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Tight Clothing
How the MFA Affects Asian Apparel Exports

Carolyn L. Evans and James Harrigan

11.1 Introduction

Apparel is the archetypal labor-intensive footloose manufacturing industry. It is also very distorted by protection. This protection is unusually opaque, as world trade in textiles and apparel is heavily influenced by a complex system of bilateral quotas called the Multifiber Arrangement (MFA). Our goal in this paper is to improve our understanding of the extent and effects of the MFA, making use of a unique data set on product-level U.S. import quotas. We combine the quota data with very detailed data on trade flows, transport costs, and tariffs, and we focus on the East Asian exporters who have traditionally supplied the bulk of U.S. apparel imports. Our findings include the following:

- The MFA constrains exporters in East Asia, although many exports are not subject to binding quotas, especially those from China and Hong Kong.
- Trade liberalization during the 1990s helped East Asian exporters to expand their sales to the United States, but hurt them relative to their competitors in Mexico and Asia.

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- Technological change, which led to an increased demand for timely delivery, also hurt East Asia relative to Mexico and the Caribbean.
- The MFA raised import prices and transferred many billions of dollars in quota rents to holders of quota licenses in East Asia and elsewhere.

11.2 U.S. Trade Policy in Apparel

A variety of restrictions have long affected trade in textile and apparel products. As early as the 1950s, the United States adopted policies intended to limit the imports of such products. One of the broadest policies, however, became effective in 1974. The MFA established a system of quotas, negotiated bilaterally, that limited imports of textile and apparel products.

Recently, efforts have been made to liberalize trade in apparel. Participants in the Uruguay Round of trade talks under the WTO agreed to phase out the MFA beginning in 1995. The MFA was replaced by the Agreement on Textiles and Clothing (ATC), which put in place a system for gradual elimination of quantitative restrictions. The ATC incorporated a series of stages, with phaseouts occurring at the beginning of 1995, 1998, 2002, and 2005, at which time all remaining quotas will be eliminated. Remaining quotas are progressively enlarged, using agreed-to increasing growth rates. The agreement also established a special safeguard mechanism for protection against surges and a monitoring body to supervise implementation. The United States has participated in the MFA phaseout process. Note, however, that when the first stage of quota elimination began in 1995, the United States was one of only four World Trade Organization (WTO) members that still maintained import restrictions under the MFA.[1]

When the MFA first came into effect, China was not a member of the WTO, so it was not a part of the initial MFA phaseout process. However, upon accession to the WTO at the end of 2001, China became eligible for participation in the MFA quota elimination process. Thus, the United States generally implemented the first three stages of "integration" (i.e., into the MFA quota liberalization program) for China in the first part of 2002.[2] When it joined the WTO, China also agreed to a special safeguard on its textile and apparel exports. Under this safeguard mechanism, if a WTO member felt that textile and apparel imports from China threatened to "impede the orderly development of trade in these products," it could re-

1. According to the WTO, the other countries were Canada, the European Community (EC) and Norway. Many other WTO Members maintained the right to use the transitional safeguard mechanism in the ATC. Only nine members were deemed to have integrated 100 percent at the outset (WTO 2003). For example, see OTEXA (2003b).

2. See Federal Register (2001, 2002), WTO (2001), and United States International Trade Commission (2004).

quest that China limit its exports to that country, generally for no more than one year. If consultations did not lead to a different solution, China would agree to hold its exports of the given product "to a level no greater than 7.5 per cent (6 per cent for wool product categories) above the amount entered during the first 12 months of the most recent 14 months preceding the month in which the request for consultations was made" (WTO 2001, 46–47).[3] This safeguard mechanism will remain in place until December 31, 2008. As a result, although MFA quotas will generally be eliminated by January 1, 2005, their growth in imports from China could remain limited, depending on developments with regard to this special safeguard mechanism.

In addition to agreeing to eliminate quantitative restrictions, the United States agreed to reduce its tariffs on textile and apparel products. According to the Office of Textiles and Apparel (OTEXA, a division of the U.S. Commerce Department that administers the United States's MFA quotas), tariffs on textile and apparel products were slated to decline from a trade weighted average of 17.2 percent ad valorem in 1994 to a trade weighted average of 15.2 percent ad valorem in 2004. The majority of these reductions were to be phased in over the ten years (see OTEXA 1995).

Regional liberalization efforts have also affected the degree to which quantitative restrictions constrain trade. The main regional agreements affecting the period that we examine are the Caribbean Basin Initiative/Caribbean Basin Economic Recovery Act (CBI/CBERA) and the North American Free Trade Agreement (NAFTA).[4] The CBI/CBERA programs, initially enacted in the mid-1980s, provided preferential treatment for imports from twenty-four countries in that region.[5] While apparel products are generally not eligible for CBI/CBERA benefits, apparel assembled in the Caribbean Basin using U.S.-origin components receives preferential treatment in the form of easing of quotas and/or reduced duties. While

3. Note that at the end of 2003 the United States used this safeguard mechanism for imports from China of three categories of imports: knit fabric, cotton and man-made fiber brassieres, and cotton and man-made fiber dressing gowns.

4. The Andean Trade Preference Act (ATPA) was another program that provided benefits that, in some cases, applied to trade in apparel. The ATPA was signed into law on December 4, 1991 but excluded many apparel products. More specifically, ineligible products included, "textile and apparel items subject to textile agreements on the date that the ATPA took effect" (Shelburne and Chao 2002, 43). In 1996, of wearing apparel and accessories (Standard and Industrial Classification [SIC] 1987-based product group 238) imports from ATPA countries, $1.2 million of $6.8 million entered duty-free, and in 1997 $1.2 million out of $15 million entered duty-free. In 1995, ATPA countries also became eligible for 9802 benefits. Assembled apparel items ($185 million with 47 percent U.S.-content value) accounted for almost 95 percent of the value of U.S. imports from ATPA beneficiaries under Harmonized Tariff Schedule (HTS) item 9802.00.80 in 2001; the other industrial group with appreciable amounts was textile mill products ($10 million with 54 percent U.S.-content value). See Shelburne and Chao (2002).

5. Note that benefits were subject to the countries satisfying certain conditions.

these trade preferences clearly affected imports from this region, there were no major changes to the policy over the time period that we examine.

Prior to the enactment of NAFTA in 1994, Mexico did not receive trade preferences on apparel exports commensurate with those available to the CBI countries (Pregelj 2000). The enactment of NAFTA, however, significantly changed the relative position of CBI countries vis-à-vis Mexico. Many apparel articles not eligible for benefits under CBI/CBERA were scheduled for a gradual reduction in duties under NAFTA. Further, provisions for production-sharing arrangements with Mexico became more advantageous than those for production sharing with CBI countries. (This change in the relative position of Mexico versus the CBI countries can be seen in the change in tariff incidence by region between 1990 and 1998, as shown in figures 11.5 and 11.6.)

