Industry & Trade Summary

Manmade Fibers

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This report was prepared principally by

Linda C. Shelton

Textiles and Apparel Branch
Energy, Chemicals, and Textiles Division

Address all communications to
Secretary to the Commission
United States International Trade Commission
Washington, DC 20436

PREFACE

In 1991 the United States International Trade Commission initiated its current *Industry and Trade Summary* series of informational reports on the thousands of products imported into and exported from the United States. Each summary addresses a different commodity/industry area and contains information on product uses, U.S. and foreign producers, and customs treatment. Also included is an analysis of the basic factors affecting trends in consumption, production, and trade of the commodity, as well as those bearing on the competitiveness of U.S. industries in domestic and foreign markets.[1]

This report on manmade fibers covers the period 1989 through 1993 and represents one of approximately 250 to 300 individual reports to be produced in this series during the first half of the 1990s. Listed below are the individual summary reports published to date on the chemicals and textiles sectors.

USITC Publication number	*Publication date*	*Title*
Energy and Chemicals:		
2458	November 1991	Soaps, Detergents, and Surface-Active Agents
2509	May 1992	Inorganic Acids
2548	August 1992	Paints, Inks, and Related Items
2578	November 1992	Crude Petroleum
2588	December 1992	Major Primary Olefins
2590	February 1993	Polyethylene Resins in Primary Forms
2598	March 1993	Perfumes, Cosmetics, and Toiletries
2736	February 1994	Antibiotics
2739	February 1994	Pneumatic Tires and Tubes
2741	February 1994	Natural Rubber
2743	February 1994	Saturated Polyesters in Primary Forms
2747	March 1994	Fatty Chemicals
2750	March 1994	Pesticide Products and Formulations
2823	October 1994	Primary Aromatics
2826	November 1994	Polypropylene Resins in Primary Forms
Textiles and apparel:		
2543	August 1992	Nonwoven Fabrics
2580	December 1992	Gloves
2642	June 1993	Yarn
2695	November 1993	Carpets and Rugs
2702	November 1993	Fur Goods
2703	November 1993	Coated Fabrics
2735	February 1994	Knit Fabric
2841	December 1994	Cordage
2853	January 1995	Apparel
2874	April 1995	Manmade fibers

[1] The information and analysis provided in this report are for the purpose of this report only. Nothing in this report should be construed to indicate how the Commission would find in an investigation conducted under statutory authority covering the same or similar subject matter.

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INTRODUCTION

The world manmade fiber industry has undergone significant restructuring during the past decade, largely in response to changing world market conditions. Historically, the industry has been dominated by the developed countries. In recent years, however, the developing countries of Asia have become increasingly important. Between 1980 and 1993, these developing Asian countries, led by China, Taiwan, and Korea, accounted for most of the growth in world manmade fiber production, increasing their aggregate share of world production from 15 to 42 percent. Development of the manmade fiber industry in Asia was largely spurred by the rapid buildup of the region's textile and apparel industry, the major consumer of manmade fibers. Asian textile and apparel production was driven largely by exports to the developed countries and by local demand, which has risen as these economies have grown.

In contrast, production of manmade fibers has remained relatively stagnant in the United States, Japan, and Western Europe. Their aggregate share of world output fell from 60 percent in 1980 to 43 percent in 1993. This relative decline in the share of world output partly reflected the growth in these countries' imports of textile and apparel products; those products displace domestic demand for manmade fibers. Direct fiber imports of the developed countries have been relatively small but growing. During the early 1990s, economic recessions have reduced growth in demand for manmade fibers in the developed countries.

Barriers to entry in the manmade fiber industry are considerable, as production is generally highly capital intensive and requires significant technical expertise and economies of scale. As a result, the world manmade fiber industry has long been dominated by a few large, mostly multinational chemical companies based mainly in the United States, Western Europe, and Japan. In recent years, however, major producers based in Taiwan and Korea have emerged. In 1994, the world's 10 largest manmade fiber firms accounted for an estimated 30 percent of world production capacity (table 1).

The United States is the world's largest producer and consumer of manmade fibers, accounting for 17 to 18 percent of world output and consumption in 1993. During 1989-93, U.S. manmade fiber production grew by 2 percent to almost 4.2 million metric tons. U.S. consumption during that period increased by 11 percent to almost 4.7 million metric tons. In terms of value, however, U.S. industry shipments decreased by 7 percent during 1989-93 to an estimated $12.4 billion and consumption fell by 3 percent to an estimated $12.1 billion.

The U.S. manmade fiber industry underwent significant restructuring during 1989-93. The industry became more concentrated as several large producers increased their production capacity by improving productivity in existing operations and by purchasing additional facilities. Some producers downsized their operations by withdrawing from certain fiber markets, while others exited the manmade fiber industry altogether. Concentration by fiber type also increased as producers began to focus on fewer (one or two) core fibers. The U.S. industry also became more globally integrated during the period as several domestic producers increased production capacities overseas and as several foreign firms entered into production in the United States.

