1984	102.1	—	—	27.3
1985	105.0	75.5	—	29.6
1986	105.9	78.4	—	31.1
1987	110.6	85.1	—	31.5
1988	115.4	90.6	—	32.4
1989	118.6	93.0	25,509	35.9
1990	124.1	96.2	26,747	38.4
1991	128.7	96.4	27,377	38.0
1992	131.9	98.8	32,644	—
1993	133.7	98.4	35,475	—
1994	133.4	98.6	38,561	—
1995	132.0	100.0	41,208	—
1996	130.0	100.9	43,075	—

Notes:

Consumer Price Indexes for all urban consumers: Annual averages of monthly figures (1982-84 =100). Source: Bureau of Labor Statistics, Monthly Labor Review and Handbook of Labor Statistics.

Import Price Indexes for Apparel: Annual averages of monthly figures, 1995=100. Source: Bureau of Labor Statistics, International Price Indexes.

Value of Imported Apparel (in millions of dollars): Imports are restricted to goods imported for consumption and are on a customs value basis (1992 as the base year). Source: International Trade Administration, U.S. Department of Commerce.

Import Penetration Ratios for Apparel: Source: 1980-1986: Cline (1987); 1987-1991: Chen (1994).

*Data are not available.

of apparel for all urban consumers (BLS 1997a; BLS 1997b) and the import price of apparel as measured by the International Price Index (BLS 1997c), while International Trade Administration (ITA) and the U.S. Department of Commerce provide the value of imported apparel. Cline (1987) and Chen (1994) estimated the import penetration ratio, which is defined as the share of imports in U.S. apparel consumption.

The importance of imported apparel has increased in the U.S. economy, reflected in both total value of imports and import penetration ratio. The total value of import apparels have increased with trade liberalization, particularly since 1992 with the end of MFA. Started from a small base in the early 1960s (3.7 percent), apparel imports in 1991 accounted

for nearly 40 percent of U.S. apparel consumption. Therefore, the impacts of changes in prices of imported apparel products are now even greater.

REVIEW OF LITERATURE

Income and Own-Price Elasticities of Apparel

Income elasticities of apparel have been reported to be positive. However, differences in elasticity values have been noted depending on the measurement of income. In most studies using disposable income as the income measure, income elasticities have been in the 0.5-0.6 range (Bryant and Wang 1990; Dardis, Derrick, and Lehfeld 1981; Fareed and Riggs 1982; Houthakker and Taylor 1970; Lazear and Michael 1988). On the other hand, when total expenditure has been used as a proxy for permanent income, the income elasticity for apparel has been estimated as greater than 1.0, so apparel could be considered a luxury good (Norton and Park 1986; Dardis et al. 1981; Norum 1990; Nelson 1989). Empirical estimates of income elasticity of apparel using total expenditure as a proxy ranged from 1.01 to 2.01 (Nelson 1989).

The price elasticity of apparel has been found to be negative in all cases, indicating that an increase in price was associated with a decline in the amount of clothing purchased. However, the empirical estimates of price elasticity vary. For example, inelastic price elasticity was reported by Norum (1990) using 1929-1987 Consumer Expenditure Survey (CE) data and Rimmer and Powell (1996) using 1954-1989 Australian data. However, Mokhtari (1992) reported that clothing expenditures were highly price elastic (–1.9) in the short run, while in the long run this elasticity settled at unity (–1.0), using an error correction model for the same period of time as Norum (1990). Bryant and Wang (1990) also found unitary price elasticity for apparel in their study. Most recently, Fan, Lee, and Hanna (1996) reported an own-price elasticity of –1.65, using U.S. data from 1980 to 1992.

Welfare Impact of Apparel Trade Restrictions

Several researchers have estimated consumer welfare loss due to trade restrictions. Using 1986 data, Cline (1987, 1990), Metzger (1989), Trela and Whalley (1990), and Scott and Lee (1994) estimated consumer welfare loss with different assumptions. Based on a partial equilibrium model, Cline (1990) estimated that the elimination of protection would lower the

prices of imported and domestic apparel by 34.6 and 18.9 percent, respectively. The elimination of protection further would cause the volume of imports to increase by 56.7 percent, and the increases in imports would reduce domestic apparel production by 18.9 percent. Cline estimated that the total consumer costs of protection equaled to $17.6 billion.