The differential effect of these preferential agreements on Mexico/CBI versus Asia should be kept in mind. However, there were generally no significant changes in the treatment of CBI countries over this time so that NAFTA is the more important element to consider. Further, in the section in which we discuss changes in patterns of imports from Asia versus Mexico/CBI, the tariff and quota data should capture the effects of the preferential agreements.

11.3 The Extent of Protection in Apparel

Given this elaborate structure of trade restrictions, it is not surprising that textiles and apparel have often been characterized as the "bad boy" of broader efforts to liberalize trade flows. For example, Michael Finger and Ann Harrison (1996, 48) write, "Although textiles and apparel account for less than 2 percent of total employment in the U.S. economy, protecting them against import competition accounts for 83 percent of the net cost to the U.S. economy of all import restrictions."

U.S. imports of apparel encounter both tariff and quota protection at the border. Data on tariff rates is fairly readily available. We utilize trade data on apparel imports, tariffs, and transport costs from CD-ROMS purchased from the U.S. Department of Commerce. These data are reported at the ten-digit Harmonized Tariff Schedule (HTS) level, which is the finest level of disaggregation available. Among other things, the data include information on import values, import quantities, tariffs, transport costs, and source country.

The data suggest a high level of protection in this sector, at least at the beginning of the 1990s. Figure 11.1 shows histograms, weighted by import values, of tariff rates across all sources of apparel imports. In 1990 and 1991, about half of U.S. imports paid tariffs of over 16 percent, and virtually none came in duty-free. There has been some liberalization since the early 1990s.

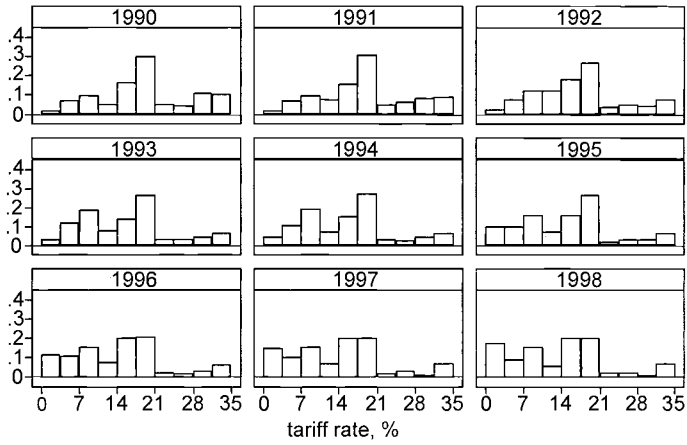

Fig. 11.1 Distribution of tariff rates, 1990–1998

Notes: The histogram is weighted by import values and includes values ≤ = 35 percent, 98.5 percent of data. This histogram illustrates the incidence of tariffs or quota fill rates weighted by the value of imports. The vertical axis measures the share of total imports, and the height of the bars gives the share of imports in a particular range of tariffs or quota fill rates.

However, by 1998, high tariffs were much less prevalent, and about 20 percent entered nearly duty-free (with tariffs of less than 2 percent).

Information on quota incidence is more difficult to obtain than data on tariffs. As a result, analysis evaluating the extent to which the quota system has restricted imports to the United States has been somewhat limited. Information on U.S. textile and apparel quotas is maintained by OTEXA within the U.S. Department of Commerce. Working with OTEXA, we have assembled a comprehensive product-level time series on the U.S. MFA program. Quota levels vary by product, year, and trading partner. We obtained records on all apparel quotas from 1990 to 1998. The Office of Textiles and Apparel uses their own import classification system to administer the MFA, which has no simple relationship to any other U.S. or international system of reporting trade data. The product categories are broken down by type of fiber (cotton, wool, silk, man-made, and other) and are fairly broad: categories include "dresses," "sweaters," "underwear," and so on. Using this data, we are able to examine the extent to which quotas have restricted imports of apparel and textile.

The most important indicator of a quota's restrictiveness is its "fill rate," defined as the percentage of a quota that is used. Fill rates that are much less than 100 percent suggest that the quota is not binding, while higher fill rates indicate that the quota indeed keeps imports below what they would otherwise be. Table 11A.1 summarizes quota incidence in 1991 and 1998 by commodity.

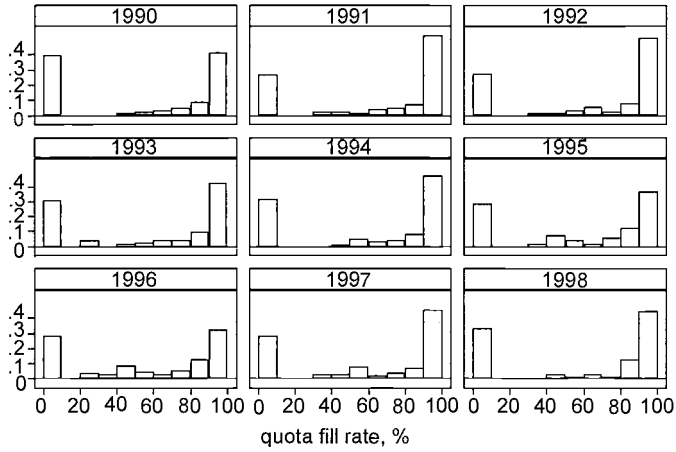

Fig. 11.2 Distribution of quota fill rates, 1990–1998

Notes: The histogram is weighted by import values. This histogram illustrates the incidence of tariffs or quota fill rates weighted by the value of imports. The vertical axis measures the share of total imports, and the height of the bars gives the share of imports in a particular range of tariffs or quota fill rates.

Figure 11.2 illustrates the incidence of quotas. It shows histograms of quota fill rates across all sources of apparel imports, weighted by import values, for each of the years in the sample. If we define a binding quota as one with a fill rate of 90 percent or above, the figure shows that about 40 percent of U.S. apparel imports came in under binding quotas throughout the 1990s.[6] One question of interest is whether the gradual liberalization under the WTO has affected the incidence of quotas. Many of the required changes in quota restrictions have been delayed until the very last phaseout period. In the case of the United States, nearly 50 percent of the planned phaseouts will not occur until the final tranche on January 1, 2005.[7] In fact, according to the 1998 review of the implementation of the agreement, a number of countries complained that a vast majority of liberalization in terms of the value of trade would indeed not occur until the final phases of the program (see WTO 1998). This slow progress on liberalization is reflected in the fact that there has been little change in the proportion of trade coming in under binding quotas during this period. Nevertheless, the fact that much of the trade is not affected by a binding quota suggests that even the current restrictions are not as onerous as might have been expected.