The U.S. manmade fiber industry is highly competitive in the domestic market, supplying more than 90 percent of apparent consumption. During 1989-93, growth in demand occurred mainly in the carpet and rug market and the industrial and miscellaneous consumer goods market where import penetration has been relatively low. Although U.S. consumption of apparel and home textiles rose during the period, much of the increase in demand in these markets was for imported garments and home furnishings and for cotton goods.

The United States traditionally has had a favorable balance of trade in manmade fibers. In recent years, however, the trade balance has deteriorated sharply, as imports rose to successively higher record levels and exports in 1993 fell to their lowest level in at least 5 years. The U.S. trade surplus in manmade fibers declined from a peak of $870 million in 1990 to $267 million in 1993. This decline stemmed in part from an increase in economic activity in the United States, which spurred demand for imports, and in part from prolonged weakness in major foreign markets. Global investment strategies of the multinational firms also influenced patterns of U.S. trade in manmade fibers. Intracompany transfers accounted for a major portion of U.S. trade, especially with Canada, the largest U.S. trading partner by far, and Mexico, the fourth largest partner.

This report examines recent developments in the manmade fiber industry, particularly those during 1989-93. It describes the principal products and the basic manufacturing process. The report examines changes in the U.S. manmade fiber industry, followed by a brief overview of the foreign industry. The report discusses the performance of the U.S. manmade fiber industry in both domestic and foreign markets and reviews trends in U.S. foreign trade in manmade fibers.

Table 1
World manmade fiber industry: Top 10 producers, country of parent company, and countries of foreign affiliates, 1994

Producer (country of parent company)	Country of foreign affiliates		
	The Americas	Europe	Asia and Others
Akzo Nobel N.V. (Netherlands)	Brazil Colombia Ecuador Mexico United States	Germany Netherlands	India
Asahi Chemical Industry, Co. Ltd. (Japan)		Ireland	Indonesia Japan Korea
DuPont Co. (United States)	Argentina Brazil Canada Mexico United States	Germany Luxembourg Netherlands Spain Turkey United Kingdom	Australia Indonesia Japan Singapore
Hoechst A.G. (Germany)	Brazil Canada Mexico United States	Austria Belgium Germany Portugal United Kingdom	China S.Africa
Montefibre-Enichem Group (Italy)		Italy Spain	
Rhône-Poulenc S.A. (France)	Argentina Brazil	France Germany Spain Switzerland	
Teijin Ltd. (Japan)			Indonesia Japan Korea Thailand
Toray Industries, Inc. (Japan)			Indonesia Japan Korea Malaysia Thailand
Formosa Plastics Group (Taiwan)	United States		Taiwan
Wellman, Inc. (United States)	United States	United Kingdom	

Note.—Does not include licensing and royalty agreements nor non-manmade fiber affiliations.

Source: Compiled by the staff of the U.S. International Trade Commission from Fiber Economics Bureau, Inc., *World Directory of Manufactured Fiber Producers* (Roseland, NJ: Fiber Economics Bureau, Inc., 1994-95) and various other sources.

PRODUCTS AND PRODUCTION PROCESSES

Manmade fibers, as defined in the Harmonized System (HS), include staple and filament fibers that are manufactured of organic polymers.[1] The HS groups these fibers into synthetic and artificial. The basic raw materials for the manufacture of synthetic fibers are petrochemicals, whereas those for the production of artificial fibers are cellulose (mainly wood pulp). As such, the trade often refers to artificial fibers as cellulosics; synthetic fibers are sometimes known as noncellulosics. This report will use the standard trade terms of cellulosic and synthetic to describe the two groups of manmade fibers.

The first manmade fibers commercially manufactured in the United States were the cellulosics, led by rayon (originally known as "artificial silk") in 1910 and acetate in 1924.[2] The first synthetic fiber produced domestically was nylon, in 1939. Since then, most technological advances in manmade fibers have occurred in synthetics, which now make up almost all U.S. production of manmade fibers. Polyester, nylon, polyolefin, and acrylic are the main synthetic fibers produced in the United States.[3] The growing use of these synthetic fibers in a wide range of applications has enabled the manmade fiber industry to account for 57 percent of all textile fibers consumed in the United States in 1993 (figure 1). These applications can be broadly divided into four groups: (1) carpets and rugs, (2) apparel, (3) home textiles such as bedding, curtains, and towels, and (4) industrial and miscellaneous consumer products (figure 2).