Metzinger (1989) estimated consumer welfare loss with the assumption that imported apparels were perfect substitutes for domestic apparels. Since domestic and imported apparels have very high cross-price elasticities of demand, apparel can be modeled as if they were perfect substitutes. Metzinger's estimation of consumer welfare loss caused by trade restriction was $19.3 billion. Trela and Whalley (1990) estimated the welfare cost of apparel import restrictions as $12.3 billion based on a general equilibrium model. In their study, consumer welfare loss was measured as Hicksian Equivalent Variations with an own-price elasticity of demand for imports of –6.4.

Dardis (1988) estimated the total cost of U.S. apparel trade restrictions as $13.11 billion for consumer loss, $10.37 billion for producer/distributor gain, and $2 billion for tariff revenue, resulting in a total welfare loss of $0.74 billion for the whole U.S. economy in 1984. The estimates were based on partial equilibrium models of supply and demand for apparel products. Tarr (1989) estimated the consumer welfare loss, measured in Hicksian Equivalent Variations, of removing importation quotas as $13.06 billion for the U.S., using a general equilibrium trade model and an aggregate own-price elasticity for apparel of –3.92 for final imported textile and apparel products, and –0.40 for final dimestic products. Based on previous studies, Tarr (1989) estimated that a quota premium rate on apparel products to be 47 percent, and 40.5 percent for apparel and textile combined.

Scott and Lee (1994) investigated the impact of trade restrictions based on the assumption of oligopolistic market structure instead of competitive structure because concentration has been increasing in most segments of apparel distribution. It was assumed that a small number of apparel distribution firms were the only buyers of imported apparel, and that distributors and retailers practiced price discrimination between imported and domestic suppliers of apparel. Under this assumption, Scott and Lee argued that if protection was eliminated, the profits of distributors would be increased, while only limited price reductions would be passed on to consumers. Their estimated price effects on imported apparel and domestic apparel were 10.1 percent and 2.6 percent decline, respec-

tively. The elimination of protection also would cause the volume of imports to increase by 10.1 percent, and the increase in imports would reduce domestic apparel production by 8.6 percent. Overall, consumer welfare loss due to protection was estimated to be $3.7 billion.

Although previous estimations of consumer welfare loss to apparel trade restrictions varied depending on the specification of models, trade restrictions appear to impose substantial costs on consumers and also impose a net cost on the economy. Furthermore, although the welfare impact of trade restrictions has only been calculated at the aggregate level, price changes were expected to be greater for poor consumers compared to wealthy consumers because bilateral quotas mostly restricted exports by lower cost developing countries (Trela and Whalley 1990), and low-value products were mostly consumed by low-income consumers (Christerson 1994).

MODEL

The estimation of consumer welfare loss in this study involves two steps: (1) the estimation of demand equations for apparel, and (2) the estimation of consumer welfare loss based on results of the demand equations.

Estimation of Demand Equations for Apparel

The neoclassical consumer demand theory provides a theoretical framework for the analysis of consumer demand by formulating expenditure functions for goods and services. Given a budget constraint and a utility function representing consumer preferences, the bundles of commodities that maximize consumer utility subject to the budget constraint can be expressed as a function of relative prices of goods, household income, and household preferences. To ease operation, empirically, the expenditures (E) or budget shares (W), rather than the quantities (Q), are often used as a function of relative prices of goods ($P_1, \ldots P_k$), household income (M), and consumer demographic characteristics ($D_1, \ldots, D_m$), such as ethnicity, household composition, household life-cycle stage, education level, residence area and region, assuming households that share similar characteristics would have similar preferences. Mathematically, the demand functions for commodity i can be expressed as follows:

$$Q_i=q_i(M,P,D), \quad E_i=e_i(M,P,D), \quad W_i=w_i(M,P,D). \tag{1}$$

Because consumer demand on apparel are likely to be affected by consumer demand on other commodities, a complete demand system approach is used to estimate the apparel demand equations. For computational manageability, the linear approximation of the Almost Ideal Demand System (LA/AIDS) is chosen for estimation. Because some of the commodities included have limited dependent variable problems, such as alcoholic beverages, a two-stage tobit model is used to correct for sample selection bias[1] (Greene 1990; Fan 1997; Maddala 1983).

In the first stage, the following probit equations are estimated:

$$\text{Prob}(W_i>0) = \tau_0 + \tau_1 \log M + \tau_2 \log P + \tau_3 \log D + e_i. \quad (2)$$

In the equations, W, P and M are budget share, price vector, and income, respectively, and i is the i^{th} expenditure category. D is a vector of demographic variables.