6. Industry experts define a quota as restrictive or "constraining" if it is filled to between 85 and 90 percent. Although this level is still below the maximum allowed export limit, complexities in the quota management system (including complex aggregates) can make it difficult to completely fill a quota (USITC 2002). The European Union (EU) defines quotas 95 percent filled as constraining. See USITC (2002).

7. See OTEXA (2003a). This is consistent with the liberalization requirements of the ATC.

Figures 11.1 and 11.2 cover all sources of U.S. apparel imports and are not necessarily indicative of the barriers facing East Asian exporters. Figure 11.3 shows the value of apparel imports from East Asia. China and Hong Kong are the largest exporters of both constrained and unconstrained imports, while the smaller exporters (Thailand, Singapore, Indonesia, and the Philippines) seem to have their exports very tightly capped by MFA quotas.

Table 11.1 shows the extent to which quotas have applied to U.S. imports, and it confirms the visual impression of figure 11.2: the share of U.S.

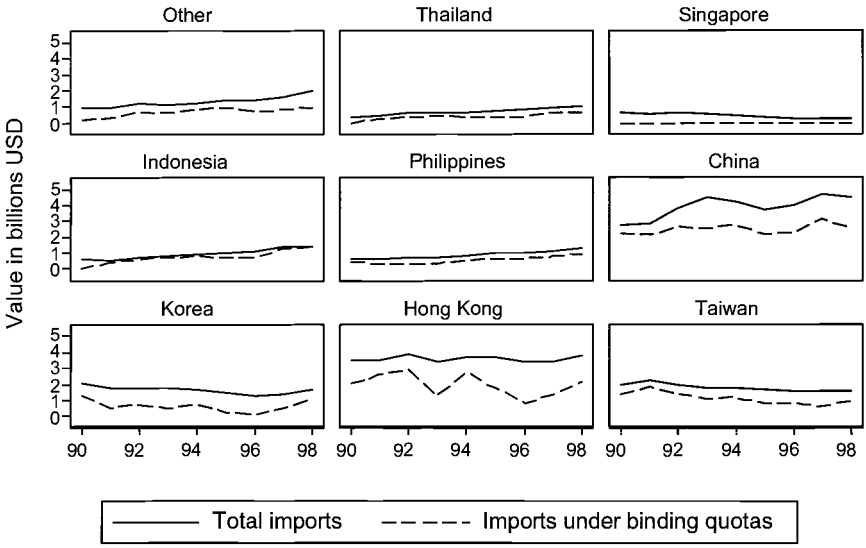

Fig. 11.3 U.S. apparel imports from East Asia, 1990–1998

Table 11.1 U.S. apparel imports from all sources, percent of total

	Unrestricted	Nonbinding quota	Binding quota
1990	39	20	41
1991	27	21	52
1992	27	22	51
1993	30	27	42
1994	30	23	47
1995	27	37	36
1996	27	41	32
1997	28	27	45
1998	33	23	44

Notes: Table reports the share of total imports subject to different levels of quotas. Unrestricted imports face no quota. A nonbinding quota is defined as having a fill rate between 0 and 90, and binding quotas have fill rates of at least 90 percent.

imports coming in under a binding quota did not change much during the 1990s. It is important to remember that the 1990s were a time of booming demand in the United States, so it may be that expanding quota limits simply kept pace with growing demand, leaving the equilibrium amount of quota-constrained trade roughly equal. Indeed, the import-weighted average binding quota grew by 10 percent per year over the period. Table 11.2 illustrates that there was substantial liberalization for the major East Asian exporters, with China and Hong Kong seeing their quota-constrained exports fall by more than 15 percentage points as a share of their total exports, while Taiwan's quota-constrained share fell by 25 percentage points. By contrast, Thailand, Indonesia, the Philippines, and Korea all found themselves more tightly constrained in 1998 than they were in 1991.

Figures 11.2 and 11.3 and tables 11.1 and 11.2 establish that the aggregate U.S. quota coverage didn't change much, while the big East Asian exporters saw some liberalization. How is this possible? The answer is Mexico and the Caribbean. Figure 11.4 shows that the 1990s saw a substantial shift in apparel import market share away from Asia and toward Mexico

Table 11.2 **Quota incidence in East Asia: Percent of imports under binding quota**

	1991	1998
Other	33	48
Thailand	53	59
Singapore	0	0
Indonesia	81	99
The Philippines	58	70
China	74	57
Korea	28	65
Hong Kong	73	57
Taiwan	83	58

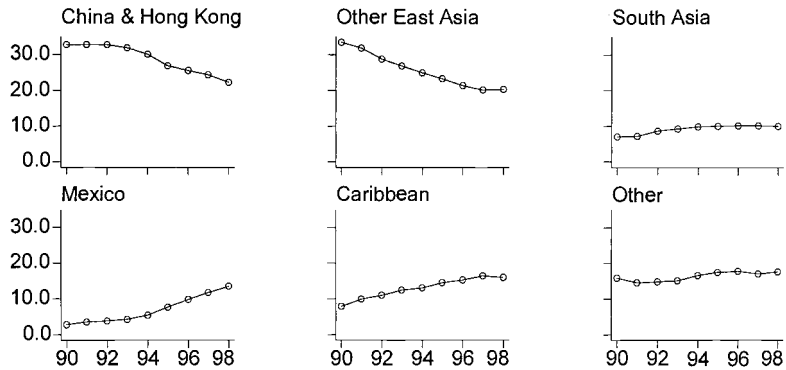

Fig. 11.4 **Share of U.S. apparel imports, 1990–1998**

and the Caribbean. This was at least partly due to tariff liberalization that favors these countries close to the United States, as seen in figures 11.5 and 11.6. However, as tariffs were liberalized for Mexico and the Caribbean, Mexico became more constrained by quotas, as illustrated in figures 11.7 and 11.8.

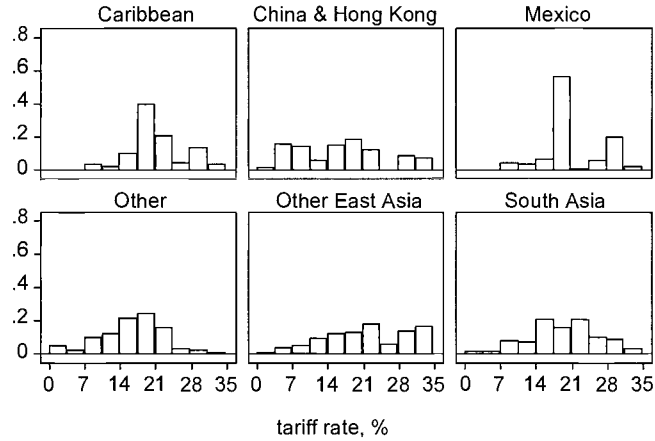

Fig. 11.5 Tariff incidence by region, 1991

Notes: The histogram is weighted by import values and includes values ≤ = 35 percent, 98.5 percent of data. This histogram illustrates the incidence of tariffs or quota fill rates weighted by the value of imports. The vertical axis measures the share of total imports, and the height of the bars gives the share of imports in a particular range of tariffs or quota fill rates.