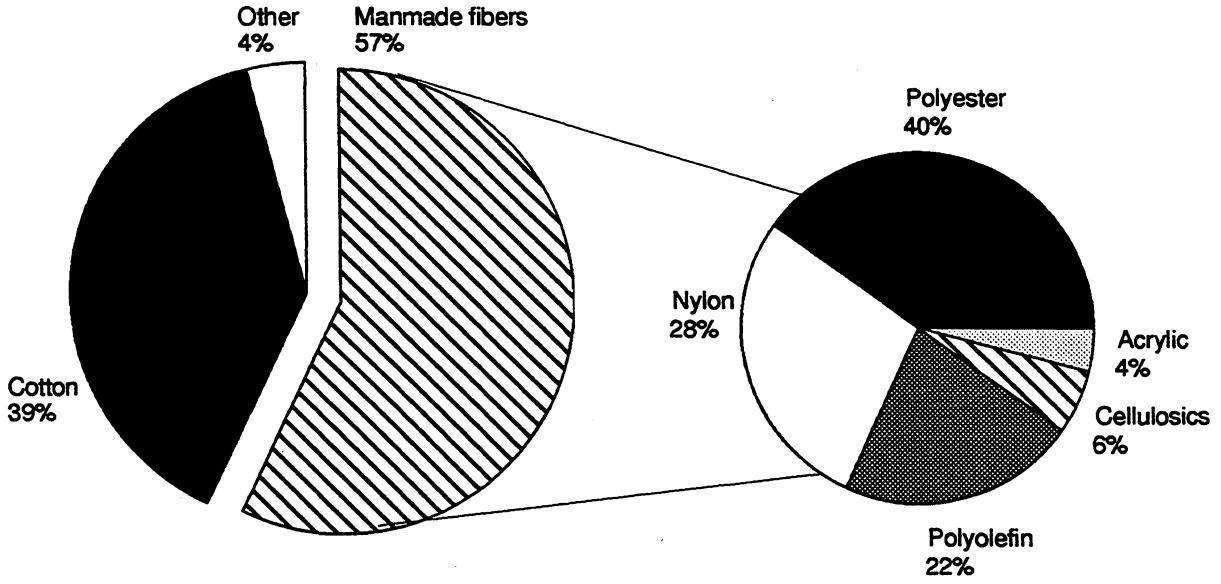
The basic manufacturing process for manmade fibers is similar for most synthetics and cellulosics. The fiber-forming substances, which come in solid form, are processed into a liquid state, usually by dissolving them in a solvent or melting them. The resultant thick, syrupy substance is forced through tiny holes of spinnerets (which work much

[1] The HS, an international nomenclature system, forms the core of the U.S. tariff nomenclature, the Harmonized Tariff Schedule of the United States.

[2] Other cellulosic fibers are triacetate, cupra, and, most recently, lyocell, which in the United States is currently under review by the Federal Trade Commission for a new generic classification.

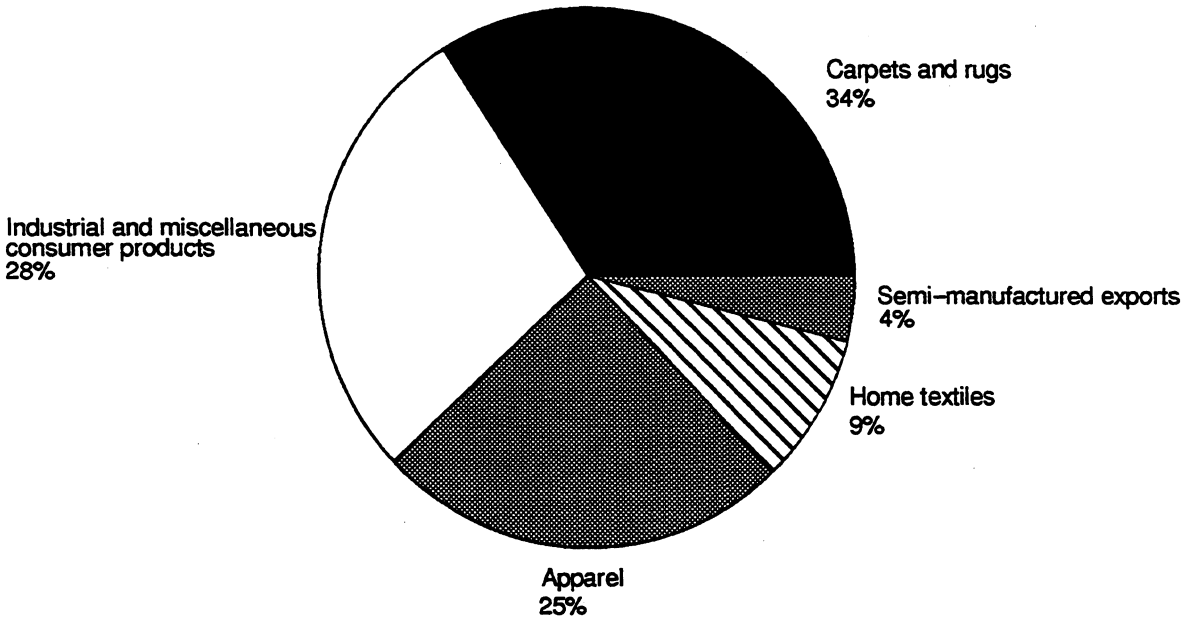
[3] Other synthetic fibers include aramid, azlon, modacrylic, PBI, saran, spandex, sulfar, vinal, and vinyon.