The estimates of the probit equations are then used to construct a term correcting for sample selection bias. The LA/AIDS system with correction for limited dependent variable is then specified as

$$W_i = \alpha_{i0} + \sum_{h=1}^{m} \alpha_{ih} D_h + \Sigma \gamma_{ij} \log P_j + (\beta_{i0} + \sum_{h=1}^{m} \beta_{ih} D_h) \log(M/P^*)$$

$$+ \sigma_i[\phi_i - (1 - \Phi_i)(\tau_{i0} + \tau_{i1} \log M + \tau_{i2} \log P + \tau_{i3} D)], \quad (3)$$

where ϕ_i is the density function of the standard normal distribution evaluated at $\tau_i(M,P,D)$ for commodity i, and Φ_i is the cumulative probability function of the standard normal distribution evaluated at $\tau_i(M,P,D)$ for commodity i. P* is a price index, computed using the Stone index, which is defined by

$$\log P^* = \Sigma W_i^* \log P_i. \quad (4)$$

[1]From page 222 (Maddala 1983), we have

$$E(y_i) = \text{Prob}(y_i>0) * E(y_i|y_i>0) + \text{Prob}(y_i\leq 0) * E(y_i|y_i\leq 0) = \Phi_i \Sigma \beta_{ih} X_h + \sigma_i \phi_i$$

$$= \Sigma \beta_{ih} X_h [1 - (1 - \Phi_i)] + \sigma_i \phi_i = \Sigma \beta_{ih} X_h - \sigma_i (1 - \Phi_i)(\Sigma \beta_{ih} X_h / \sigma) + \sigma_i \phi_i$$

$$= \Sigma \beta_{ih} X_h + \sigma_i [\phi_i - (1 - \Phi_i) \sum_{h=1}^{n} \tau_{ih} X_h],$$

where

$$\Sigma \beta_{ih} X_h / \sigma_i = \sum_{i}^{n} \tau_{ih} X_h.$$

This approach is similar to Greene's (1990, 729, 732). However, Greene's formula appears to contain a mistake.

To avoid statistical problems, the Stone index is created using mean budget shares for each region/city size combination and, thereby, can be treated as exogenous.

To maintain the theoretical properties of the demand system, including adding-up, homogeneity, and symmetry, cross-equation parameter restrictions are tested, not rejected, and imposed. For details in parameter restrictions, see Deaton and Muellbauer (1980). For a more detailed description of the model development used in this study, see Fan (1997).

Following the same notation, the income elasticity for commodity i is formulated as

$$e_i = 1 + \frac{\partial \ln(W_i)}{\partial \ln(M)} = 1 + \frac{1}{W_i}\left[(\beta_{i0} + \sum_{h=1}^{m} \beta_{ih} D_h) + \sigma_i \tau_{i(\log M)} (\Phi_i - 1)\right] \quad (5)$$

where τ_{ih} is the probit coefficient for variable h from the probit equation for commodity i (e.g., $\tau_{i(\log M)}$ is the probit coefficient for the variable logM for commodity i in equation 2).

Following recent literature on the correct computation of price elasticities when LA/AIDS is used (Alston, Forster, and Greene 1994; Pashardes 1993), the price elasticity of commodity i with respect to commodity j adjusted for bias is formulated as

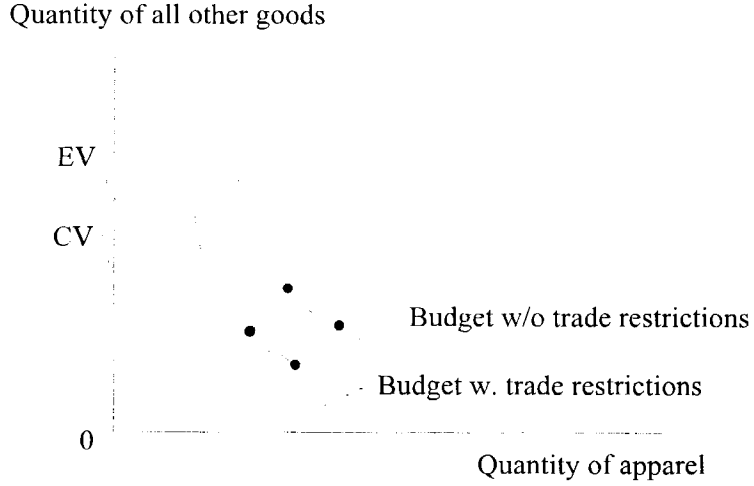
$$e_{ij} = -\delta_{ij} + \frac{\partial \ln(W_i)}{\partial \ln(P_j)} = -\delta_{ij} + \frac{1}{W_i}\left[\gamma_{ij} - (\beta_{i0} + \sum_{h=1}^{m} \beta_{ih} D_h) W_j + \sigma_i \tau_{i(\log Pj)(\Phi i - 1)}\right] \quad (6)$$

where δ_{ij} is the Kronecker delta, with $\delta_{ij} = 1$ when i = j, 0 otherwise.