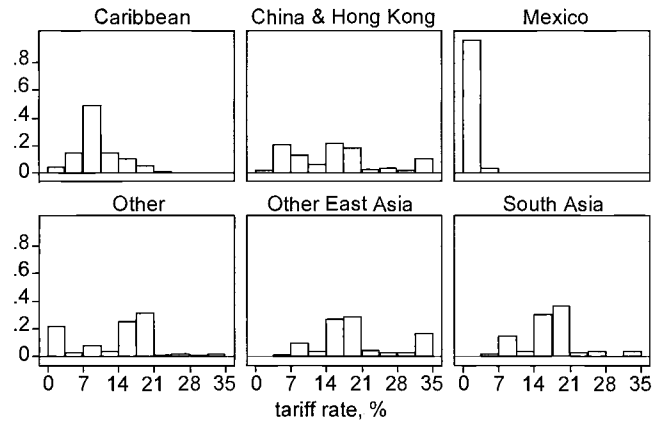

Fig. 11.6 Tariff incidence by region, 1998

Notes: The histogram is weighted by import values and includes values ≤ = 35 percent, 98.5 percent of data. This histogram illustrates the incidence of tariffs or quota fill rates weighted by the value of imports. The vertical axis measures the share of total imports, and the height of the bars gives the share of imports in a particular range of tariffs or quota fill rates.

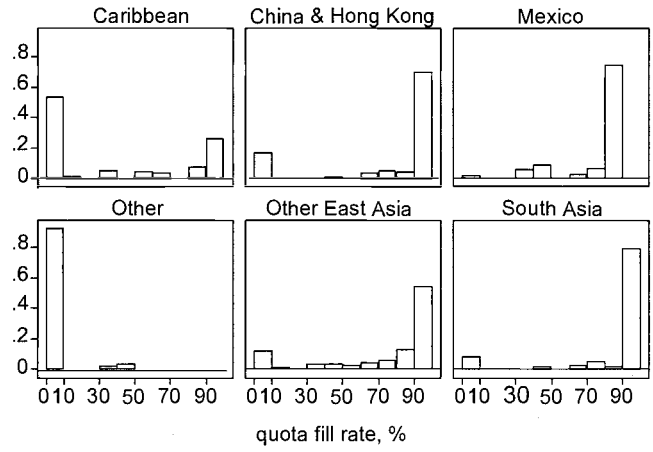

Fig. 11.7 Quota incidence by region, 1991

Notes: The histogram is weighted by import values. This histogram illustrates the incidence of tariffs or quota fill rates weighted by the value of imports. The vertical axis measures the share of total imports, and the height of the bars gives the share of imports in a particular range of tariffs or quota fill rates.

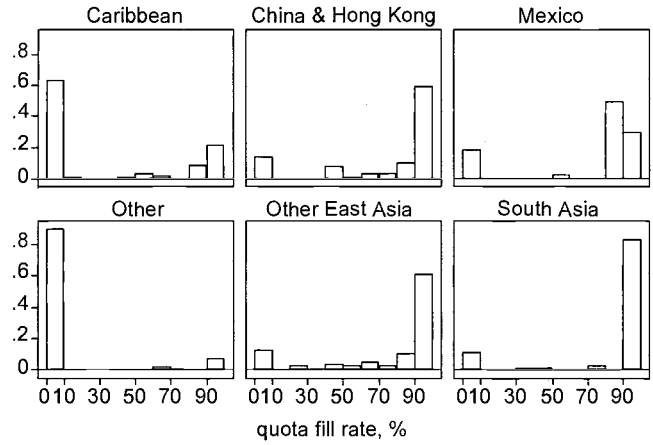

Fig. 11.8 Quota incidence by region, 1998

Notes: The histogram is weighted by import values. This histogram illustrates the incidence of tariffs or quota fill rates weighted by the value of imports. The vertical axis measures the share of total imports, and the height of the bars gives the share of imports in a particular range of tariffs or quota fill rates.

11.4 Trade and the Demand for Timeliness

Trade policy in the form of NAFTA and the CBI is certainly part of the reason for the market share shifts seen in figure 11.4. Another explanation, discussed in detail in Evans and Harrigan (2004), is that an increased demand for timeliness (by which we mean a short and reliable lag between or-

der and delivery) has affected the pattern of trade. In apparel retailing, the demand for timely delivery comes from fluctuations in demand and varies by product category. To measure the demand for timeliness, we collected data from a major U.S. department store chain on the percentage of various apparel categories that are subject to "rapid replenishment," that is, which are reordered continuously throughout the selling season. This business strategy was almost unknown in 1990 but was in widespread use by the end of the decade (see Abernathy et al. 1999). Since rapid delivery is most profitable from nearby locations, our hypothesis is that imports of products where rapid replenishment is important have grown disproportionately from countries near the United States.

A possible substitute for proximity is airfreight: imports that are shipped by air from distant countries can arrive just as quickly as products shipped by sea or land from nearby countries. Air freight has gotten much cheaper over time (see Hummels 2001), but it remains far more expensive than other modes, suggesting that only products that have a high ratio of value to weight ("light" products) can profitably be shipped by air. If airfreight is a substitute for proximity, and if airfreight is only profitable for light products, then we should see that light products have increasingly been sourced from countries far from the United States.

To investigate this hypothesis, we estimated the following equation on a single long-time difference from 1991 to 1998:

$$\Delta m_{ic} = \mu_i + \mu_c + \alpha \Delta \tau_{ic} + \beta_1 r_i d_c + \beta_2 v_{ic} d_c, \tag{1}$$

where the μs are product- and country-fixed effects and

Δm_{ic} = growth in imports in product i from country c.
$\Delta \tau_{ic}$ = change in ad valorem trade barriers.
r_i = percent of products in category i subject to rapid replenishment.
d_c = indicator equal to 1 for countries close to the United States (Mexico, Caribbean, Canada).
v_{ic} = value-to-weight ratio of product i from country c in last year of sample.

Larger values of v_{ic} correspond to lighter products.