Figure 1
U.S. fiber consumption: Percentage distribution by principal fibers, 1993



Source: Compiled by the staff of the U.S. International Trade Commission from Fiber Economics Bureau, Inc., *Fiber Organon* (Roseland, NJ: Fiber Economics Bureau, Inc., Apr. 1994).

Figure 2
Manmade fibers: Percentage distribution of U.S. consumption, by principal end-use markets, 1993



U.S. consumption = 5.0 million metric tons

Note.—Semi-manufactured exports include fiber processed or fabricated in U.S. mills, but exported before reaching the point at which end use was measured (e.g., exports of yarn and fabric).

Source: Compiled by the staff of the U.S. International Trade Commission from Fiber Economics Bureau, Inc., *Fiber Organon* (Roseland, NJ: Fiber Economics Bureau, Inc., Sept. 1994).

like a bathroom shower head) and extruded into fibers, or filaments, of indefinite length. The filaments are then stretched to align the molecules in a more orderly pattern, thereby improving their strength. A significant portion of polyolefin is produced as slit film fiber, in which the polymer is extruded as a wide sheet of film that is cut lengthwise into narrow continuous strips.

Manmade fiber filaments are usually converted into continuous filament yarn or cut into short lengths of fibers known as staple. Monofilament yarn is formed from a single filament of continuous length and multifilament yarn is obtained by grouping two or more monofilaments together generally as they emerge from the spinnerets. A large portion of the filament yarn used in the textile industry is textured or crimped to impart bulk, stretch, or softness.[4] Staple is produced by grouping together a large number of filaments into large rope-like bundles called tow. This tow may be stretched and cut into short lengths, usually 1 inch to 4 inches, for processing into spun yarn. Fiber in tow form is also sold to customers who cut their own staple.

[4] Texturing in the United States is generally performed by firms in the textile mill sector.

Fiber characteristics may be modified by varying chemical inputs, the production process, or the cross-sectional shape of the fiber. Fiber thickness may be varied by changing the size of the holes in the spinneret and the speed of extrusion. The thickness of multifilament yarn may also be changed by increasing or decreasing the number of filaments per yarn. For example, fine monofilament yarns (e.g., 12 denier) are commonly used in sheer pantyhose, whereas heavier multifilament yarns (e.g., 1,680 denier) are used in automobile tires for added strength and stability.[5]

U.S. INDUSTRY PROFILE

U.S. producers of manmade fibers are classified in the Standard Industrial Classification (SIC) system as part of the chemicals and allied products sector (SIC 28). Establishments producing manmade fibers are classified in SIC 2823, Cellulosic Manmade Fibers, and SIC 2824, Manmade Organic Fibers, Except

[5] Denier is a measure of the thickness of yarn expressed as the weight in grams of 9,000 meters of yarn. For example, if 9,000 meters of a yarn weigh 50 grams, the yarn is 50 denier. The lower the number, the finer the yarn.

Cellulosic. Excluded from this report are establishments that texturize manmade-fiber filament yarn, which are classified in the textile mill products sector under SIC 2282, Yarn Texturizing, Throwing, Twisting, and Winding Mills.

Industry Structure

The U.S. manmade fiber industry is highly concentrated. Nine firms accounted for roughly 70 percent of U.S. production capacity in 1994; the rest of the capacity was held by some 85 other firms (figure 3). DuPont is the largest domestic producer, with over 1 million metric tons of annual capacity. The number of producers and the level of concentration vary by fiber type. In 1994, only two firms produced acrylic and three manufactured rayon. Although roughly 30 firms produced polyester and nylon and some 60 firms produced polyolefin, 7 producers accounted for about 85 percent of total U.S. nylon and polyester capacity and 3 producers accounted for over one-half of the polyolefin capacity. In recent years, the number of polyolefin producers has risen, largely because of the growing market for the fiber and the increased availability of relatively low-volume production equipment.

