Globalization in the Apparel and Textile Industries: What is New and What is Not?

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Introduction

In the first half of the nineteenth century, American vessels carried Indian (and later American) cotton to Britain, and Lancashire goods to Asia. In the latter half of the nineteenth century, American cotton cloth competed actively in China, temporarily dominating the market in North China and Manchuria. As the quality of yarn and cloth manufactured in Japan and China rose during the first decades of the twentieth century, demand grew for American cotton, which displaced the shorter-staple Indian fiber. Particularly after World War I, when Japan developed techniques for blending American and coarser cottons, American cotton came to dominate the Asian cotton trade. The United States was also active in exporting textile machinery.¹

It would be disingenuous to deem globalization of the textile and apparel industries a recent phenomenon. As the above quote from Bruce Reynolds makes clear, the movement of textile and apparel products across international boundaries predates recent decades or even the twentieth century. Indeed, international trade in apparel and textile goes back well before the periods described above and has been a favorite example of the gains from trade used by economists going back to David Ricardo. So what is all the fuss about the globalization of the textile and apparel industries?

The answer is that there is “old news” and “new news” in this story. The old news is that the movement of apparel and textile products between nations arises from the comparative factor costs and productivities for labor, capital and other inputs between nations and their impact on product costs, as modified by transportation, insurance, and related costs. Similarly old news is that the flow of goods is mediated by changes in international exchange rates, as evidenced most recently during the Asian fiscal crisis. Finally, quotas and tariffs continue to affect global trade of apparel and textile products now as they have for centuries, given the changing desire of countries to protect their nascent apparel and textile industries (often viewed as the foundation of industrialization policies) from “foreign competition.”²

So, is there anything “new” about the globalization of apparel and textiles? This question has particular policy salience given that the current system of bilateral agreements
on quotas for apparel and textiles (the Multi-Fiber Arrangement) that has been in place for decades will come to an end in 2005 and that in the years following that, China will also became a full player in a “quota-free” world of trade under the World Trade Organization (WTO). Many commentators surveying and forecasting the future scene rely on the “old news” factors described above and forecast rapid shifts in the sourcing of global textile and apparel with most of those goods moving to low wage nations in Asia, and especially China. This view is evinced by many U.S. textile and apparel manufacturers, government agencies, labor union officials, and the governments of nations that, as we shall see, have been recent beneficiaries of “globalization.”

There is “new news” to be told about globalization. That news challenges some of the notions about what will drive change in the flow of apparel and textile goods in the next decades. Although factor prices and comparative productivity, exchange rates, transportation costs, and tariffs will continue to affect patterns of sourcing, a new set of factors related to the distribution of products plays an increasingly important role.

Before looking at actual patterns of trade in the United States, we sketch out the important changes that have occurred in the distribution of products in the U.S. market. We then, through a brief presentation of a model of on-shore versus off-shore production, demonstrate why the calculus of sourcing decisions has changed. With this as grounding, we turn to the evidence on the national origins of apparel products sold in the U.S. market and describe major shifts in those sourcing patterns. We then analyze the role of “old” and “new” factors in explaining the shifts. Given the major changes in trade laws that will affect (some say transform) the global sourcing of apparel and textile trade, we assess the impact of projected changes in trade agreements in 2005 and beyond on patterns of apparel and textile sourcing in light of our findings. We conclude by relating our work on apparel and textiles to the general themes of this volume.
New factors in global sourcing: Lean retailing and the supplier problem

Lean retailing and product proliferation

Two changes profoundly affect the problems faced by suppliers of consumer industries: the spread of a new form of retail distribution in the U.S., “lean retailing,” that now characterizes much of the retail sector; and increasing product proliferation of consumer goods. Lean retailing and product proliferation together change the basic production problem facing suppliers and supply chains. As we will develop below, this in turn changes one of the key drivers of international sourcing of apparel products.

In contrast to the infrequent, large bulk shipments between apparel manufacturers and retailers under the traditional retail model, lean retailers require frequent shipments made on the basis of ongoing replenishment orders placed by the retailer. These orders are made based on real-time sales information at the stock keeping unit level (or SKU, the specification of the product at the most detailed level), that is collected at the retailer's registers via bar code scanning, and aggregated centrally. Orders based on these data are sent to suppliers, often on a weekly basis for each store. With the advent of lean retailing, suppliers must replenish a higher percentage of their products within a selling season. Rather than specifying that manufacturers respond to a single, fixed order placed far in advance of required delivery time, leading lean retailers require that a replenishment order be filled in as little as 3 days (Abernathy, Dunlop, Hammond, and Weil 1999; 2000a). The diffusion of lean retailing across different channels of retail distribution—mass merchants, department stores, specialty stores—means that apparel and textile suppliers now replenish a high percentage of their products within a selling season.³

Product proliferation compounds the problem posed by lean retailing because suppliers must provide a growing number of products on a replenishment basis. Even the apparent sameness of products like men’s dress shirts masks a much larger set of offerings. A Lands’ End pinpoint oxford dress shirt, made of 80s two-ply cotton, and available only in white or blue seems the most basic of apparel. Along with the usual choice
of neck and sleeve length, the customer may choose from four collar types and three cuts (regular, trim, and tall). The total number of combinations available to consumers of this basic dress shirt adds up to 577. Yet this represents only one line of men’s pinpoint dress shirts offered by the company—add to it other weights and types of fabric, solid colors, stripes and plaids, and styles and the offerings quickly go into the tens of thousands.

Product proliferation means that a quantity of demand that might have been spread across 100 different products in 1980 might now be spread across 1000. If those products are provided on a replenishment basis, each week the supplier awaits the electronic “call” of its retail customers to tell which one should be sent. For many products, the call may be an infrequent and unpredictable event—even for a large manufacturer.

Take the case of a major jeans manufacturer that sells about 100 million pair of jeans per year. Since the manufacturer carries somewhere between 25,000 and 40,000 SKUs at one time, average annual sales per SKU equal between 2,500 and 4,000. That means, it will sell on average only between 48 to 77 units of a typical SKU per week. Although popular SKUs may sell 10 or even 100 times as many per week, less popular items may sell less than 10 in any week across all retail stores in the U.S.

The confluence of product proliferation and lean retailing profoundly changes the problem faced by a supplier. Supplier responsiveness to replenishment orders is central to lean retailing. Dealing with variability in demand has therefore become crucial to suppliers competing in a lean retailing world. Even for basic products, demand varies from day-to-day and from week-to-week. Thus, even if a retailer follows the simplest strategy of ordering at the beginning of each week exactly those items that sold during the previous week, manufacturers must be prepared to ship an unknown number of items each week. Since very few manufacturers can produce items in the limited lead time retailers allow for replenishment, they must fill such orders from their finished goods inventory. And, as one would expect, the higher the variation in week-to-week demand, the more inventory relative to average demand a manufacturer must hold to meet retailer’s high service expectations.
The manufacturer’s problem and its impact on global sourcing

Most apparel producers search for ways to decrease their production costs. One of the most popular is to go to offshore producers or contractors that have lower labor costs, even though their transportation cost and lead times are higher than for local producers. A manufacturer providing goods to the U.S. market must balance the benefits of more proximate but costly sources that offer short-cycle local production against lower cost offshore operations that require far longer lead times.

Lean retailing demands that an apparel manufacturer be able to fill retailers’ orders on three to five days notice; hence the requested items must be in finished goods ready to pick and pack the individual store's specific orders. The replenishment orders for any given Stock Keeping Unit (SKU) vary considerably from week to week, even when the orders from all retail outlets are aggregated together. To meet this weekly variation in demand the apparel manufacturer must carry significant levels of finished goods for each SKU; the amount varies from SKU to SKU depending on its demand variability.

A measure of the variability of demand for a given SKU is its coefficient of variation (Cv - defined as the standard deviation of weekly demand divided by the average weekly demand). In modeling the sourcing decision, we use the Cv of each SKU in a given style as one of the inputs to the production scheduling process. Other inputs are the factory cycle time (the time from placing an order until it is delivered to the manufacturer's Distribution Center (DC)), the cost of fabric and trim delivered to the factory, the labor cost of assembly and shipping to the DC, and the cost of capital to finance the work-in-process (WIP) and finished goods (FG) inventory.