Estimation of Consumer Welfare Loss

The basic idea of measuring consumer welfare change is to attach a monetary value to the change in consumer utility resulting from a change in prices (Deaton and Muellbauer 1980). Two commonly used consumer welfare measures are Hicksian Compensating Variation (CV) and Hicksian Equivalent Variation (EV). The CV uses the new prices as the base and asks what income change would be necessary to compensate the consumer for the price change, whereas the EV uses the current prices as the base and asks what income change at current prices would be equivalent

FIGURE 1
Hicksian Equivalent Variation (EV) and Compensating Variation (CV)



to the proposed changes in terms of its impact on utility (Varian 1992). The idea of the Hicksian EV and CV measures is illustrated in Figure 1. Mathematically, with a single price change, CV and EV are defined as

$$CV = e(p^0, u^0) - e(p^1, u^0), \quad EV = e(p^0, u^1) - e(p^1, u^1), \tag{7}$$

where p^0 are initial prices, p^1 are new prices, u^0 is the original utility level, and u^1 is the utility level after the price change. In the situation of apparel trade restrictions, the EV is a measure of income loss caused by the higher apparel prices. In that sense, the EV measure can be seen as equivalent to an income tax imposed by apparel trade restrictions, and the EV as a percentage of total income can be interpreted as a marginal income tax rate. If this tax is regressive, then apparel restrictions hurt poor consumers more than wealthy consumers, whereas a progressive tax indicates the opposite.

For the computation of the Hicksian EVs, the algorithm introduced by Vartia (1983) is used to compute the exact welfare change, using the estimated demand equations.

SAMPLE, VARIABLES AND ESTIMATION METHODS

Sample

The three major data sources used in this study are the 1980-1992 Consumer Expenditure Survey (CE), the 1980-1992 Consumer Price Index (CPI), both collected by the BLS, and the 1990 ACCRA Cost of Living Index (ACCRA), published by the American Chamber of Commerce Researchers Association. The CE data set, collected continuously since 1980 by the BLS, provides very detailed information on household expenditures and household demographic characteristics. For this study, only households that completed the interview for an entire calendar year are selected. To construct a consistent data set, all the expenditure categories of interest are constructed or modified following the category definitions defined by the BLS in 1990.

The price data coming from the CPI, published by the BLS since 1913, are compatible and consistent with the CE because the CPI data use expenditure weights obtained from the CE data. While the CPI provides price data over time, the ACCRA data give price differences among standard metropolitan statistical areas for major expenditure categories and are used as a supplement to the CPI in this study. However, the commodity and location samples used in the ACCRA data are not exactly the same as the samples used in the CPI. For example, the apparel prices in the ACCRA data include only prices of men's and boy's apparel, whereas the apparel prices in the CPI data include also women's and girl's apparel and footwear. In order to assess the quality of the ACCRA price data, a time series price index of men's and boy's apparel from 1980 to 1992 is constructed from the detailed CPI data. This constructed men's and boy's apparel price index is then correlated with the overall CPI apparel index. The correlation is very high at 0.996, indicating that the use of the ACCRA apparel price data should not reduce the quality of the price data substantially.

Because household decisions about expenditures on different commodities are interdependent, it is important to take other commodities into consideration when studying expenditures on apparel. Considering data availability and computational feasibility, besides apparel, 12 other mutually exclusive categories of expenditures are selected for this study. They are (1) food at home; (2) food away from home; (3) shelter; (4) fuel and utilities; (5) household operation, household equipment and furnishing; (6) entertainment; (7) transportation; (8) education; (9) health care;

(10) alcoholic beverages; (11) tobacco and tobacco-related products; and (12) personal care. For a detailed description of commodities in-cluded in each category, refer to 1990 CE EXPN data file documentation.