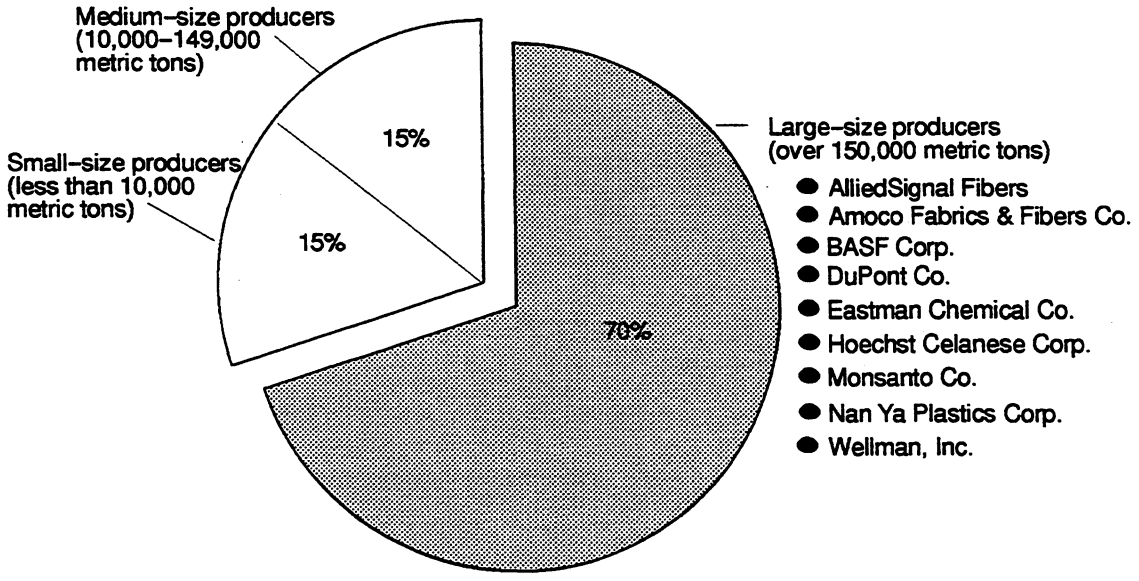
The U.S. manmade fiber industry experienced significant restructuring during 1989-93,[6] responding in part to weak domestic demand in the apparel and home textiles markets. In an effort to increase market share and improve profit margins, many firms realigned their product mix to reflect their strengths in certain fiber markets. Several firms stopped production of certain fiber types and others exited the industry altogether. In many cases production capacity was absorbed by existing firms or new producers in the industry. Figure 4 lists the major producers by fiber type in 1994 versus 1989.

U.S. manmade fiber production takes place in some 170 plants[7] located mainly in the Southeast, where the major customer, the textile mill industry, is

[6] See, for example, The Economist Intelligence Unit, *Textiles Intelligence - Technical Textile Markets* (United Kingdom: Textile Intelligence Ltd.), Jan. 1995.

[7] Fiber Economics Bureau, Inc., *World Directory of Manufactured Fiber Producers - 1994-95* (Roseland, NJ: Fiber Economics Bureau, Inc.).

Figure 3
U.S. manmade fiber industry: Annual capacity by producer size, 1994



Total annual capacity = 5.1 million metric tons

Note.—Capacity is as of March 1994.

Source: Compiled by the staff of the U.S. International Trade Commission from various industry sources.

Figure 4
U.S. manmade fiber industry: Primary producers by fiber, 1989 and 1994

Fiber	Producers	
	1989	1994
Polyester	BASF Corp.[1] DuPont Co. Eastman Chemical Co[2] Hoechst Celanese Corp. Wellman, Inc.	Wellman, Inc. DuPont Co. Hoeschst Celanese Corp. Nan Ya Plastics Corp.[3]
Nylon	AlliedSignal Fibers BASF Corp. DuPont Co. Monsanto Co.	AlliedSignal Fibers BASF Corp. DuPont Co. Monsanto Co.
Polyolefin	Amoco Fabrics & Fibers Co. Hercules Inc. Phillips Fibers Corp.[4] Synthetic Industries	Amoco Fabrics & Fibers Co. Hercules Inc. Synthetic Industries
Acrylic	American Cyanamid Co.[5] DuPont Co.[6] Mann Industries[7] Monsanto Co.	Cytec Industries, Inc.[5] Monsanto Co.[6]
Rayon	Avtex[8] BASF Corp.[9] Courtaulds Fibers Inc. North American Corp.	Courtaulds Fibers Inc. Lenzing Fibers Corp.[9] North American Corp.
Acetate	Eastman Chemical Co. Hoechst Celanese Corp.	Eastman Chemical Co. Hoechst Celanese Corp.
Spandex	DuPont Co. Globe Manufacturing Co.	DuPont Co. Globe Manufacturing Co. Miles, Inc.[10]
Aramid	DuPont Co.	DuPont Co.

[1] BASF Corp. stopped polyester production in mid-1994.
[2] Eastman Chemical Co. left the polyester market in 1993.
[3] Nan Ya Plastics Corp. commenced U.S. production of polyester in mid-1993.
[4] Phillips Fibers Corp. sold its polyolefin fiber business to Amoco Fabrics & Fibers Co. in 1993.
[5] In 1993, American Cyanamid Co. divested its chemicals business, including fibers, by establishing Cytec Industries, Inc., a freestanding chemicals company.
[6] DuPont Co. phased out its "Orlon" acrylic fiber production in 1990 (see DuPont Annual Report 1990). Monsanto Co. acquired "Wintuk" and "Sayelle" acrylic craft yarns from DuPont Co. in 1991 (see 1991 Annual Report of Monsanto Co.).
[7] Mann Industries purchased BASF Corp.'s acrylic production facility in 1989. In 1993, Mann Industries filed bankruptcy, and in early-1994 shut down its acrylic facility.
[8] Avtex closed its last rayon plant in 1989.
[9] BASF Corp. sold its rayon plant to Lenzing Fibers Corp. in mid-1992.
[10] Miles, Inc., began construction on a spandex fiber facility in early 1993; start-up of the new plant is expected in early 1995.