The hypotheses are that $\beta_1 > 0$ and $\beta_2 < 0$ would support our hypothesis: products where replenishment is important and products that are heavy grew more rapidly from nearby countries. We test this hypothesis using only observations where quotas were not binding, and the results are given in table 11.3 (which is closely related to results in Evans and Harrigan 2004; see that paper for more details, data description, and sensitivity analysis). The proximity-replenishment effect β_1 is about one, with a t-statistic of 3. How big is this effect? Because the range of the replenishment variable is between 0 and 67 percent, an estimated β of 1.04 implies that high-replenishment products from nearby countries grew $1.04 \times 67 = 70$ percentage points faster than otherwise. This is a big effect: it is more than 2.5

Table 11.3 **Import growth 1991–1998**

Variable	Estimate
Proximity × replenishment	0.9968
	3.00
Proximity × (value/weight)	–0.132
	–2.42
Trade barriers	–1.259
	–7.60

Notes: All regressions include country and product fixed effects. Sample is observations not constrained by quotas ($N = 2{,}753$). *t*-statistics in italics. Dependent variable is bounded import growth between 1991 and 1998:

$$G_{ic} = 200 \cdot \frac{m_{ict} - m_{ic,t-1}}{(m_{ict} + m_{ic,t-1})}$$

times faster than the mean level of bounded growth and almost half again as fast as median growth. For products where replenishment is less important, with a replenishment percentage of 25 percent, the estimates still imply a big proximity effect, with imports growing 26 percentage points faster from nearby countries than more remote sources. The replenishment-proximity effect is also large relative to the effects of protection: the estimated parameters imply that, for high-replenishment products, proximity to the United States is equivalent to a 53 percentage point reduction in tariffs, while for goods with a replenishment percentage of 25 percent, proximity is equivalent to a 20 percentage point tariff reduction.

The effect of weight is also large. The standard deviation of the value-weight ratio is 230; multiplying this by the estimated β_2 means that imports of light products grew $-0.132 \times 230 = 30$ percentage points more slowly from nearby than from faraway countries.

11.5 The Effect of Protection on Import Prices

We have shown that both trade policy and geography have had an important effect on the pattern and volume of trade in apparel. We now turn to the effect of U.S. trade policy on the prices of apparel imports. With two or more competing exporters, a key parameter is the degree of substitutability in the importer's demand between the products of the different exporters. We consider a few simple cases here, as a guide to empirical work.

The simplest model that is relevant to the MFA is one where there are two exporters, only one of whom faces a binding quota and whose exports are perfect substitutes in the importer's demand. The situation is illustrated in figure 11.9.

The import demand curve facing two exporting countries A and B is given by $m(p)$. A has lower costs $c_A < c_B$, so that in the absence of trade re-

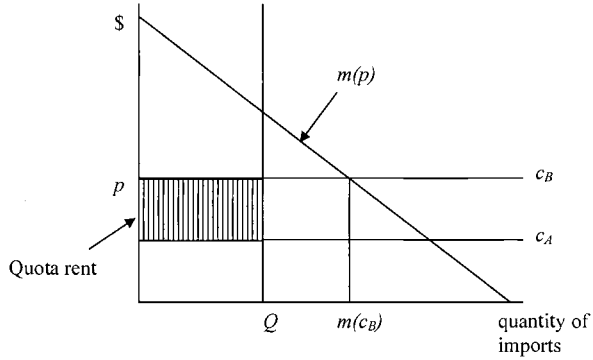

Fig. 11.9 Effects of a quota when imports are perfect substitutes

strictions all imports would be from A. However, a quota has been placed on imports from A, $m_A \leq Q$. As a result, the world price is determined by cost in B, $p = c_B$, with exporters in A earning a rent per unit equal to the cost difference.[8] The quota binds, with $m_A = Q$ and $m_B = m(c_B) - Q$.

An interesting thing about this little model is that it implies that, across a group of exporting countries, there need be no relationship between unit value and a binding quota: the two countries charge the same price even though one is bound by a quota and the other is not. Furthermore, any change in the level of the quota will have no effect on price, as long as $Q \leq m(c_B)$; beyond that point, B's market share goes to zero and any further quota relaxation leads to a fall in price as the equilibrium moves down the demand curve.

What if imports from A and B are imperfect substitutes? This case is illustrated in the two panels of figure 11.10. A relaxation of the quota constraint on A leads to lower prices on imports from A, which in turn shifts the demand curve facing exporters in B. Depending on the elasticities of demand in the two markets, and the elasticity of supply in B, relative prices of A and B exports can rise, fall, or stay the same. A useful benchmark is one where the own elasticity of demand is the same, while the cross elasticity is less than the own elasticity: in this case, the shift down in B's demand curve is less than the fall in the price facing A. This implies that the equilibrium price of imports from A will fall relative to the price of imports from B when the quota on A is relaxed. In the cross section, then, binding quotas will be associated with higher prices. Note, however, that the equilibrium price difference across exporters depends on many structural parameters of demand and supply that are impossible to estimate without a great deal of information.

8. Technical point: the importer is indifferent between buying from A or B at any price, so assume an infinitesimally lower price from A to close the model.

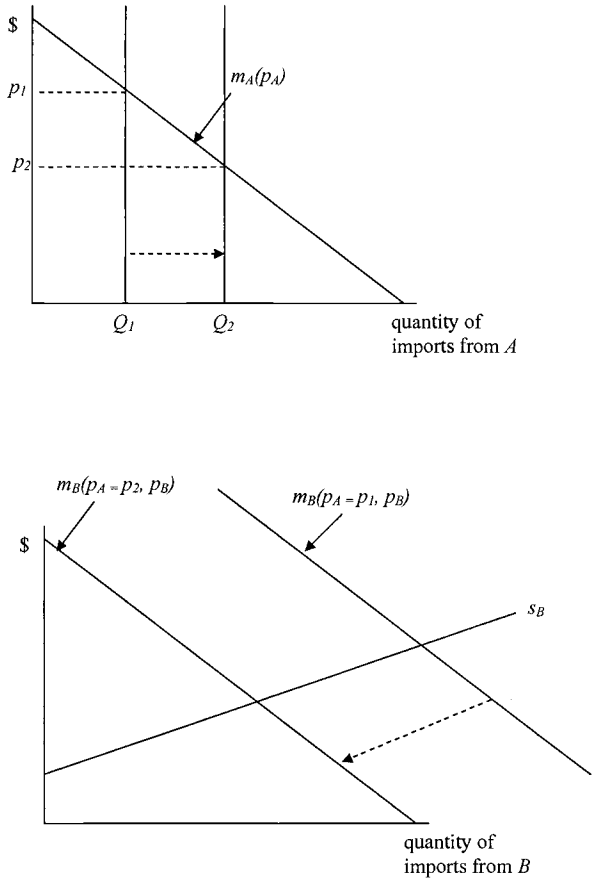

Fig. 11.10 Effects of a quota when imports are imperfect substitutes

What about nonbinding quotas? In most models unfilled quotas will have no effect, and the equilibrium is the same as one with no quotas at all.