Generally speaking, if you assemble products in locations distant from the retail market in order to take advantage of existing low labor costs, then transportation cost are higher and lead times longer than if you assembled the garments closer to the DC. If you assemble far away and use low cost transportation, then the cycle time is much longer than
if you manufactured closer to the DC. If your distant factory's cycle time is much longer than the nearby plant's, then to provide the same level of service to retailers, the FG inventory levels must be higher than it would need be if you used a shorter cycle plant, because it would take a long time to correct the FG inventory when there are unexpectedly high sales of a given SKU. High C_v SKUs might have a particular week's demand 8 to 10 times the average; therefore the FGs must be more than 8 to 10 weeks of average demand, because the week following the very high demand might also be higher than average.

Lean retailers wish to minimize their in-store inventory for each SKU, hence retailers’ demand that their orders be fulfilled at a very high rate, typically 95% or higher. Such order fulfillment constraints imply higher FG inventories. Without retailers' constraints on order fulfillment or the penalties they assign to suppliers with low service levels, it might be more profitable for a manufacturer to miss an occasional sale to a retailer rather than carry the inventory to meet the demand. The importance of this constraint to the supplier depends on the profit margin of a sale and the cost of capital to finance the inventory.

The following simulation illustrates the trade-offs facing such a firm. The simulation allows us to compare the profit and inventory levels from using different combinations of a short cycle local plant and a much slower offshore plant. In this example, it is assumed that the production costs of the short cycle plant are 20% higher than the offshore plant and the production cycle times are 2 weeks (short cycle) and 11 weeks (offshore). The scheduling algorithm employed in the simulation involves loading the short cycle plant with the highest C_v products and then working down until the plant capacity limit is reached. This means that the short cycle plant capacity is used for products that are expected to incur large weekly variations in demand. Figure 3-1 presents the resulting profit and total inventory levels for different capacity mixes of the two plants.

Figure 3-1 about here
The relationship between profit and inventory depicted in Figure 3-1 has important implications for sourcing decision-making. First, the maximum profit does not occur with all manufacturing done offshore, but at nearly half-local and half-offshore. In this example, half of the weekly demand has relatively large week-to-week variation in demand. At the most profitable mix of the two sources, the local short cycle plant is producing on average all of the high variation SKUs. Perhaps even more important, than the profit results from the model is the inventory story. Total inventory drops from 15 weeks of demand with all production offshore to a little less that 10.5 weeks at the 50% production ratio. If all production is local (short cycle), the required inventory drops just below 6 weeks.

One repercussion of lean retailing is that more of the risk from holding the wrong product at the wrong time is shifted backward onto the supply chain. This problem is compounded by product proliferation, since a given level of demand will be spread across a larger number of SKUs with lower average demand and higher levels of variability-i.e. higher C_v.s. As a result, there is significant financial risk associated with a manufacturer carrying 15 weeks of inventory of any consumer product, especially a perishable commodity like apparel. A sudden drop in the demand for a line of goods means that a supplier faces liquidating 15 or more weeks of product, simply because it cannot “turn off the tap” of supply instantaneously.6

The example presented above represents only one set of simulation results.7 In terms of profitability, the optimal allocation of production capacity to a local plant and an offshore plant involves the cost of carrying the higher inventory of the offshore plant versus lower inventory costs though higher production cost at the local plant. If the cost of capital rises, inventory becomes more expensive and the most profitable position shifts toward local production. If the cycle time difference between the plants in the two locations decreases, then the most profitable allocation shifts toward the offshore plant.

The specific allocation results and their effects on profitability and risk vary according to the mix of products being produced by the manufacturer. Figure 3-1
illustrates, however, the fact that manufacturers increasingly need to incorporate lead time and demand variance considerations in their sourcing decisions given lean retailing and product proliferation. The resulting sourcing patterns may look very different as a consequence.

**Impacts of old and new factors on apparel globalization**

The insights from the above model can be linked to sourcing decisions. One of the advantages offered by Mexico, Latin America, and the Caribbean apparel suppliers to U.S. retailers is their proximity to the U.S. market (Gereffi 1994, 1999). Proximity means less time elapses from the time orders are placed to when they are delivered for shipment to retail purchases. Indicative of this are lead times between the two regions. Case evidence collected by the authors suggest that lead times for U.S. suppliers with operations or contractors in Mexico may range from 4 to as much as 9 weeks. For retailers sourcing out of China, typical lead times may range from 7 to 16 or more weeks.

In addition, the ability to ship via land (Mexico) or only short distances by sea potentially implies more direct (and simpler) infrastructure connections relative to sourcing in more distant countries in Asia. The more variability added to the shipment process through underdeveloped and / or constrained transportation networks, fragmented administrative processes for trade, political instability, or weather-related problems, the more risk facing the supplier and consequent need to hold larger buffer inventories. As a result, a company providing ongoing replenishment to retail customers could reduce the amount of goods in its replenishment pipeline (and therefore the total amount of inventory it held) by sourcing products closer to the U.S. With these broad predictions as a background, we turn to an examination of actual sourcing patterns over the last decade in order to see if they provide evidence of supplier responses along the lines suggested above.
Apparel sourcing patterns, 1984-2000

U.S. consumers commonly perceive China as the largest source of imported apparel products. Although this perception was accurate in the early 1980s, it no longer holds today. Figure 3-2 compares the sources of imports into the U.S. market (measured in square meters) in 1984 versus 2000. The figure shows that the volume of apparel imported in the U.S. from the share of total imports arising from the combined output of China, Hong Kong, Taiwan, and Korea—often referred to as the Asian Big Four--fell from 63 percent in 1984 down to 19 percent in 2000. At the same time, the combined output from Mexico and a group of Caribbean countries proximate to the U.S. rose from 7 percent of total imports in 1984 (measured in square meters) to 39 percent in 2000.

Figures 3-2 about here

Figures 3-3 and 3-4 provide more detailed evidence of this dramatic shift. Figure 3-3 shows that Mexico and the CBI countries surpassed the Asian Big Four in physical volume in 1995. Figure 3-4 shows that the Mexico / CBI block surpassed the Asian Big Four in value of shipments in 1998. By 2000, the Mexico / CBI block accounted for $17.9 billion of imports into the U.S. market versus $17.7 billion for the Asian Big 4.

Figures 3-3 and 3-4 about here

The shift in sourcing can be attributed to a constellation of traditional factors including comparative labor and factor costs and productivities, transportation costs, exchange rates, tariff structures, and quotas. To these traditional factors, we would add the growing importance of proximity to market for apparel suppliers given lean retailing and its attendant effects discussed above. In order to ascertain whether part of the shift can be attributed to the impact of retail restructuring, we look more deeply at the underlying data on patterns of shifts between the markets, beginning with the effects of quota restrictions.
The impact of quotas

A first explanation for the dramatic shifts in sourcing portrayed in Figures 3:2-4 is that they arise from the effects of quotas and tariffs. Several major changes in the system of trade agreements pertaining to apparel have occurred during the period that potentially impact the sourcing of goods. Since the late 1950s, the growth of textile and apparel imports into the U.S. has been limited through a series of bilateral agreements with other governments that specify limitations on product categories and annual increases in the growth of those quotas over the prior period. In 1974 a more comprehensive system of managed trade agreements was ratified in the so-called Multi-Fiber Arrangement (MFA). The system of “managed” trade under the MFA allowed signatory countries to negotiate bilateral agreements on quotas and tariffs throughout the 1980s and 1990s.12

In 1995, arising from the Uruguay Round of multilateral negotiations under the General Agreement on Trade and Tariffs, the system of trade restraint created by the MFA was replaced by the Agreement on Textiles and Clothing (ATC) and became part of the broader World Trade Organization agreements. Central to this transition was agreement by all WTO members to eliminate all quotas on textiles and apparel over a 10 year period, culminating on January 1, 2005.

Yet despite the major changes signaled by these international agreements, it should be noted that both quotas and tariffs remained in place for a significant percentage of the apparel items for the period depicted in Figures 3:2-4. The Uruguay Round of GATT specified that quotas would be removed from apparel categories in three phases between 1995 and 2005.13 The products selected for quota elimination in the first two phases tended to be those where quotas were not binding. As a result, even by 2001, many of the product categories that constitute large shares of trade remained under quota protection. In addition, even after the final phase out of quotas under the agreement, tariffs will remain in place between the signatory nations, albeit at lower levels than in 1995. Finally, under the separate Memorandum of Understanding between the U.S. and China regarding China’s accession
to the WTO, a bilateral consultation mechanism remains in affect for 4 additional years beyond the end of quotas for WTO countries (through December 31, 2008). This “safeguard mechanism” would allow the U.S. to seek to extend quotas with China for specific goods where the elimination of such restrictions would result in “…market disruption, threatening to impede the orderly development of trade between the two countries…” (USITC 1999: 8-12).