Source: Compiled by the staff of the U.S. International Trade Commission from various industry sources.

concentrated. Large fiber producers manufacture or purchase basic organic chemicals and synthesize them into fiber-forming polymers, whereas the smaller firms process purchased polymers into fiber. Smaller firms often purchase polymers from the larger fiber producers that manufacture polymer for sale and for internal use. Several large firms are integrated upstream to petroleum exploration and recovery, either through their parent companies or affiliates in the petroleum industry. Few firms are integrated downstream into the production of end-use products. The main exception is Amoco Fabrics & Fibers Co., the largest U.S. producer of polyolefin fibers, which also converts these fibers into carpet backing and geotextiles for use in erosion control, road stabilization, and waste containment.[8] The broader

[8] A growing number of U.S. carpet producers have integrated back into manmade fiber production, mainly in polyolefin. For information on carpets, see U.S. International Trade Commission (USITC), *Industry & Trade Summary: Carpets and Rugs*, USITC publication 2695, Nov. 1993.

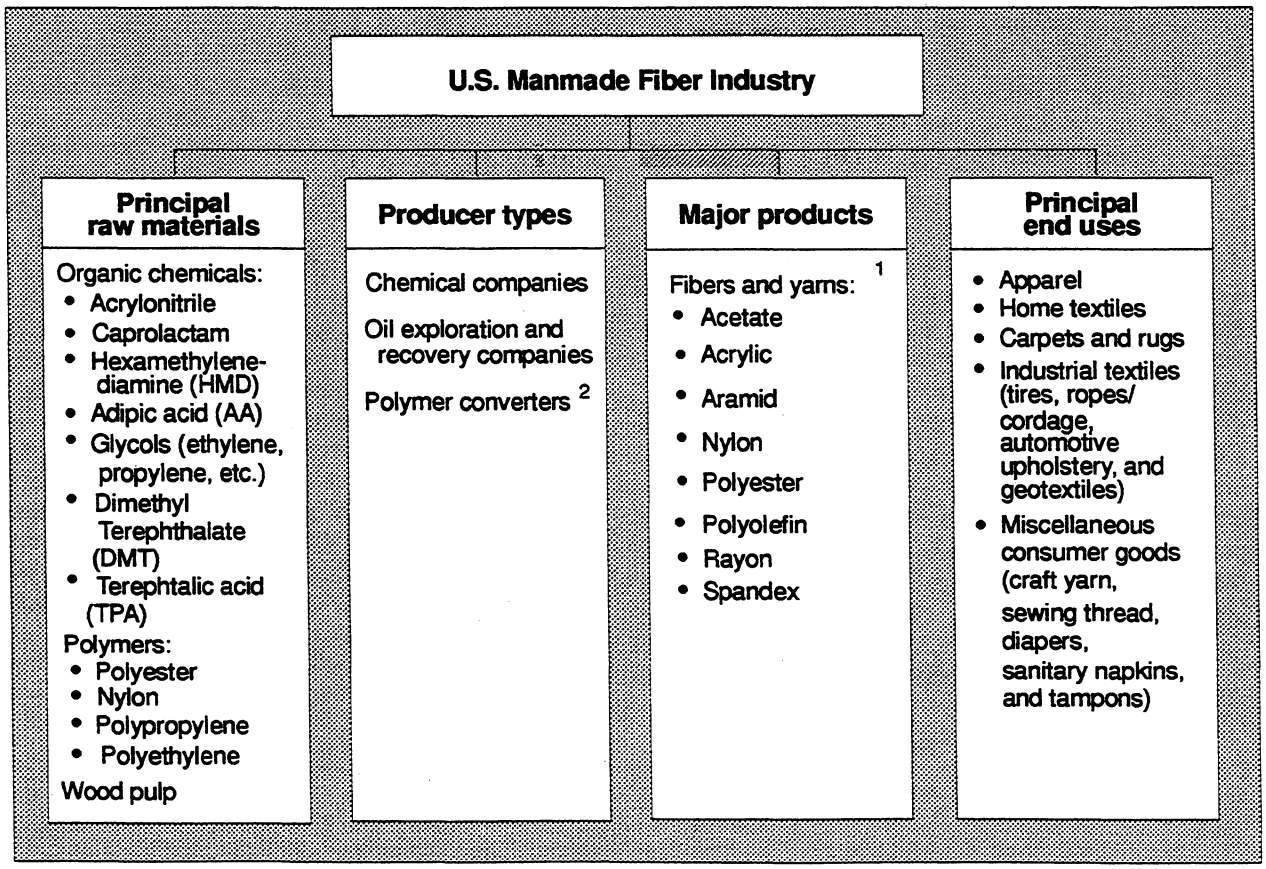
structure of the U.S. manmade fiber industry and its principal raw materials, products, and end uses is illustrated in figure 5.