This theoretical discussion suggests a simple reduced-form model for the effect of quotas on import prices:

$$\ln p_{ict} = \alpha_i + \alpha_c + \alpha_t + \beta_1 \ln(1 + \tau_{ict}) + \beta_2 \ln(1 + \text{fillrate}_{ict}) + \beta_3 \text{binding}_{ict} + \varepsilon_{ict} \quad (2)$$

In equation (2), the αs are product-, country-, and year-fixed effects. The slope coefficients β measure the effects of

(1) τ_{ict} (ad valorem trade barriers, including tariffs and transport costs); (2) fillrate_{ict} (the proportion of a quota that is used. By definition, the fill

rate for flow not subject to a quota is zero [since the implicit quota is infinite]); and (3) binding_{ict} (a dummy variable equal to 1 if the quota is binding).

A drawback of equation (2) is that it imposes constant coefficients across products and years. Our data has enough cross-sectional variability to make year-by-year estimation feasible, so we also estimate

$$\ln p_{ict} = \alpha_{it} + \alpha_{ct} + \beta_{1t} \ln(1 + \tau_{ict}) + \beta_{2t} \ln(1 + \text{fillrate}_{ict}) + \beta_{3t}\text{binding}_{ict} + \varepsilon_{ict} \quad (3)$$

While equations (2) and (3) are nonstructural, theory does give some suggestions about the interpretation of the slope coefficients. β_1 summarizes how free on board (f.o.b.) import prices respond to ad valorem trade barriers and is expected to be negative to the extent that the United States has market power. If nonbinding quotas don't have any effect, β_2 is likely to be zero, given that the effect of binding quotas is measured by β_3.

A problem with estimating equations (2) and (3) is that we do not have true price data and must make do with unit values instead. Unit values are constructed from the raw data by dividing the value of shipments by the physical quantity of imports (usually measured by "dozens" in the case of apparel). Unit values in a given category can differ across exporters even if identical goods have identical prices everywhere, to the extent that the composition of exports within a category differs by source country. The theory of "quality upgrading" suggests that binding quotas induce higher unit values, in which case $\beta_3 > 0$ may measure quality differences rather than quota rents (see Feenstra, forthcoming, chap. 8).

Table 11.4 shows the results of estimating equations (2) and (3). We report both ordinary least squares (OLS) and weighted least squares (WLS) estimates, with the weights given by import values. We focus here on the WLS results.

The column headed "barriers" suggests that the United States does indeed have market power in apparel, with a significantly negative elasticity of import prices with respect to ad valorem barriers in most years. Interestingly, the effect seems to have declined over time, with an elasticity of –0.5 at the beginning of the sample and only –0.06 by 1998.

Binding quotas had a sizable impact on prices, with an overall effect of 6.3 percentage points. Between 1990 and 1996, the quota effect was on the order of 5–10 percentage points, an effect which jumped to 24 in the "Asia Crisis" year of 1997 before becoming slightly negative in the recovery year of 1998. This anomalous behavior may be due to the fact that two of the largest quota-constrained exporters, China and Hong Kong, did not devalue in 1997, while other countries did.

Controlling for whether a quota is binding, the fill rate has no effect, as

Table 11.4 **Price effects**

	OLS			Weighted LS		
	Barriers	Quota	Fill rate	Barriers	Quota	Fill rate
1990–198	–0.241	0.102	0.000	–0.016	0.063	–0.003
	–29.0	*5.1*	*0.0*	*–2.7*	*14.2*	*–1.9*
1990	–0.395	0.205		–0.504	0.108	
	–11.2	*3.1*		*–8.5*	*7.5*	
1991	–0.302	0.104		–0.212	0.053	
	–10.4	*2.0*		*–3.9*	*4.0*	
1992	–0.235	0.097		–0.390	0.054	
	–8.1	*1.8*		*–9.2*	*4.2*	
1993	–0.211	0.133		–0.343	0.065	
	–9.1	*2.4*		*–11.9*	*5.0*	
1994	–0.266	0.159		–0.179	0.096	
	–10.4	*3.0*		*–7.8*	*6.6*	
1995	–0.303	0.057		–0.182	0.076	
	–11.2	*1.1*		*–7.9*	*5.5*	
1996	–0.257	0.080		–0.062	0.088	
	–9.1	*1.5*		*–2.9*	*6.2*	
1997	–0.264	0.115		0.010	0.242	
	–9.6	*2.2*		*0.5*	*18.5*	
1998	–0.264	0.129		–0.060	–0.034	
	–10.6	*2.6*		*–2.8*	*–2.5*	

Notes: Dependent variable is log unit value of imports into the United States by exporter, product, and year. See text for definitions of regressors. All regressions include exporter and product fixed effects, and first row regressions include year fixed effects. For weighted least squares, the weights are import values. *t*-statistics in italics.

shown in the first row of table 11.4. For clarity in reporting, we excluded the fill rate as a regressor in the year-by-year regressions.[9]

Our results suggest that effect of quotas on prices is a step function: for fill rates between zero and 90 percent, the effect is zero, and for fill rates above 90 the effect is constant. This is the right specification only if quotas bind precisely when fill rates hit 90 percent but not before or after. To check this we estimated versions of equation (2) that included dummies for fill rates in the intervals [80,85), [85,90), [90,95), and [95,100]. The results suggests that quotas start to bind at fill rates of around 85 percent and that the price effect is constant between 85 percent and 100 percent.[10] However, the

9. This result is not surprising, but it does cast doubt on the results of Krishna and Tan (1998). They find a positive effect of fill rate on import prices but fail to control for whether the quota is binding.

10. In particular, the coefficient on the indicator for the [80,85) interval is insignificantly different from zero, while the other intervals are all significantly positive. In addition, an *F*-test fails to reject the hypothesis that the coefficients on the [85,90), [90,95), and [95,100] intervals are equal.

results from assuming that quotas bind at a fill rate of 85 percent are not materially different from the results reported in table 11.4.

What do these results imply about the level of quota rents? It is impossible to answer this question with any confidence, as our statistical model is nonstructural, but a back of the envelope calculation is instructive. Using the overall WLS binding quota effect of 6.3 percent and multiplying by the aggregate quantity of quota-constrained imports between 1990 and 1998 ($106.5 billion) gives an estimate of quota rents of $6.71 billion. This is almost surely a lower bound on the cost of the MFA for U.S. apparel consumers, as the elimination of quotas would likely reduce world prices.

11.6 Conclusions

The 1990s had both good and bad news for East Asian apparel exporters. Their overall exports to the United States increased, at least partly due to trade liberalization in the form of reduced tariffs and expanded quotas. But both discriminatory trade policy (NAFTA and the CBI) and technological change (which made proximity to the U.S. market more valuable) conspired against East Asia, leading to a loss of market share to Mexico and the Caribbean. As trade continues to liberalize, trade policy may cease to be an advantage for exporters near the U.S. market, but their geographical advantage will persist. This suggests that even when the MFA is finally phased out, trade patterns are unlikely to return to where they were before NAFTA and the CBI.