Similarly, although the North American Free Trade Agreement that formally took effect in January 1994 and requires the eventual elimination of tariffs, many of those tariffs were not phased out during much of the 1990s. For example, in 1998 the top ten product groups from Mexico faced an average tariff rate by U.S. Customs of 11.1 percent. In addition, about 82 percent of the top 10 product categories (classified on the basis of SITC codes) were covered by some type of quota restriction in 1998. As a result, one should not conclude that the shift in the country of origin for apparel products arose from the “lifting” of quotas and elimination of tariffs, because much of the system of bilateral agreements that dates back to the MFA remained firmly in place during much of the 1990s.

A more detailed method of examining the role of quotas on the observed shift in sourcing is addressed in a study by Evans and Harrigan (2001). Evans and Harrigan use information on the percentage of quotas for different bilateral trading partners with the U.S. that were filled in each year between 1990 and 1999 (defined as quota fill rates of 90% or higher fill rate). For each year, they classify whether a given product had its quota filled for a given trading partner (e.g. China). They then assemble a “basket of products” that were constrained for that trading partner, and those products that were unconstrained. By classifying products on this basis, they can test to see if products imported into the U.S. by other trading partners track those product categories where other major sources of imports face quota constraints.

If the shift in the sources of imports from the Asian Big 4 to Mexico and the CBI was driven solely by quota limits in China, one would expect to see high levels of growth
from Mexico and the CBI in the “quota constrained” product baskets, and much less
growth in “unconstrained baskets” where quotas constraints are not binding. Alternatively,
if one observed substantial growth in imports in the Mexico and CBI nations even among
product categories where constraints had not been reached by China, it would suggest that
other factors beyond quotas are present in explaining the shift.

Table 3-1 presents the results of their analysis of “constrained” and
“unconstrained” product baskets, defined on the basis of annual Chinese quota fill rates. They
calculate the overall change in import share--defined as the percent of total imports
accounted for by the country for that “basket” of goods--in three time periods: 1990-98;
1990-94; and 1995-98. The first 3 columns of data provide the overall percentage change in
import share for the unconstrained product baskets and the latter 3 columns for the
constrained product baskets.

Table 3-1 about here

The evidence in Table 3-1 shows that there was substantial growth in the import
share accounted for by Mexico and the CBI among both constrained and unconstrained
product baskets during the 1990-98 period. For example, it shows that the import share
accounted for by Mexico of all imports to the U.S. for products unconstrained by Chinese
quotas was 464% versus 511% for constrained categories. Although this means that the
Mexico’s share of imports in the constrained basket grew more rapidly over the course of
the 1990s, the result shows that there was major growth even in those segments where
China was not facing quota constraints. During the 1990-94 period, the growth in the
Mexican share of imports was more striking among products where the Chinese were
constrained by quotas than in the unconstrained categories. However, if one looks at the
1995-98 period, Mexico’s share grew more among those product categories where China
was unconstrained by its quotas versus the basket of products where China was
constrained. Similar patterns can be observed for the CBI nations.
The analysis in Table 3-1 suggests that although quotas certainly play a part in explaining the shifts in import country of origin depicted in Figures 3:2-4, there must be other factors that contributed to the rapid growth of products “unconstrained” by quota protections. Further analysis of the product composition of import flows provides further insight into the role of lean retailing as a contributing factor.

**Composition of flows: Product level analysis**

An implication of the model presented above is that the goods coming from Mexico and the Caribbean should be composed primarily of products that are more subject to ongoing replenishment orders by lean retailers. In contrast, those products coming from Asia should be primarily composed of items where replenishment is currently not being practiced, and therefore where traditional cost considerations dominate the issue of variability in demand.

In order to examine this issue, we analyze the product specific composition of apparel goods originating in China and Mexico (the appendix provides detailed information on the data used throughout the chapter). If the growth in Mexico as a source of imports during the 1990s arose as a result of broad changes in trade policy (e.g., lowering of tariffs under NAFTA) or from exchange rate shifts, one would expect all product categories to move in the same direction (that is—all product categories should be moving up). Similarly, if national factor productivities rose (or relative wage levels fell), one would expect to find an increase in the volume of imports from that nation, all other things being equal, with the basic composition staying the same. If, on the other hand, replenishment has become a more important factor in sourcing products in Mexico, as we would expect given the rise of lean retailing and growth in product proliferation, one would expect to observe a shift in Mexico’s product composition from the beginning to the end of the decade. Similarly, if China is not being used as a source of replenishment and sourcing decisions remained driven by traditional factors, one would not expect to see a broad based shift in the
composition of goods over the study period, except arising from significant shifts in consumer taste.

In order to test the above hypothesis, we analyze the import data from both China and Mexico in 1991 and 1999 at the 6-digit SITC level. For each country, we calculate the share of total imports accounted for by each product group and ranked them based on this share. Table 3-2 presents the top 10 imports by product category and volume shipped into the U.S. market from Mexico and China in 1991 and 1999 (ranked on the basis of 1999 imports).

Table 3-2 about here

The upper panel in Table 3-2 displays the top 10 product imports to the U.S. from Mexico, ranked on the basis of 1999 volume (far right column). Comparing the rankings of products in 1999 with that in 1991 reveals that only 5 of the products that were in the top 10 in 1999 were also in the top 10 in 1991. Further, a number of the products highly ranked in 1999 constituted a very small part of Mexican imports to the U.S. in 1991. For example, although T-shirts made up over 16% of all Mexican imports in 1999, it constituted less than 1% of imports in 1991. This suggests a fair amount of change in product composition over the decade.

This contrasts markedly with the case of China (lower panel of Table 3-2). For China, one finds that 8 of the top 10 products in 1999 were also in the top 10 in 1991. Although there was some movement in the rankings within the top 10, the relative magnitudes of imports are similar across the time periods, suggesting far less change in the composition of imports.

In order to examine the changing relationship in product composition between 1991 and 1999 for the entire set of product imported in each country, we calculated a correlation of product rankings (by the product share of total imports from the country) in 1991 and in 1998 for Mexico and China, using all 96, 6-digit SITC product groups and their corresponding 1991 and 1998 import shares. The results are found in the bolded rows in
Table 3-2. For China, the correlation between product import shares in 1991 and 1999 was 0.944, indicating that the basic rankings of products between the two periods had changed little. In contrast, the correlation for Mexico is 0.752. Although this suggests that the product composition for Mexico in 1999 still had a strong correlation with that in 1991, it also signifies significantly more shifting of the relative share of products between the two periods.

Product categories and replenishment: We can use the data on product composition to take one step further in examining the role of lean retailing in explaining the overall shift in the sources of U.S. apparel imports. In order to do so, we categorized the 96 6-digit SITC product categories as to whether or not they are replenishable—that is subject to replenishment programs by major U.S. retailers. We use a simple dichotomous categorization here, where replenishability is defined as a product where lean retailers have been since the mid-1990s asking for at least some level of weekly replenishment of products. If lean retailing represents a partial driver in changes in sourcing patterns, one would expect to find a relationship between product composition and replenishability for Mexico (particularly in the most recent period) and little of such a relationship for China.

Table 3-3 presents the top 10 products from Mexico and China in 1991 and for 1999, and whether that product category was replenishable. Looking first at Mexico (upper panel), Table 3-3 shows that eight of the top ten apparel goods imported from Mexico were replenishable in 1999. In contrast, only three of the top ten goods imported from China (lower panel) were classified as replenishable in 1999.

Table 3-3 about here

The changing composition shown in Table 3-2 also is apparent in these results, in particular the growing importance of replenishment as a factor driving sourcing decisions. Table 3-3 shows that for the top 10, the same number of products were replenishable in 1991 and 1999 (3 of the top 10). This is consistent with the view that sourcing decisions out of China do not seem to be driven by replenishment throughout the decade—that is that
those products sourced in China tend to be those driven by traditional factors. In contrast, the upper panel of Table 3-3 for Mexico shows that the number of products that were replenishable grew from 5 of the top 10 in 1991 to 8 of the top 10 products in 1999 (representing some 76 percent of all imports from Mexico).