Large companies usually mass-produce commodity fibers, whereas smaller firms generally produce lower volume, higher value specialty fibers. However, many large producers also manufacture specialty fibers such as spandex, microfibers, high-strength fibers, and heat-resistant fibers, and have placed more emphasis on these fibers in recent years. As profit margins on commodity fibers have tightened, the sale of specialty fibers has become one way in which producers have sought to increase overall profits.

The U.S. manmade fiber industry has traditionally had one of the highest levels of foreign ownership of all U.S. industries. In 1990, partially or wholly foreign-owned establishments accounted for 63 percent of total U.S. synthetic fiber shipments.[9] Several major U.S. producers are wholly owned subsidiaries of multinationals based in other countries and several are partially (10 percent or more) owned by foreign entities. For example, Hoechst Celanese and BASF Corp. are wholly owned subsidiaries of large German-based multinationals and DuPont is slightly less than 25 percent owned by Seagram Co. Ltd. (Canada). The level of foreign ownership likely has increased in recent years as several new foreign producers have entered the U.S. market by either purchasing existing U.S. facilities or building new operations.

[9] The synthetic fiber industry ranked a close third, after the inorganic pigments and biological products industries, as having the highest percentage of shipments accounted for by foreign-owned establishments. The average for all manufacturing industries was 14.5 percent. U.S. Department of Commerce, Bureau of Economic Analysis, "Characteristics of Foreign-Owned U.S. Manufacturing Establishments," *Survey of Current Business*, Jan. 1994, pp. 36 and 37.

Figure 5
U.S. manmade fiber industry: Principal raw materials, producer types, major products, and principal end uses



[1] Manmade fibers and yarns include monofilament and multifilament yarns, staple, tow, and slit film fiber.

[2] Polymer converters primarily extrude purchased polymer; they do not perform any chemical synthesis.

Source: Compiled by the staff of the U.S. International Trade Commission.

Several U.S. manmade fiber producers have subsidiaries, joint ventures, and affiliates in other countries, particularly Canada, Mexico, and in Western Europe. U.S. investment in the European Union (EU) has increased significantly in recent years. DuPont recently purchased the European fiber business of ICI PLC, making it the largest nylon producer in Europe, and AlliedSignal acquired Akzo Nobel's carpet fiber business in Europe. By locating operations within the EU, U.S. manmade fiber producers gain market access in all member countries, avoiding tariffs and other trade barriers applied to imports from nonmember countries. U.S. manmade fiber investment in Asia has been limited. However, several major producers have shown increasing interest in production in Asia, largely due to the region's growing demand for manmade fibers.

Factors of Competitiveness

The competitive strength of the U.S. manmade fiber industry mainly stems from its proximity and access to the large domestic market and its ability to realize economies of scale in production. The industry has remained competitive through significant investment in (1) new equipment and plants and (2) research and development (R&D). This investment has allowed the industry to develop and employ manufacturing methods and technology that has led to more efficient production and the development of new and improved products.

Capital expenditures on new equipment and plants by the manmade fiber industry during 1989-92 ranged from $796 million to $915 million annually, or the equivalent of 6 to 7 percent of industry shipments.[10] Partly as a result of these expenditures, the industry was able to increase overall productivity and reduce the number of production workers. Between 1989 and 1993, the number of production workers in the industry fell by 22 percent, from 54,300 to 42,600, and labor productivity rose from an average of 62 metric tons per worker to 76 metric tons.[11] This improvement in productivity is significant given that wages are relatively high, averaging $13.98 an hour in the synthetic fiber industry in 1993.[12] A portion of the decline in employment, however, was due to plant closures, as well as the use of less labor-intensive production methods.

Many large U.S. producers allocate 5 to 6 percent of sales to R&D annually. Much of the R&D spending goes into the development of new products, which has become increasingly important in boosting sales in the mature U.S. market. Some of the more widely publicized product developments in recent years include microfibers[13] and recycled fibers. Because product development and new product launches are costly, some firms share R&D costs through cooperative agreements with other fiber producers or with their customers. U.S. manmade fiber producers have worked closely with carpet mills to develop fibers and yarns with special properties such as stain and crush resistance.[14] In fact, the attributes of these fibers are so important in the promotion of carpets at the retail level that promotional materials frequently emphasize the name of the fiber producer or the brand name of the fiber, more than the name of the carpet mill.