The MFA continued to substantially distort trade even after the founding of the WTO. We find that MFA quotas tightly constrained many East Asian exporters and led to substantially higher import prices in the United States. A rough calculation suggests that MFA quotas yielded many billions of dollars in quota rents to holders of quota licenses.

Appendix

Table 11A.1 Binding quota incidence and market share by commodity

Description	Commodity no.	Percent binding 1991	Percent binding 1998	Market share, 1998
M&B knit shirts, cotton	338	66	58	10.7
M&B cot. trousers/breeches/shorts	347	56	35	10.4
W&G cotton trousers/slacks/shorts	348	63	30	8.4
W&G knit shirts/blouses, cotton	339	48	60	7.4
M&B cotton shirts, not knit	340	71	54	6.4
W&G mmf. knit shirts and blouses	639	64	86	4.9
Other M&B mmf. coats	634	79	43	3.5
W&G mmf. coats	635	54	28	3.2
M&B mmf. trousers/breeches/shorts	647	69	64	3.1
M&B mmf. knit shirts	638	55	70	3
W&G cot. shirts/blouses, non-knit	341	47	71	2.6
Mmf. dresses	636	59	32	2.6
W&G mmf. slacks/breeches/shorts	648	66	62	2.3
Other mmf. apparel	659	38	22	2.3
Other cotton apparel	359	46	17	1.8
W&G not-knit mmf. shirts and blouses	641	60	43	1.8
W&G sweaters, wool	446	64	56	1.6
W&G mmf. sweaters	646	6	47	1.6
W&G wool coats	435	29	11	1.5
Mmf. skirts	642	30	40	1.4
Sweaters, other non-cot. veg. fibers	845	85	73	1.3
Cotton sweaters	345	49	68	1.2
M&B not-knit mmf. shirts	640	38	27	1.1
Cotton dresses	336	47	51	1
W&G not-knit silk shirts and blouses	741	0	0	1
Mmf. hosiery	632	48	0	0.9
W&G silk knit shirts and blouses	739	0	0	0.9
M&B suit-type coats, wool	433	5	6	0.8
Cotton hosiery	332	12	2	0.7
Wool knit shirts/blouses	438	3	61	0.7
M&B sweaters, wool	445	27	43	0.7
Trousers/breeches/shorts, silk and veg.	847	67	56	0.7
Cotton skirts	342	31	32	0.6
M&B wool trousers/breeches/shorts	447	19	8	0.6
W&G wool slacks/breeches/shorts	448	31	14	0.6
Non-knit shirts and blouses, silk and veg.	840	24	43	0.6
W&G cotton coats	335	46	26	0.5
W&G silk coats	735	0	0	0.4
Silk dresses	736	0	0	0.4
Knit shirts and blouses, silk and veg.	838	30	37	0.4
Other M&B coats, cotton	334	48	16	0.3
Wool skirts	442	31	12	0.3
M&B mmf. suit-type coats	633	19	10	0.3
M&B mmf. sweaters	645	3	17	0.3
M&B mmf. down-filled coats	653	58	71	0.3

Table 11A.1 (continued)

Description	Commodity no.	Percent binding 1991	Percent binding 1998	Market share, 1998
Silk skirts	742	0	0	0.3
W&G silk trousers/breeches/shorts	748	0	0	0.3
W&G coats, silk and veg. blends	835	69	37	0.3
Dresses, silk and veg. blends	836	0	62	0.3
Other M&B wool coats	434	3	2	0.2
Other wool apparel	459	22	19	0.2
W&G mmf. down-filled coats	654	64	77	0.2
Silk neckwear	758	0	0	0.2
Skirts, silk and veg. blends	842	5	9	0.2
M&B suit-type coats, cotton	333	33	1	0.1
Wool dresses	436	61	3	0.1
M&B silk knit shirts	738	0	0	0.1
M&B not-knit silk shirts	740	0	0	0.1
W&G silk sweaters	746	0	0	0.1
M&B silk trousers/breeches/shorts	747	0	0	0.1
Other silk apparel	759	0	0	0.1
M&B suit-type coats, silk and veg.	833	3	1	0.1
Sweaters, silk blends	846	5	2	0.1
Other silk and non-cot. veg. apparel	859	43	24	0.1
M&B down-filled coats	353	75	72	0
W&G down-filled coats	354	77	88	0
Wool hosiery	432	1	2	0
Wool shirts/blouses, not-knit	440	10	5	0
M&B suit-type silk coats	733	0	0	0
Other M&B silk coats	734	0	0	0
M&B silk sweaters	745	0	0	0
Hosiery, silk and veg. blends	832	1	2	0
Other M&B coats, silk and veg.	834	55	51	0
Neckwear, silk and veg. blends	858	0	0	0

Notes: Abbreviation M&B = men and boys; W&G = women and girls; Mmf. = man-made fiber.

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Comment Leonard K. Cheng

This is an interesting empirical study of the effects of protectionist measures as represented by both tariffs and quotas on U.S. apparel imports,

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with a particular focus on imports from East Asia. The tariffs reflect the results of nondiscriminatory global trade liberalization as well as discriminatory regional trade liberalization, whereas the quotas are those under the Multifiber Arrangement (MFA). Many researchers have talked about the MFA, a complex system of bilateral quotas, but few have taken the time and effort to examine what the "quota fill rates" (i.e., the extent to which quotas were actually binding) were like, how the fill rates evolved over time, and how the quotas with different fill rates affected the prices of U.S. apparel imports.

The paper's four main findings pertain to (a) the constraints of MFA quotas (as measured by their fill rates) faced by different apparel exporters; (b) the effects of discriminatory regional trade liberalization on exports from East Asia versus exports from Mexico and the Caribbean; (c) the impact of geographical distance; and (d) the impact of MFA quotas on free on board (f.o.b.) prices paid by the United States for its apparel imports. None of them is very surprising, but it is reassuring to obtain them from the empirical data and through hypothesis testing. I would like to congratulate the authors for their rich factual findings and interesting results from hypothesis testing.

One finding is that "China and Hong Kong are the largest exporters of both constrained and unconstrained imports, while the smaller exporters (Thailand, Singapore, Indonesia, and the Philippines) seem to have their exports very tightly capped by MFA quotas" (chap. 11 in this volume). Indeed, table 11.2 shows that the percentage of imports under binding quota in 1998 was 99 percent for Indonesia, markedly higher than that for the other East Asian exporters. (However, contrary to the preceding statement, the percentage for Singapore was zero!) Was it because the smaller exporters were given small quota growth rates than the bigger exporters? Or was it because the cost structures in 1998 of the formerly competitive exporters like Hong Kong made them uncompetitive? Was the initial quota of Indonesia small because it was a latecomer in the export of apparels so that the same quota growth rates like other exporters simply was not enough to exploit fully its cost advantage? It seems difficult to understand why China, presumably a low-cost production site, had only 57 percent of binding quotas in 1998. What were the reasons? Did it have anything to do with antidumping threats or shifts in commodity composition? It would be helpful if the authors could answer these questions.