We can also use the entire set of 96 products, classified in terms of product share and replenishability, to further test the relationship. For China and Mexico, we calculated the correlation between the replenishment categorization of the goods and the share of imports made up by the category in 1991 and 1999. The correlations are reported in the middle and bottom rows of Table 3-3. For Mexico, there is a positive and statistically significant relationship between replenishability and product import share for Mexico in both periods. Even more suggestive is the fact that the correlation between the product-level share of imports and replenishment status increases between the two time periods, going from a correlation of 0.242 in 1991 to 0.356 in 1999. In contrast, for China (lower panel) there is little correlation between replenishment category and import share by product type in either 1991 or 1999. In both periods the correlations are below .1 and are not statistically discernable from zero.

The increase in the relationship between replenishment and product share for Mexico, at the same time that replenishment status remains uncorrelated for Chinese imports, occurs during the time period that lean retailing became a greater driving force in the U.S. market. This evidence is therefore consistent with replenishment considerations becoming a more important driver of sourcing decisions and therefore patterns of global location of production for apparel products.

Separating out the factors underlying global sourcing is a complex matter since it involves the interplay of product markets and differences in national development patterns in addition to tariff and quota policies. The story above provides a mosaic of evidence, all consistent with the view that replenishment has played a role in the observed shift in the source of apparel products between the two periods. Thus, despite the passage of NAFTA,
the devaluation of the Mexican peso, and the start of quota phase-outs under the WTO over this period of time, we believe the above evidence suggests that part of the shift in global sourcing witnessed over the past decade can be ascribed to the emergence and spread of lean retailing and its effects on supplier behavior.\textsuperscript{21}

**The illusion and reality of 2005: The future of global trade in apparel and textiles**

Major changes will affect the international trading system in coming years. As mentioned above, the Uruguay Round of trade agreements provided that among WTO members all quotas in textiles and apparel would be eliminated by January 1, 2005.\textsuperscript{22} Two pieces of recent U.S. legislation also will affect imports from countries in the coming decade: (i) modification of the CBI arrangement to grant Caribbean Basin nations trade status on the same basis as Mexico under NAFTA; and (ii) granting countries in sub-Saharan Africa preferred trade status, roughly equivalent to the CBI arrangements.\textsuperscript{23}

Many consider the year 2005 as the harbinger of cataclysmic shifts in the global trade of apparel and textiles. Representatives of the U.S. apparel and textile industry have publicly held that the final elimination of quotas will mark the final death knell of the domestic apparel industry, especially with China as a full member of the WTO. Similarly draconian implications have been forecasted for other countries that are perceived as beneficiaries of quotas on Asian producers, including those in the CBI.\textsuperscript{24} At the same time, other countries that consider the existing quota system as the main barrier to access to the lucrative U.S. market characterize 2005 as the beginning of a new age for their apparel and textile industries.

We have already cited our skepticism of this piece of conventional wisdom. Although traditional factors and the ending of the quota system will impact the sourcing of products, we believe that mainstream predictions miss the mark in several respects. As we noted above, the structure of international trade agreements will not be removed entirely in
2005: tariffs will remain in place, and the U.S. / China accession agreement extends procedural safeguards until 2008.

More importantly, we have argued that replenishment considerations arising from the new economics of distribution and production channels explain an important portion of the shifts in sourcing over the past decade. As lean retailing becomes even more widespread and suppliers more sophisticated in thinking about managing risk, replenishment considerations will factor even more heavily into sourcing decisions. This will make the countries with proximity more competitive for those goods where replenishment is important, and will subject those countries competing along traditional lines to greater competition over a smaller set of apparel products. As these economic factors will not disappear in 2005--indeed, they will intensify--this driver of sourcing location will persist.

We believe that a more nuanced view of the world beyond 2005 is warranted, one that recognizes the “old” factors that have driven part of globalization for centuries but also the “new” factors we have focused upon here. In particular, we would cite four implications regarding the path of globalization in the decade after 2005.

*The future of textiles:* This chapter has not discussed the textile industry, but the set of industries that compose textiles are being affected by much of what we discuss in the chapter. For the portion of the U.S. textile industry that supplies apparel, the shift towards Mexico and the CBI has been very beneficial. Apparel products imported from China and other Asian nations do not contain U.S. fabric. In contrast, CBI and Mexican apparel imports drew extensively on U.S. textiles throughout the 1990s.

This can be strikingly seen in the trade figures on textile exports from the U.S. to Mexico versus textile exports to China. In 1991, the U.S. exported $48.8 million of textiles to China. By 1999, those exports had only grown to $82.5 million, or about 1.1% of the value of Chinese apparel imports. In contrast, textile exports to Mexico were $542 million
in 1991, growing to $2.84 billion by 1999, or 36% of the value of Mexican apparel imports. Similar patterns can be observed for the decade in terms of textile exports to CBI nations.27

A further implication of these trade figures is the opportunity for Mexico to expand its textile sector. Along with increasing Mexican investment in textile production, many major U.S. textile companies have started to move capital there.28 Yet the obstacles to developing a high quality, technologically advanced textile sector are much more substantial than for apparel. Textile production is a far more capital intensive process requiring development of infrastructure, electricity, water, and the management of sophisticated manufacturing processes.29 Thus, the development of a major textile sector in Mexico and its attendant effects on the U.S. industry will occur over a longer period of time.30

Development pathways and policies. The “new” factors in globalization alter the traditional role apparel and textile industries can play in economic development. The factors considered here do not change the attractiveness of apparel and textile industries for development. But assuring the success of those industries has become more complex for several reasons. Our analysis suggests that it will be difficult for many nations with inadequate infrastructure, distant location from major consumer markets, or political (or even climactic) instability, will be at a considerable competitive disadvantage for many apparel products, even if they have low wage rates. Further, for those categories of apparel where replenishment is not a major factor in sourcing, the presence of a large number of countries with extensive apparel capacity means more intense competition among these nations for a smaller market of non-replenishment products. Together, these forces will make the future of apparel industries reliant solely on low wages as the source of competitive advantage (e.g., Bangladesh) increasingly bleak and vulnerable to the removal of quotas in 2005.

In discussing prospects for the development of a textile industry in Mexico, we noted that textile production has become very capital intensive, technologically sophisticated, and infrastructure dependent (especially in regard to the need for reliable sources of
electricity and water). Combined with the need to have textile production closer to apparel manufacturers in order to reduce lead times and inventory risk, this analysis suggests that nations hoping to use textiles as a focus of development will need to have more comprehensive policies in place—as well as advantageous geographic location—to succeed.31

The regionalization of distribution and supply channels: A common view of apparel trade flows following 2005 foresees products moving from low wage, developing countries to the major consumer markets of the developed world, unimpeded by the system of bilateral quota agreements. The result is a “global” market with limited regionalization.

This perspective does not adequately recognize that retailing models with lean retailing features have been emerging in consumer markets in Europe and in Japan (see Miwa and Ramseyer (2001) on Japan; Courant and Parat on (2000) regarding Europe). Sourcing arrangements are evolving along lines similar to those that have developed for supplying the U.S., with Europe drawing on countries in Eastern Europe and North Africa as locations to provide short cycle production. For example, Turkey has become an increasingly important source for the European apparel and textile market. Turkish manufacturers have improved their lead time performance as a means of taking advantage of major investments in textile capacity in the 1990s (Tan 2000).32 Similarly, Japan will rely on proximate Asian sources to serve replenishment needs for their market.

As a result, greater regionalization of textile and apparel production is a natural outgrowth of the competitive forces described here. Regional trade agreements along the lines of NAFTA will also play a role in (and in some ways reflect) these developments. Finally, the longer term development of internal retail markets and the growth in income levels and domestic consumption in China and Mexico will focus these major producers on their own markets (Gu 1999; Stiglitz 2000). Instead of a single international market for apparel and textiles, three regionally based models anchored in the U.S., Europe, and Japan may better reflect the realities of post-2005 globalization.
Implications beyond apparel

From computers to home building supply products, a growing percentage of consumer products are being sold via distribution systems using lean retailing principles. This means that proximity, inventory risk reduction, and replenishment have a bearing on sourcing decisions for many industries beyond apparel and textile. Accordingly, the changes underway in this very old chain of industries provide general insight into the major themes that cut across this volume. But we would also argue in thinking about this volume’s major themes one must be careful to delineate what is truly “new” about these changes from more longstanding forces acting on the firms that make up international supply chains.