The first step in data construction is to use the CPI area sample and population weights and the ACCRA price information to construct 1990 region/city-size price index for each of the 13 commodities and for each of the 14 region/city-size classifications. The second step is to use the CPI region/city-size price indexes from 1980 to 1992, combined with 1990 region/city-size price indexes created in step one, to construct region/city-size price indexes for the 13 commodities, for 14 region/city-size classifications, and for the years 1980 to 1992. Each commodity has 182 different price index numbers (14 region/city-size classifications each year for 13 years). The third step is to incorporate the created price indexes into the 1980-1992 CE data, using region and city size information for households in the CE sample. Because the CE does not provide city size information for households living in the West region, regional indexes are constructed for the West region. In the final data, each commodity has 156 different price index numbers. Because the CPI data do not give price index information for households in rural areas, and also because the CE data do not include rural households between 1980-1981, rural households are excluded from this study. For details of the data construction process, and a discussion of strengths and weaknesses of this approach, see Fan (1996) and Fan (1997). The total sample size is 10,400 households that were interviewed for a whole calendar year during 1980 to 1992.

Variables

Total household expenditure is used as a proxy for household permanent income. Total expenditure is defined as the sum of the expenditures on the 13 commodities. Compared to the BLS-defined total expenditure variable, the variable used in this study does not include social security tax, cash contribution, life insurance payment, and net vehicle outlay. Because prices are included as explanatory variables, total expenditure does not need to be adjusted for the Consumer Price Index.

The following demographic variables are used in the model: (1) characteristics of the reference person: ethnic dummies (Black, Hispanic, others (base)); gender dummy (female, male (base)); logarithm of age; education dummies (less than high school (base), high school graduate or more); employment status (full time, others (base)); and occupation (white collar, others (base)); (2) characteristics of the household: number

of earners; family composition (number of adults age 18 or older, number of children less than 18); housing tenure (renter (base), owner with mortgage, owner without mortgage); and (3) a continuous variable indicating the year of interview.

Estimation Methods

The sample is split into four quartiles, using the CPI-adjusted per capita total expenditure as the criterion. Demand equations are estimated separately for each quartile using an iterative seemingly unrelated regression (ITSUR) method with the PROC MODEL procedure in SAS. For the estimation of average income and price elasticities and average consumer welfare loss, a representative in each income quartile in 1992 is constructed using means of all relevant variables. Because the estimates of price difference caused by apparel trade restrictions in the literature vary, ten different price change situations are used in this study, with apparel price being 5 percent to 50 percent lower in the situations without trade restrictions compared to the real 1992 apparel price.

To investigate the relationship between household income and consumer welfare loss to apparel trade restrictions, an average household in 1992 is constructed using means of all relevant variables other than total expenditure and apparel price. This average household is then assumed to have the average per capita total expenditure in each of the four quartiles for the simulations. The simulations are also done for ten levels of apparel price change from 5 percent to 50 percent.

Descriptive Statistics

During the 13-year sample period, household income, expenditures, budget shares, and market prices have experienced many changes. Generally speaking, prices have increased over time, but the rate of increase for different commodity categories was different. Among the 13 expenditure categories, apparel had the second lowest price increase (45 percent) over the 13-year sample period, second only to household equipment and operation (37 percent). On average, tobacco products had the highest price increase (209 percent) during the 13-year sample period, followed by education (177 percent) and health care (158 percent). Although the prices of apparel have risen more slowly than general inflation despite trade protection, there is every reason to believe that inflation in apparel would have been even lower in the absence of protection (Cline 1990).

There are also considerable price differences among regions and cities. On average, the price increase in apparel over the 13-year sample period was greater for the South (57.1 percent), compared to Northeast (40.5 percent), Midwest (42.3 percent), and West (36.0 percent). However, Northeast cities with a population of more than 1.2 million still had the highest price of apparel among all areas in 1992.

While the mean unadjusted dollar amount of permanent income for the sample has increased from $10,989 in 1980 to $22,915 in 1992, a 109 percent increase during the 13 years, the simultaneous inflation canceled out most of the income growth. The mean budget shares for shelter and health care have increased over the years, while the budget shares for food at home, transportation, and alcoholic beverages have declined. During the 13-year sample period, the budget share for apparel was fairly stable. The lowest budget share was 4.99 percent in 1980 and the highest was 6.06 percent in 1986.