The authors tested the relevance and importance of geographical distance as a determinant of exports of apparels that are subject to "rapid replenishment"—a form of just-in-time delivery in global supply chains. The variables used to explain the growth of imports of different products from different exporters included (a) product and country dummies, (b) change in ad valorem tariff rates, (c) distance dummy multiplied by the percentage of rapid replenishment products, and (d) distance dummy multiplied by

the value-to-weight ratio. I am glad the authors are able to use the last variable to implement my earlier suggestion to consider the availability of air freight as a counterweight to geographical proximity for high value (per-unit weight) products. Besides having the right signs, the two coefficients for distance and the value-weight ratio are both statistically and economically significant.

In conducting the preceding test, the authors used only observations where quotas were not binding. That is a clever way to exclude quotas from their estimation equation. However, I suspect the reader would not be completely satisfied because the impact of quota constraints on exports remains unanswered. It would be great if the authors can find some ways to answer this question. For instance, can they use the estimation equation obtained in the preceding manner to predict the growth of U.S. imports of the excluded observations (which by definition are quota constrained) and then examine whether the prediction errors vary systematically with the degree of quota constraints or, better still, estimate the effects of quotas from the prediction errors?

The second hypothesis testing was about the determinants of f.o.b. prices received by different suppliers of apparel products to the United States. The determinants included were (a) product, country, and time dummies, (b) tariff rate, (c) quota fill rate, and (d) a dummy variable for binding quotas. Two models of demand and supply (namely, one for homogeneous products and the other for differentiated products) were developed to generate hypotheses about the effect of quotas on f.o.b. prices, exports by different suppliers, and their market shares. The adopted estimation equation seems to have rejected the model of homogeneous products, which predicts that "any change in the level of the quota will have no effect on price" (chap. 11 in this volume) so long as there are other suppliers besides the supplier with a quota constraint. However, the adopted estimation equation is indeed not inconsistent with the homogeneous products model if *B*'s supply curve is upward sloping. Under this last condition, an increase in *A*'s quota would lead to a decrease of the price of the homogeneous product supplied by both *A* and *B*. The authors perhaps should soften their conclusion in the case of homogeneous products that "any change in the level of the quota will have no effect on price" (chap. 11 in this volume).

The following are two minor issues to point out. First, the authors are aware that the coefficient of the binding quota dummy captures both the supply restriction effect of binding quotas and the quality upgrading effect brought about by such quotas. They should note that the quality upgrading effect may invalidate their conclusion that the estimated "quota rents of $6.71 billion . . . is almost surely a lower bound on the cost of the MFA for U.S. apparel consumers" (chap. 11 in this volume). Second, they interpret "rapid replenishment" as a technological change. I am not sure that is the most appropriate interpretation. I personally would prefer to interpret

it as a change in demand or, more specifically, an increase in demand for fashion goods, that is, goods with a short shelf life.

To sum up, I enjoyed reading this very interesting and informative paper and have learned a lot from it. I commend the authors for their useful contribution to the literature on the MFA, global and regional trade liberalization, and location advantages.

Comment

Philippa Dee

I very much enjoyed the paper—empirical work is essential if we are to understand the trade effects and welfare consequences of nontariff measures such as the Multifiber Arrangement (MFA). My comments are of two types—technical comments and comments on the policy "bottom line."

The main technical point is on the role of rapid replenishment. Clearly this has been part of the revolution in textiles and clothing over the last decade. But the paper assumes in its functional form that rapid replenishment is only a factor in countries such as Mexico and the Caribbean, which are geographically close to the United States. But it is not clear that its role is so restricted. The chief executive officers (CEOs) of Hong Kong textile companies describe themselves as being, not in the textile and clothing business, but in the supply chain management business. The key to this is logistics, and logistics is only partly geography.

These Hong Kong–based CEOs also state that Mexico is competitive on a narrow range of goods that meet the U.S. rules of origin but that elsewhere it is not competitive. Why is this, when shipping delays clearly work in Mexico's favor? The minimum shipping times are three days from Mexico, compared with twelve days from Hong Kong and fifteen days from China, a definite advantage for Mexico in clothing, where a product cycle can last as little as forty-five days.

The answer lies in the ability of Hong Kong supply chain managers to cover the entire product chain, from design onward, and to shepherd a product from sample making to delivery in just three weeks. In doing so, they may divide the production and sourcing process into as many as ten or twelve stages across the whole Asian region, reconfiguring its architecture for each new order. And with this extent of value added, they find it a small cost to air freight the final product.

According to interviews, availability of MFA quotas no longer figures prominently in the production and sourcing decisions of these Hong Kong

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CEOs (Spinanger and Verma 2003). Instead, the key factors are politics and stability in the host country; quality of transport infrastructure in the host country; quality of telecommunications infrastructure in the host country; policies (other than quotas) affecting international trade and investment; labor costs; policies affecting labor, health, and the environment; and lack of restrictions on capital and profits transactions. Prominent in this list are factors that affect the ability of the CEOs to meet the demands of rapid replenishment. Therefore, I would like to see the rapid replenishment variable applied to all countries in the sample, not just those that are geographically close to the United States. Distance also matters, but its effects are probably adequately controlled for by the country-fixed effects.

In the model of how quotas affect prices, it is good to see the use of both perfect competition and imperfect competition models. But it is not clear that rents from MFA quotas have always flowed to exporters, given the monopsony buying power of companies like Karstadt in Germany or Walmart in the United States. And if importers are sharing the rents, then quotas will have a price impact even in a perfectly competitive supply situation.

The effects of quotas on prices will be affected more generally by supply side factors in general equilibrium. These effects can be worked out in a structural model of the textile and clothing sector. Yang (1994) is an early example of such work.

The price effects are estimated econometrically using weighted least squares. A further technical point is whether import values are the right weights. The concern is similar to concerns about the use of import weights for tariff averaging. In both cases, the lowest weights can be given to situations where trade barriers are most tightly binding. In any event, the weighted least squares estimates are very volatile.

A policy bottom line of the paper is that the geographical advantage of Mexico will persist so that even when the MFA is phased out, trade patterns will not return to where they were before NAFTA. But the available evidence suggests this may not be the case. Even in the two years beyond 1998, where the paper's sample ends, the trade shares into the United States turned against Mexico and back to China and Hong Kong. The paper by Spinanger and Verma (2003) also gives several cogent examples of where the sourcing of textiles and clothing from China has changed quickly and dramatically in response to changing quotas elsewhere.

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