Transportation, communication and globalization: Falling transportation and communication costs have long affected the growth and development of markets. For example, reduction in shipping costs arising from the growth of the intercontinental railroad system in tandem with the adoption of telegraphy dramatically changed the scale and scope of U.S. retail markets and the industries that supplied them. Similarly, lean retailing represents a marriage of a set of transportation, communication, and business innovations that collectively reduce the transaction costs between the final consumer and the “first mover” in a supply chain. We have shown here that the end result of these falling transaction costs is a distinctive pattern of geographic sourcing that reflects firms efforts to deal with both “old” and “new” costs of production and distribution.

We believe that supply chains in other industries are increasingly balancing the old costs of supply (labor, factor, and direct transportation) against the new costs associated with managing risk. How particular industries balance these costs will arise from distinctive characteristics of production, technology, industrial organization, and the nature of final consumer markets. For example, the chapter by Curry and Kenney indicates the current leader of the personal computer industry, Dell Computers, undertakes final assembly in the
U.S. rather than pursuing lower wage assembly opportunities off-shore in response to the perishability of PC and the attendant risk that goes with it.

*Time and speed:* Elapsed time between order and delivery has become far more important as a competitive factor for many of the products provided by apparel suppliers in a world of lean retail distribution. Prior to lean retailing, the presence of large inventories made time a relevant factor in terms of either companies meeting a delivery deadline for an upcoming season, or for the creation of fashion items for a new season. As a result, the relevant measure of time for suppliers was months rather than days. In this sense, time has become a vastly more important issue for supply chains here as in other cases discussed in this volume.33

It should be emphasized, however, that lean retailing means that time and speed pertain not only to median lead time performance, but also to variance around that lead time. A supplier that meets delivery targets to demanding retailers on average, but subjects them to high variance in shipments on a week-to-week basis will not survive long. Traditional global sourcing decisions paid relatively little attention to variance because they are made on the basis of direct costs with lesser attention to risk. Yet predicting how supply chains will evolve—as well as prescribing what policies developing nations should pursue in regard to those supply chains—must take into account that factors that affect variability in time and speed. This places factors like the reliability of national transportation and communication infrastructures, political stability, and the adequacy of national security systems, on increasingly equal footing with traditional factors like input prices and tariff and quota agreements as location determinants.

*Pricing pressure:* Intense price competition has been a fundamental feature of garment production since the emergence of dry goods wholesalers in apparel in the 1850s and 1860s (Chandler 1977). Lean retailing has only intensified pricing pressure at all stages of the channel, from retailing all the way back to fiber markets. Yet the cross-cutting implication from apparel to other industries facing similar restructuring in distribution is not
that pricing will remain important in the international location of production: It surely will. More important is how much buyers along the supply chain will be willing to balance price against the “new costs” of production in making their sourcing decisions.34

Manufacturing as a service and the location of production: We have argued that the emergence of lean retailing in major U.S., European and Asian consumer markets is already leading to a regionalization of production serving the replenishment markets for apparel. Similar developments can be expected to emerge across other consumer product industries where replenishment is of growing importance. This implies that the production / assembly portion of the manufacturing process will be increasingly decoupled from other activities traditionally undertaken by manufacturers. At the same time, such developments require that some party in the supply chain undertake the increasingly complicated task of using information on consumer sales to determine the allocation of production across supply chains with different cost, product variety, quality, lead time, and risk characteristics. These tasks are very different than those traditionally undertaken by consumer products suppliers. As a result, the difficult role of coordinating across supply chains may be ceded (as they have in parts of apparel) to third parties with distinctive competencies in managing inventories and logistics at an international level.

The relative effects of “old” and “new” factors in the realm of globalization will obviously differ across distribution and supply channels, and with them the manner in which new sourcing patterns play out. But it seems clear that the forces examined in this chapter will contribute increasingly to trade flows and patterns more generally in the coming decade. What is “new” for apparel—one of the oldest industries engaged in global trade—illustrates the forces that will shape globalization across a wider range of industries.
Appendix: Sources of data used in the analysis

Value of shipment by country:

The import data are taken from the U.S. Department of Commerce, Bureau of the Census, Administrative and Customer Services Division, *U.S. Imports / Exports History, International Harmonized System Commodity Classification by Country*, by Customers District, Historical Summary 1991-95 with updates for 1996-1999. The data is based on information collected by the U.S. Customs Service in its Custom Service Entry Summary forms that are filed with the Customs Service at the time that merchandise is released to the importer and used to assess tariffs.

The data is organized under the Harmonized Tariff Schedule of the United States Annotated (HTUSA or often termed “HS codes”), which provides a unique 10-digit reporting number for each product imported into the U.S. We used annual data on the value of imports (in current dollars) for the different countries of origin. In order to analyze the data at a more aggregated product level, we use concordance files provided to us by the U.S. Department of Commerce to convert HS codes into the more commonly used Standard International Trade Classification (SITC) system. We use the resulting 96, 6-digit SITC codes as the basis for the analyses conducted throughout the text.

The dollar values represent the current value of imports as appraised by the U.S. Customs Service in accordance with the legal requirements of the Tariff Act of 1930. The value is generally defined as the price actually paid or payable for merchandise when sold for export to the United States, excluding U.S. import duties, freight, insurance, and other charges incurred in bringing the merchandise to the United States. The price refers to the total payment made or to be made for the imported merchandise by the buyer to the seller. For more details on the definitions of import values, see [www.census.gov/foreign-trade/guide](http://www.census.gov/foreign-trade/guide).

Replenishment classification:
The 96 product categories were assigned a replenishment status based on a dichotomous variable where:

-1 if the product is replenishable given prevailing lean retailing practice or

=0 if the product is not replenishable given prevailing practice

This assessment was based on two sources of information. First, we have available the detailed product records for one of the top 10 U.S. retail department stores for sales in a portion of FY 2000. This data contains information on total sales to date for detailed product categories as well as replenishment sales to date in each of those categories. This allows us to calculate a percent of total sales replenished at a detailed product level. We used this information to provide general guidance on the classification of products. The limitation of this data is that it is grouped on the basis of the retailer’s internal product classification system rather than the SITC system for product categorization. We are therefore unable to use it to directly make the classification.

In the cases where we were not able to directly use the retail data set for classification, we relied upon our qualitative assessment of the replenishability of a product category based on fieldwork and case evidence collected by the authors as part of our larger study of the retail – apparel – textile channel. Although we believe the combination of the two methods of classification provide us with a reliable overall measure of replenishability, we did not choose to use the actual percent of replenishment as our metric (although these were available to us in many cases from the retail data set). In future work, we will further refine this measure to provide more precise estimates of the relationships between replenishment and trade flows. The classification is available from the authors or at our website, www.hctar.org.
Figure 3-1
Impact of Short Cycle Manufacturing on Profits and Inventory
Simulation Results

ASEAN countries include Philippines, Indonesia, Thailand, Malaysia, and Singapore

Figure 3-3
Trend in Apparel Imports
Physical Imports to the U.S., 1988-2000
(Volume in million square meters)
Figure 3-4
Trend in Apparel Imports
Value of Shipments from Two Regions to the U.S., 1991-2000
(Current $ millions)

Source: U.S. Department of Commerce, Data compiled by HCTAR
Table 3-1
Change in Import Share for Quota Constrained and Unconstrained Product Baskets, China / Hong Kong Quotas, 1990-1998

<table>
<thead>
<tr>
<th>Source of Imports to the U.S. market</th>
<th>Unconstrained Product “Basket” by China / Hong Kong Quotas</th>
<th>Constrained Product “Basket” by China / Hong Kong Quotas</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percent change in import share</td>
<td>Percent change in import share</td>
</tr>
<tr>
<td></td>
<td>-26.5</td>
<td>17.7</td>
</tr>
<tr>
<td>Mexico</td>
<td>463.6</td>
<td>28.4</td>
</tr>
<tr>
<td>CBI Countries</td>
<td>188.1</td>
<td>125.2</td>
</tr>
</tbody>
</table>

1 Product-level quotas as defined by bilateral agreements between the United States and China and Hong Kong.
2 Basket of products where the import quota for China / Hong Kong was not exceeded in the year under study.
3 Basket of products where 90 percent or more of the import quota for China / Hong Kong was reached in the year under study. Note that the basket of goods in each category may shift on a year-by-year basis depending on the level of quota reached for the given year.
4 Import shares are calculated as a percentage of total world imports of the constrained or unconstrained commodity basket.