To provide more insights into the sample, demographic profiles for the whole sample and for the four subsamples with different levels of per-capita income are provided in Table 2. Budget share for apparel increases when household per capita income is higher, with households in the lowest income quartile spending about 5.06 percent of their budget on apparel, and households in the highest income quartile spending about 6.74 percent, a 33 percent difference. The lowest income quartile had a higher percentage of household heads who were female, minority, less-educated, and not employed full-time, compared to households with higher per capita income.

RESULTS AND DISCUSSION

The R^2s for the apparel budget share equations are 0.23, 0.23, 0.18, and 0.13 for the four income quartiles, from the lowest to the highest, respectively. For the demand systems, the R^2s range from 0.07 to 0.42, with food at home, shelter, fuel and utilities, transportation, and health care for all income quartiles having R^2s higher than 0.30 and tobacco for the third income quartile having the lowest R^2 (0.07). Due to space limitations, only selected results are reported in this paper. Detailed estimation results can be obtained from the authors upon request.

Income and Own-Price Elasticities

The estimated income and own-price elasticities for an average house-

TABLE 2
Selected Characteristics for the Four Income Quartiles

Sample Characteristics	Whole Sample (n=10,400)	Bottom Quartile	Second Quartile	Third Quartile	Highest Quartile
Per capita expenditure (in 1992 dollars) (mean)	10,120	<5,692	5,692-8,431	8,432-12,526	>12,526
Apparel budget share (%)	5.76	5.06	5.35	5.89	6.74
Age of reference person (mean)	49.00	47.40	50.50	49.00	47.80
Ethnicity of reference person (%)					
Black non-Hispanic	11.00	23.00	9.20	6.10	5.80
Hispanic	5.70	12.60	4.80	3.10	2.10
Other non-Hispanic	83.30	64.40	66.00	90.80	92.10
Gender of reference person (%)					
Male	67.00	60.80	71.10	70.10	66.00
Female	33.00	39.20	28.90	29.90	34.00
Education of reference person (%)					
Less than high school	25.40	44.00	28.80	19.80	9.20
High school graduate or more	74.60	56.00	71.20	80.20	90.80
Employment status (%)					
Full-time employed	63.50	53.60	61.20	65.70	73.60
Not full-time employed	36.50	46.40	38.80	34.30	26.40
Occupation of reference person (%)					
White collar	33.60	15.70	28.30	37.80	52.60
Others	66.40	84.30	71.70	62.20	47.40
Number of earners (mean)	1.38	1.38	1.45	1.44	1.27
Family composition (mean)					
Number of adults	1.94	2.18	2.06	1.92	1.60
Number of children <18	0.75	1.53	0.81	0.47	0.17
Housing tenure choice (%)					
Renters	29.90	40.20	27.20	24.80	27.20
Home-owner with mortgage	45.00	33.90	43.60	48.90	53.80
Home-owner without mortgage	25.10	25.90	29.20	26.30	19.00

hold in each income quartile are presented in Table 3. An average household in the highest income quartile has the lowest income elasticity for apparel at 1.29, while the income elasticities for average households in other income quartiles are quite similar at 1.54, 1.59, and 1.55, respectively. Evidently, apparel is a luxury commodity for all income groups. It is more so for households with low or average income than for households with very high income. The income elasticity estimates are within the range of estimates reported in previous studies using total expenditure as a proxy for income.

As for own-price elasticities, households in the lowest income quartile and the third income quartile have about unitary own-price elasticities (−1.03 and −1.07, respectively), whereas households in the second and

TABLE 3
Estimated Income and Own-Price Elasticities, and Hicksian Equivalent Variation (EV) Losses, for an Average Household in Each Per Capita Income Quartiles

	Per Capita Income Quartiles			
	Bottom Quartile	Second Quartile	Third Quartile	Highest Quartile
Estimated Income Elasticity	1.54	1.59	1.55	1.29
Estimated Own-Price Elasticity	−1.03	−1.75	−1.07	−2.15
EV with a 5% price change ($)	31	42	56	96
EV with a 10% price change ($)	70	97	126	226
EV with a 15% price change ($)	104	149	189	348
EV with a 20% price change ($)	141	205	256	485
EV with a 25% price change ($)	180	268	328	640
EV with a 30% price change ($)	231	353	421	853
EV with a 35% price change ($)	276	434	505	1058
EV with a 40% price change ($)	326	525	597	1293
EV with a 45% price change ($)	391	651	718	1624
EV with a 50% price change ($)	451	774	830	1952

the highest income quartiles are much more price elastic (–1.75 and –2.15, respectively). Because no past study has investigated own-price elasticities by income levels, a direct comparison is not possible. For a rough comparison, several researchers have found unitary own-price elasticities for apparel (Bryant and Wang 1990; Mokhtari 1992), and Mokhtari (1992) reported a short-term own-price elasticity of –1.9.