**Table 3-2**
Top 10 Imports by Product Category and Volume Shipped
Mexico and China 1991 and 1999, Ranked by 1999 Shipments

<table>
<thead>
<tr>
<th>SITC</th>
<th>PRODUCT CLASSIFICATION</th>
<th>1991 Value of Shipments</th>
<th>% of total</th>
<th>Rank, 1991</th>
<th>1999 Value of Shipments</th>
<th>% of total</th>
<th>Rank, 1999</th>
</tr>
</thead>
<tbody>
<tr>
<td>84140</td>
<td>TROUSERS, OVERALLS, SHORTS ETC, MEN/BOYS, NOT KNIT</td>
<td>212,620,530</td>
<td>23.4%</td>
<td>1</td>
<td>1,709,381,769</td>
<td>21.8%</td>
<td>1</td>
</tr>
<tr>
<td>84280</td>
<td>TROUSERS ETC, WOMEN/GIRLS, TEXTILE FAB, NOT KNIT</td>
<td>130,444,894</td>
<td>14.3%</td>
<td>3</td>
<td>1,280,403,717</td>
<td>16.3%</td>
<td>2</td>
</tr>
<tr>
<td>84540</td>
<td>T-SHIRTS, SINGLET &amp; OTH VESTS, KNIT OR CROCHET</td>
<td>3,748,684</td>
<td>0.4%</td>
<td>34</td>
<td>972,061,347</td>
<td>12.4%</td>
<td>3</td>
</tr>
<tr>
<td>84550</td>
<td>JERSEYS, PULLOVERS, CARDIGANS ETC, KNIT OR CROCHET</td>
<td>10,288,035</td>
<td>1.1%</td>
<td>17</td>
<td>824,050,016</td>
<td>10.5%</td>
<td>4</td>
</tr>
<tr>
<td>84551</td>
<td>BRASSIERES, WHETHER OR NOT KNIT OR CROCHET</td>
<td>63,531,004</td>
<td>0.7%</td>
<td>4</td>
<td>307,577,330</td>
<td>3.9%</td>
<td>5</td>
</tr>
<tr>
<td>84552</td>
<td>GARMENTS, OF FELT &amp; SIMILAR FABRICS, COATED OR NOT</td>
<td>162,192,679</td>
<td>1.8%</td>
<td>2</td>
<td>217,895,090</td>
<td>2.8%</td>
<td>6</td>
</tr>
<tr>
<td>84426</td>
<td>TROUSERS, OVERALLS, SHORTS ETC, WOMEN/GIRLS, KNIT</td>
<td>12,693,769</td>
<td>1.4%</td>
<td>11</td>
<td>191,609,009</td>
<td>2.4%</td>
<td>7</td>
</tr>
<tr>
<td>84470</td>
<td>BLOUSES, SHIRTS, ETC, WOMEN/GIRLS, TEXT, KNIT</td>
<td>12,214,734</td>
<td>1.3%</td>
<td>12</td>
<td>169,196,572</td>
<td>2.2%</td>
<td>8</td>
</tr>
<tr>
<td>84534</td>
<td>TROUSERS, OVERALLS, SHORTS ETC, MEN/BOYS, TX, KNIT</td>
<td>883,669</td>
<td>0.1%</td>
<td>49</td>
<td>149,578,355</td>
<td>1.9%</td>
<td>9</td>
</tr>
<tr>
<td>84682</td>
<td>BRIEFS &amp; PANTIES, WOMEN/GIRLS, TEXTILE, KNIT</td>
<td>29,031,166</td>
<td>3.3%</td>
<td>5</td>
<td>136,520,048</td>
<td>1.8%</td>
<td>10</td>
</tr>
</tbody>
</table>

**TOTAL VOLUME IMPORTS**
909,718,506 70.2% 7,845,262,587 75.8%

**CORRELATION BETWEEN 1991 AND 1999 PRODUCT SHARES (ALL PRODUCTS)** 0.752

**CHINA, TOP 10 PRODUCT IMPORTS AND CORRESPONDING REPLENISHMENT VOLUME, RANKED BY 1999 VOLUME**

<table>
<thead>
<tr>
<th>SITC</th>
<th>PRODUCT CLASSIFICATION</th>
<th>1991 Value of Shipments</th>
<th>% of total</th>
<th>Rank, 1991</th>
<th>1999 Value of Shipments</th>
<th>% of total</th>
<th>Rank, 1999</th>
</tr>
</thead>
<tbody>
<tr>
<td>84538</td>
<td>JERSEYS, PULLOVERS, CARDIGANS ETC, KNIT OR CROCHET</td>
<td>858,270,426</td>
<td>22.3%</td>
<td>1</td>
<td>1,407,636,389</td>
<td>19.1%</td>
<td>1</td>
</tr>
<tr>
<td>84881</td>
<td>ARTICLES OF APPAREL, LEATHER/COMP LEATHER</td>
<td>151,591,228</td>
<td>3.9%</td>
<td>8</td>
<td>661,822,800</td>
<td>9.0%</td>
<td>2</td>
</tr>
<tr>
<td>84280</td>
<td>TROUSERS ETC, WOMEN/GIRLS, TEXTILE FAB, NOT KNIT</td>
<td>226,696,179</td>
<td>5.9%</td>
<td>4</td>
<td>476,004,663</td>
<td>6.5%</td>
<td>3</td>
</tr>
<tr>
<td>84270</td>
<td>BLOUSES, SHIRTS, ETC, WOMEN/GIRLS, TX FAH, NOT KNIT</td>
<td>421,827,354</td>
<td>11.0%</td>
<td>2</td>
<td>467,795,270</td>
<td>6.4%</td>
<td>4</td>
</tr>
<tr>
<td>84240</td>
<td>DRESSES, WOMEN/GIRLS, TEXTILE FAH, NOT KNIT</td>
<td>172,749,363</td>
<td>4.5%</td>
<td>5</td>
<td>308,062,376</td>
<td>5.0%</td>
<td>5</td>
</tr>
<tr>
<td>84140</td>
<td>TROUSERS, OVERALLS, SHORTS ETC, MEN/BOYS, KNIT</td>
<td>242,821,808</td>
<td>6.3%</td>
<td>3</td>
<td>308,278,860</td>
<td>5.0%</td>
<td>6</td>
</tr>
<tr>
<td>84119</td>
<td>ANORAKS, ETC, WOVEN TEXTILE, MENS &amp; BOYS</td>
<td>160,850,552</td>
<td>4.2%</td>
<td>6</td>
<td>256,535,030</td>
<td>3.5%</td>
<td>7</td>
</tr>
<tr>
<td>84821</td>
<td>ART OF APPAREL, CLOTHING ACCESSORIES, PLASTIC</td>
<td>39,276,215</td>
<td>1.0%</td>
<td>20</td>
<td>244,475,045</td>
<td>3.3%</td>
<td>8</td>
</tr>
<tr>
<td>84831</td>
<td>HATS &amp; OTH HEADWEAR, KNIT/CRO, LACE ETC, HAIRNETS</td>
<td>67,919,336</td>
<td>1.8%</td>
<td>13</td>
<td>218,890,049</td>
<td>3.0%</td>
<td>9</td>
</tr>
<tr>
<td>84219</td>
<td>ANORAKS, ETC, WOVEN TEXTILE, WOMEN OR GIRLS</td>
<td>152,570,163</td>
<td>4.0%</td>
<td>7</td>
<td>196,997,250</td>
<td>2.7%</td>
<td>10</td>
</tr>
</tbody>
</table>

**TOTAL VOLUME IMPORTS**
3,841,192,218 64.9% 7,355,591,533 63.5%

**CORRELATION BETWEEN 1991 AND 1999 PRODUCT SHARES (ALL PRODUCTS)** 0.944

### Table 3-3
Product Composition and Replenishment Status
Mexico and China, 1991 versus 1999

#### Mexico, Top 10 Product Imports and Replenishment Status, 1991 and 1999

<table>
<thead>
<tr>
<th>SITC</th>
<th>Product Classification</th>
<th>Replenished?</th>
<th>SITC</th>
<th>Product Classification</th>
<th>Replenished?</th>
</tr>
</thead>
<tbody>
<tr>
<td>84140</td>
<td>TROUSERS, OVERALLS, SHORTS ETC, MEN'S/BOYS, NOT KNIT</td>
<td>Yes</td>
<td>84140</td>
<td>TROUSERS, OVERALLS, SHORTS ETC, MEN'S/BOYS, NOT KNIT</td>
<td>Yes</td>
</tr>
<tr>
<td>84210</td>
<td>GARMENTS, OF FELT &amp; SIMILAR FABRICS, COATED OR NOT</td>
<td>No</td>
<td>84260</td>
<td>TROUSERS ETC, WOMEN'S/GIRLS, TEXTILE FAB, NOT KNIT</td>
<td>Yes</td>
</tr>
<tr>
<td>84260</td>
<td>TROUSERS ETC, WOMEN'S/GIRLS, TEXTILE FAB, NOT KNIT</td>
<td>Yes</td>
<td>84540</td>
<td>T-SHIRTS, SINGELETS &amp; OTH VESTS, KNIT OR CROCHET</td>
<td>Yes</td>
</tr>
<tr>
<td>84551</td>
<td>BRASSIERES, WHETHER OR NOT KNIT OR CROCHET</td>
<td>Yes</td>
<td>84550</td>
<td>JERSEYS, PULLOVERS, CARDIGANS ETC, KNIT OR CROCHET</td>
<td>No</td>
</tr>
<tr>
<td>84480</td>
<td>BRIEFS AND PANTIES, WOMEN'S/GIRLS, TEXTILE, KNIT</td>
<td>Yes</td>
<td>84551</td>
<td>BRASSIERES, WHETHER OR NOT KNIT OR CROCHET</td>
<td>Yes</td>
</tr>
<tr>
<td>84270</td>
<td>BLOUSES, SHIRTS, ETC, WOMEN'S/GIRLS, TX FAB, NOT KNIT</td>
<td>Yes</td>
<td>84210</td>
<td>GARMENTS, OF FELT &amp; SIMILAR FABRICS, COATED OR NOT</td>
<td>No</td>
</tr>
<tr>
<td>84822</td>
<td>RUBBER GLOVES</td>
<td>No</td>
<td>84420</td>
<td>TROUSERS, OVERALLS, SHORTS ETC, WOMEN'S/GIRLS, KNIT</td>
<td>Yes</td>
</tr>
<tr>
<td>84454</td>
<td>HATS &amp; OTH HEADGEAR, KNIT/CRO, LACE ETC, HARNETS</td>
<td>No</td>
<td>84470</td>
<td>BLOUSES, SHIRTS, ETC, WOMEN'S/GIRLS, TEXTILE, KNIT</td>
<td>Yes</td>
</tr>
<tr>
<td>84589</td>
<td>ARTICLES OF APPAREL, WOMEN'S OR GIRLS' NOS, MT KNIT</td>
<td>No</td>
<td>84334</td>
<td>TROUSERS, OVERALLS, SHORTS ETC, MEN'S/BOYS, TX, KNIT</td>
<td>Yes</td>
</tr>
<tr>
<td>84587</td>
<td>ARTICLES OF APPAREL, MEN'S OR BOYS, NOS, MT KNIT</td>
<td>No</td>
<td>84482</td>
<td>BRIEFS AND PANTIES, WOMEN'S/GIRLS, TEXTILE, KNIT</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Correlation Between Product Share and Replenishability, 1991 (All Products)**

*Calculated as correlation between 96 6-digit SITC product categories in 1991 and 1999. Full product shares by year available from the authors (available at www.hctar.org).

**Source:** Value of shipments 1991, 1999, U.S. Department of Commerce; replenishment status, see Appendix.
Notes for Chapter 2

1 Reynolds (1986: 130). See also Williamson (1998) for a historic perspective on the “new” issue of globalization.

2 See Gerschenkron (1962) for a seminal discussion of the role of textiles in the economic development of nations.

3 Not all products provided by lean retailers move from suppliers to consumers via replenishment. There remain a significant, but shrinking percentage of products ordered well in advance of selling season based on the assessment of buyers and reflecting the merchandising decisions of retailers. But even these typically fashion-oriented products are moving towards partial replenishment models.

4 This number excludes certain combinations of this particular product that Lands’ End does not offer. It therefore accurately reflects the number of SKUs that the company must be ready to provide their customers. Example based on shirts offered in the Lands’ End for Men catalog, June /July 2000, pp. 26-27.

5 The manufacturer in the simulation is described using generic costs, variations in weekly demand, and production cycle time. However, the values used are close to those for casual pants, bras, or an up-scale men’s dress shirt manufacturer. The average demand for the product is assumed to be constant throughout the year to simplify the data presentation (i.e. we assume no significant seasonality in demand). This assumption would, in fact, be true for men’s and women's undergarments, some casual pant, and blazers. For the
illustrative example, the total collection of SKUs are aggregated into the three groups shown in the following table.

<table>
<thead>
<tr>
<th>% of weekly demand</th>
<th>Cv</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>Low</td>
</tr>
<tr>
<td>35</td>
<td>Medium</td>
</tr>
<tr>
<td>15</td>
<td>High</td>
</tr>
</tbody>
</table>

Most of the SKUs (50%) have been taken to have a low value of weekly variation (0.7), and only 15% of the weekly demand is expected in the highest Cv group. This is a typical distribution of SKUs and Cv for a product offered in many styles and sizes by many manufacturers. Details on this example can be found in Abernathy, Dunlop, Hammond, and Weil (2000b) and at our research center website, www.hctar.org.

6 The Gap and Nike are just two recent examples of suppliers that have faced major reductions in demand for their products and, as a result, were forced to take large losses as a result of the need to liquidate inventories.

7 For example, Figure 3-1 is based on a case where production costs are 20% higher in the short cycle plant, the most profitable position was to have half made in the short cycle plant. Given the same demand and lead time inputs, when the local production cost rises to be 25% greater than the offshore plant, the profit is almost the same for all production mixtures up to 50% and then fall as more and more is made locally. When local costs are
30% higher than the offshore plant, then it is always more profitable to concentrate all production offshore. For other simulation results, see www.hctar.org.

8 These countries are often grouped together in trade comparisons because of the significant amount of transshipment—where products produced in one country are shipped out of another in order to thwart quota restrictions—between them. Changes in the “nation of origin” instituted on July 1, 1996 attempted to reduce the prevalence of transshipment of goods, particularly from China. See United States International Trade Commission (1996), p. 87.

9 These Caribbean nations are commonly grouped together in examining apparel and textile trade flows because they are covered by a broad economic development program, the Caribbean Basin Initiative (CBI). The CBI includes trade provisions that provide preferential trade treatment of CBI nations, including assessing U.S. customs duties on a value-added only basis for apparel products assembled in CBI countries but made of U.S. formed and cut materials. In 2000, legislation was enacted by the U.S. to confer CBI nations tariff-free entry for goods made of U.S. materials to provide parity with the treatment of goods under NAFTA (see below).

10 The estimated value of apparel imports from different countries varies according to the method used to classify the “apparel industry.” There are at least three definitions for defining the apparel and textile industries for purposes of tracking imports: the Standard International Trade Classification (SITC) system promulgated by the United Nations
which classifies on a commodity level basis (with apparel items beginning with 84 in its 10 digit system; the U.S. Standard Industrial Classification (SIC) system which uses industry level definitions that was used by the U.S. from 1940 until 1998 (with apparel items having and SIC code of 23 in the first of four digits) replaced recently by the North American Industrial Classification System; and the U.S. Textile and Apparel Category System which provides categories for textile and apparel items by fiber and type of product, and covered by international textile and apparel agreements. The three systems yield different estimates of total “apparel” imports by country. We use the SITC throughout this study.

11 See the Appendix for information on the data drawn upon for this chapter.

12 The quotas assigned under the MFA for particular products were allocated by agreements to governments rather than to particular producers, and the exporting country’s government officials were authorized to distribute the quota among producers. For a thorough examination of the secondary market that emerged within countries for quotas, see Krishna and Tan (1998).