One way to explain the price elasticity differences across income groups is to consider anecdotal evidence which suggests that apparel consumption may be grouped into several categories: "needs," "wants" and "nice-to-have." For example, a person needs one winter jacket to keep herself warm and wants to have another one or two winter jackets so she could have different colors and styles. In addition, it would be nice if she could own a fur coat. It is possible that households in the lowest income quartile are in the "needs" category of apparel consumption, households in the second income quartile are in the transition from satisfying their "needs" to satisfying their "wants," households in the third category are able to satisfy their "wants," and households in the highest income quartile are in the transition from "wants" to "nice-to-have."

For households that are in the transition from one category to a higher category, prices of apparel in the higher category may play an important role in determining their purchase. These households, therefore, are quite price elastic. On the other hand, households who are not in the transition from one category to a higher one may be less price elastic.

Average and Aggregate Hicksian EVs

The Hicksian EVs are estimated for an average household in each income quartile for ten different scenarios of apparel price differences. The estimated average Hicksian EVs are reported in Table 3. Two patterns are identified: (1) The greater the price change, the more the consumer welfare loss, no matter what the household income level is; and (2) At any given level of apparel price change, the dollar amount of consumer welfare loss is always greater when the income is higher.

The overall sample average Hicksian EV measures are estimated to be $56 per household for a 5 percent price change, to $1002 per household for a 50 percent price change, in 1992 dollars. In 1992, there were 95,669,000 households (Bureau of the Census 1994, 58), so the aggregate consumer welfare loss to apparel trade restrictions in 1992 is estimated to be between $5.4 billion, assuming a 5 percent price change, to $95.9 billion, assuming a 50 percent price change, in 1992 dollars.

For a very rough comparison, past estimates of aggregate consumer welfare loss in 1986 ranged from $12.3 billion (Trela and Whalley 1990) to $17.6 billion (Cline 1990). These estimates are very close to estimates in this study if 10 percent to 15 percent price changes are assumed. The aggregate consumer welfare loss in this study is estimated to be $12.3 billion for a 10 percent price change and $18.3 billion for a 15 percent price change. Scott and Lee (1994) estimated the aggregate welfare loss in 1986 to be $3.7 billion, with a price change estimate of 2.6 percent for domestic products and 10.1 percent for imports. The estimated aggregate welfare loss in this study with a 5 percent price change is $5.3 billion.

Simulated Hicksian EVs by Income Levels

In order to investigate the impact of apparel trade restriction on households with different levels of income, the Hicksian EV measures are estimated for an average household in 1992 with different levels of per capita income. The results are presented in Table 4.

Everything else equal, when a household's income increases, the dollar value of consumer welfare loss increases at all levels of price changes. When the Hicksian EV measures are computed as percentages of total expenditure, the pattern is more complicated. At low levels of apparel price differences, the welfare loss is progressive. For example, if the apparel price with trade restrictions were 10 percent higher than the current apparel price, the consumer welfare loss would range from about

TABLE 4
Estimated Hicksian Equivalent Variations in Dollars and as Percentages of Total Expenditure for an Average Household in 1992 with Different Levels of Per Capita Income

Price Change	Hicksian Equivalent Variation ($) (% of Total Expenditure, by Per Capita Income Quartiles) Bottom Quartile	Second Quartile	Third Quartile	Highest Quartile
5%	19 (0.18%)	47 (0.26%)	80 (0.30%)	180 (0.36%)
10%	42 (0.41%)	110 (0.61%)	182 (0.69%)	422 (0.84%)
15%	63 (0.61%)	167 (0.93%)	273 (1.04%)	649 (1.29%)
20%	85 (0.82%)	231 (1.28%)	370 (1.41%)	904 (1.80%)
25%	109 (1.05%)	302 (1.67%)	474 (1.80%)	1189 (2.36%)
30%	140 (1.35%)	397 (2.19%)	608 (2.31%)	1581 (3.14%)
35%	167 (1.61%)	487 (2.69%)	730 (2.77%)	1956 (3.89%)
40%	197 (1.90%)	588 (3.24%)	862 (3.27%)	2385 (4.74%)
45%	236 (2.28%)	728 (4.02%)	1037 (3.94%)	2988 (5.94%)
50%	272 (2.63%)	864 (4.77%)	1199 (4.55%)	3583 (7.12%)

$42 for the lowest income household to $422 for the highest income household. That is equivalent to a progressive marginal income tax rate ranging from 0.41 percent to 0.84 percent. However, at higher levels of price change (more than 45 percent), the percentage of welfare loss for households in the second income quartile exceeds that for the third income quartile. The difference gets larger as the percentage of apparel price change gets greater.