13 Under the terms of the Agreement on Textiles and Clothing, WTO members removed quotas on 16 percent of their textile and apparel trade as of January 1, 1995 (based on their 1990 import volumes); 17 percent more on January 1, 1998; 18 percent in 2002; and the remaining 49 percent on January 1, 2005. In addition to the integration of quotas into the WTO regime, the agreements also require an acceleration of quota growth rates, for
categories of goods still covered by quotas during the transition period. See USITC (1999), pp. 8-12 – 8-15.

14 Both countries initialed the Memorandum of Understanding regarding China’s accession to the WTO on February 1, 1997.

15 Prior to NAFTA, imports from Mexican assembly plants were covered by the same arrangement covering imports assembled in the CBI (where duties are applied only to the value added of goods). Under NAFTA, a growing percentage of goods enter entirely duty free. See USITC (1996), p. 43.

16 This represents a weighted average across the top 10 products. Tariffs range from 3 percent of the customs import value for men’s or boys’ trousers, overalls, and shorts of cotton (SITC 620342) to a high of 33 percent of customs import value on sweaters, pullovers, sweatshirts, and similar products (SITC 611030). In many cases, these tariff rates were comparable to those imposed on Chinese imports in the same year. These figures are based on data collected by the U.S. Customs Bureau, Department of Commerce, and are fully described in the Appendix.

17 The comparable tariff figure for the top 10 goods from China in 1998 was 11.2%. Both estimates represent a weighted average based on the subgroup of each of the top 10, 6-digit SITC categories that were covered by quotas in 1998. These ranged from SITC 620342, where 98 % of the product group is covered by quotas, to 621210 where none of the product category was covered by a quota. See appendix for the source of these estimates. We are grateful to Carolyn Evans of the New York Federal Reserve Board for
providing us this detailed information on quota fill rates that is part of her ongoing study (see Evans (2000a,b) and Evans and Harrigan (2001).

18 Table 1 is based on Evans and Harrigan (2001), Figures 10 and 11.

19 See the appendix for a description of the methods employed to classify goods as to their replenishability.

20 The categorization for all 96 SITC product groups are available from the authors.

21 Ongoing work by the authors is evaluating the implications of replenishment on global sourcing decisions through modeling the profit / risk trade-offs discussed earlier in the chapter. Continuing work by Evans and Harrigan uses detailed product level information on factor costs, exchange rates, tariffs, quota fill rates, and replenishability to econometrically estimate their separate effects.

22 Although the agreements also call for the overall reduction in tariffs, tariffs will not be eliminated in 2005. Preferential tariff treatment for certain countries also will remain after 2005 such as those specified under NAFTA.

23 Under the Trade and Development Act of 2000, CBI nations will be provided duty-free access to the U.S. (removing the current tariff on the value-added of goods assembled in those countries under the provisions of 9802.00.80 of the Harmonized Tariff Schedule of the U.S.) provided that the goods are made from textiles produced in the U.S. The African Growth and Opportunity Act of 2000 when fully implemented provides for duty- and quota-free entry into the United States for the apparel products from 34 Sub-
Saharan nations, provided that the goods are made of textiles from those nations. See United States International Trade Commission (2000), pp. 97-104.

24 This view, for example, was espoused by Laura Rodriguez-Archila, an international trade analysts at the U.S. International Trade Commission, citing a USITC analysis, stated that “Once quotas are phased out, the Caribbean Basin is going to lose its advantage.” Quoted in Paula Green, “Report: Quota Phaseout to Hurt Caribbean,” Journal of Commerce, 2/11/00, p. 12.

25 Companies that have long specialized in apparel sourcing have not surprisingly changed given the new dynamics of global sourcing. For example, Li&Fung Ltd, a company specializing in apparel supply chain management began by providing apparel products from Asian manufacturers to retail customers using acquisition of quotas for apparel products in China and Hong Kong as the key source of competitive advantage. Today, the company focuses on “managing the supply chain for high volume, time-sensitive consumer goods” by coordinating a network of manufacturers based in Asia as well as the Mediterranean, Eastern Europe and Central America in order to be “…closer to our customers in Europe and the US.” (www.lifung.com). Other companies in the international shipping and transportation industry such as Sea-Land, UPS, and American Consolidation Services increasingly are linking traditional transportation activities to the provision of sophisticated logistic services important to both retailers and suppliers (Hever 2001).
Even the most sophisticated efforts to forecast the post-2005 impacts have left out the replenishment dynamic. The USITC models of the effects of China’s accession to the WTO on U.S. apparel production and employment are indicative. The USITC models are run at the aggregate rather than commodity level. This undermines the models’ ability to capture the types of changes described here since they have their primary impact through the composition of products sourced from different countries. The USITC report indirectly acknowledges this problem: “Finally, the simulations reflect the assumption that the purchasers’ willingness to substitute imports for domestic production remains constant throughout the 12-year period [1998-2010]. This may not be the case. For example, if domestic producers were to shift production to specialized subsectors, imports could become less viable substitutes and, as a result, purchasers would be less responsive to changes in import prices.” (USITC 1999, p. 8-20).

Based on U.S. Department of Commerce value of imported textiles, SITC 65 (see the appendix for information on the underlying data). The fall in textile employment in the US during the 1990s is often mistakenly ascribed to the same factors that reduced US apparel employment. In fact, the textile industry as well as for other major end users experienced growth in production over this period, and much of the employment reduction arose from technological changes and increasing capital intensity of production. See Abernathy, Dunlop, Hammond, and Weil (1999), Chapters 11 and 12.

Among those textile firms that have invested in Mexico since 1994 are Burlington Industries, Inc.; Cone Mills Corp.; Guilford Mills Inc.; and Dan River Inc.
29 There is evidence that managerial problems are increasingly affecting the performance in apparel and textile production in Mexico. For example, a top executive of one of the largest U.S. textile manufacturers told us that it was managerial capacity that was the primary limitation to the growth of the Mexican textile sector in the next decade. More generally, the advantages arising from Mexico’s geographic proximity to the U.S. consumer market can be undermined if suppliers cannot provide short lead times and reliable deliveries to retail distribution centers. If lead times increase and the reliability of shipments decrease, Mexico will become increasingly subject to competition from nations that can provide similar performance at lower cost.

30 It is less clear that the CBI nations will be able to develop a textile sector in the near term for several reasons. First, the NAFTA parity in tariff treatment for the CBI still requires use of textile products manufactured in the U.S. (unlike NAFTA where there is no such precondition for apparel imported from Mexico). Second, capital constraints are more substantial in the CBI nations than in Mexico. Finally, the CBI apparel manufacturers currently in operation have specialized primarily in assembly. There is therefore less experience in the management of more complex apparel manufacturing than one finds in Mexico, limiting the supply of skilled managers for textile operations.

31 If relations are normalized with the U.S. in the future, Cuba may emerge as a growing source for apparel assembly arising from its proximity to the U.S. market, the availability of a labor supply with skills in this area, and the existence of social and potential business networks between the Cuban mainland and Cuban emigre communities.
Indicative of the similarities is the statement of Samir Gandhi, manager of an English company specializing in sourcing nightwear products for British retailers: “Turkey is very attractive because the quality here is higher and the lead times are significantly shorter…We are starting to realize that to be competitive in the fast-moving world of fashion, we need to cut down on our lead times. This, in and of itself, justifies the slightly higher price in Turkey.” Gandhi quoted in Robert Murphy, “Turks Aim to Develop Brands.” *Women’s Wear Daily*, 3/7/01, p. 12.

It is important to note that many of the industries described in this book are dealing with the problem of product proliferation that has been an attribute of the apparel industry. Among other implications, the presence of “fashion elements” in the production of computers, electronic components, automobiles, and other consumer goods brings with it the associated problem of product perishability. This constitutes an additional theme common to many of the supply chains described in this volume.

Also of interest will be the emergence of other methods for firms along supply chains like apparel to deal with risk exposure in making sourcing arrangements. Commodity markets have long used futures and other options as a means to deal with price risk. As the exposure to risk is pushed back in supply chains, one can imagine the emergence of markets to deal with similar risks in a more systematic fashion.

See Feenstra (1996) for a detailed discussion of issues related to data concordance between the HS codes, SITC, and SIC classification systems.