The results of this simulation show that apparel trade restrictions generally act as a progressive tax, except when the level of price change is over 45 percent. This finding is only true under the assumption that all consumers, regardless of their income, face the same level of price change. Because past literature has indicated that the prices of low-value apparel products are affected more by trade-restrictions, it is possible that the price difference with or without trade restrictions is higher for low-income consumers (Bergsten 1972). For example, a low-income consumer might face a 50 percent price difference due to trade restrictions, whereas a high-income consumer might only face a 10 percent difference. If that is the case, then the percentage of welfare loss can be higher for low-income consumers than for high-income consumers. Empirical estimates differentiating low-value and high-value prices would provide better estimates for consumer welfare loss across income levels. However, such estimates cannot be found in past studies.

SUMMARY, CONCLUSION AND LIMITATIONS

In this study, consumer welfare losses due to apparel trade restrictions are estimated for households with different levels of income, holding other things equal. The data used are constructed by combining the 1980-1992 Consumer Expenditure Survey (CE), the 1980-1992 Consumer Price Index (CPI), and the 1990 ACCRA Cost of Living Index (ACCRA).

The estimated mean income elasticity for apparel ranges from 1.29 to 1.59, with households in the highest income quartile being less income elastic than households in the three lower income quartiles. The estimated mean own-price elasticity for apparel ranges from –1.03 to –2.15, with households in the second and highest income quartile being more price elastic than households in the lowest and third income quartiles. The average consumer welfare loss caused by apparel trade restriction is estimated to be from $56 per household for a 5 percent price change to $1,002 per household for a 50 percent price change.

Under the assumption that apparel trade restrictions impose the same price increase for low-value and high-value apparel products, this study found that with apparel trade restrictions, consumer welfare loss as a percentage of household income increases as household income increases, other things equal, unless the price increase is higher than 45 percent. Therefore, even though trade restrictions are bad when evaluated in terms of economic efficiency criteria, a possible equity consideration could be added to other equity arguments (e.g., Smith 1998, 441) that might be made against liberalizing apparel imports. It is likely that the total benefits of apparel import liberalization outweigh the costs, but consideration of the possible disparate impact on different income groups perhaps should be evaluated more carefully in policy deliberations. For instance, if apparel trade restrictions take the form of import duties, the efficiency and equity aspects of a reduction in duties should be compared to the effects of an increase in another tax.

Some limitations need to be kept in mind when interpreting the results of this study. First, due to data limitations, this study does not differentiate domestic apparel products from imported apparel products. Instead, apparel is treated as one product. It is assumed that consumers living in the same area (region/city-size) in the same year would face the same apparel price. This assumption affects the accuracy of the price elasticity estimates. Second, this study only deals with direct consumer welfare loss due to apparel trade restrictions, which is only one aspect of the impact.

Producers' welfare change and some consumers' wage gains have not been taken into consideration.

Despite the limitations, this study still has an important policy implication. It is well known that trade protection imposes costs on consumers and the economy at large. Apparel manufacturers and unions have vigorously resisted trade liberalization in the name of saving jobs. It also has been reported that restriction of the supply of imports has had the effect of raising the U.S. consumer prices of apparel above levels they otherwise would have attained (Cline 1990). However, previous research has not explicitly estimated the differential impacts on households of different income levels. The findings in this paper suggest that as long as the price change caused by apparel trade restrictions is below 45 percent, apparel trade restrictions act as a progressive tax. If there is evidence of a substantial cost of job dislocation due to a reduction of apparel trade restrictions, the progressive impact of the restrictions could provide an additional argument against elimination of the restrictions. Also, in considering reduction of apparel duties, the progressive nature of apparel duties should be considered in relation to equity and efficiency aspects of a tax that would provide for the lost revenue.

Further research is needed to investigate how different the changes in different apparel products are given the current restrictions in apparel trade. Better data are also needed to distinguish the quality of apparel products consumers with different income levels purchase.

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