Pricing

U.S.-produced manmade fibers are relatively competitive in the world market. In recent years, U.S. fiber prices have generally been weak, largely reflecting sluggish domestic demand in major end-use markets, especially apparel, and excess world supplies of synthetic fibers. During 1989-93, the U.S. producer price index (PPI) for synthetic fibers rose by only about 1 percent. The PPI for cellulosic fibers, however, increased by 8 percent during 1989-91, reflecting in part the reduction of fiber on the market when two major producers stopped production.[15] The PPI for cellulosic fibers fell slightly in 1992 and 1993 as production came more in line with demand.

To some extent, manmade fiber prices are also influenced by demand for competing natural fibers, especially cotton. Polyester staple and cotton can be complementary fibers and, typically, demand for both fibers rises or falls in response to changes in demand for polyester/cotton fabrics. Within certain limits defined by aesthetics and performance, the relative shares of these fibers in blended fabrics largely depend on the price or availability of one fiber versus the other (i.e., they substitute for each other). World cotton supplies in 1993 began to tighten and cotton prices subsequently increased, which led to increased substitution of polyester for cotton.[16] In 1994 the

[10] U.S. Bureau of the Census, *1992 Census of Manufactures: Plastics Materials, Synthetic Rubber, and Manmade Fibers (Preliminary)*, May 1994.

[11] Employment estimated by the staff of the U.S. International Trade Commission from data in U.S. Bureau of Labor Statistics (BLS), *National Industry, Employment, Hours, and Earnings Statistics*, Labstat Series Report, Aug. 3, 1994. Worker productivity calculated by using production data from Fiber Economics Bureau, Inc., *Fiber Organon* (Roseland, NJ: Fiber Economics Bureau, Inc., June 1994).

[12] U.S. Bureau of Labor Statistics (BLS), *National Industry, Employment, Hours, and Earnings Statistics*, Labstat Series Report, Aug. 3, 1994.

[13] Microfibers are generally defined as manmade fibers that are finer than silk, nature's finest fiber.

[14] See, for example, U.S. International Trade Commission (USITC), *Industry & Trade Summary - Carpets and Rugs*, USITC publication 2695, Nov. 1993.

[15] USITC staff interviews with U.S. manmade fiber industry officials.

[16] Low cotton crop yields in China, Pakistan, and India, which produce roughly two-thirds of the world's cotton supply, resulted in higher world prices as mills worldwide dipped into already lean cotton reserves.

major U.S. polyester producers began to raise prices, primarily reacting to the growing demand for U.S. polyester both at home and on the world market.

Manmade fiber prices also tend to reflect the cost and availability of raw materials, the single most important cost factor for the industry. During 1989-92, the cost of materials ranged from 46 to 50 percent of the value of U.S. industry shipments.[17] The industry has access to competitively priced raw materials, mainly petroleum derivatives. The United States is the world's largest producer of many of the raw materials used in the manufacture of manmade fibers and much of these materials are processed by the major manmade fiber producers or their affiliates. During the Persian Gulf crisis, polyester prices rose during 1990 in anticipation of tight petroleum feed stocks, and then fell in 1991 following the end of the crisis.

U.S. Production and Production Capacity

U.S. manmade fiber production has shown little growth in recent years, reflecting the mature stage of the U.S. market. During 1989-93, U.S. manmade fiber production grew by 2 percent, from 4.1 million to 4.2 million metric tons (table 2). However, the value of industry shipments fell by 7 percent to an estimated $12.4 billion.

The increase in U.S. manmade fiber production during 1989-93 occurred in polyolefin. Production of this fiber grew by 32 percent, largely reflecting the increased use of the fiber by carpet and rug manufacturers. U.S. output of other manmade fibers fell in the period, mainly owing to weak demand in major end-use markets such as apparel. U.S. output of acrylic and cellulosic fibers fell sharply as major producers left those markets.

Production capacity in the U.S. manmade fiber industry expanded by 5 percent from 4.8 million metric tons in 1989 to 5.0 million metric tons in 1993. The increase was in polyolefin capacity, which grew by almost 26 percent, and polyester capacity, which grew by almost 9 percent. Additional capacity increases are planned for both these fibers. With demand for polyester likely to grow, the domestic industry plans to expand capacity by almost 7 percent by the end of 1995. Polyolefin capacity is also expected to continue increasing, with the carpet and rug market as the major driving force.[18]

Capacity utilization in the U.S. manmade fiber industry fell from 86 percent in 1989 to 84 percent in 1993. Because of weak demand and the buildup of capacity, the utilization rate for polyester declined from 90 percent in 1989 to 82 percent in 1993. Relatively high utilization rates were achieved in acrylic and cellulosic fibers during 1991-93, as the reduction in capacity brought supply more in line with market demand. Fluctuating nylon production capacity levels largely reflected the restructuring occurring in that market.

WORLD PRODUCTION AND PRODUCTION CAPACITY

Capacity and Production by Region

The single most significant trend in the world manmade fiber industry in recent years has been the rapid buildup of production capacity in the developing countries of Asia. While annual world manmade fiber production capacity increased by 10 percent during 1989-93, to 23.7 million metric tons, capacity in Asia, excluding Japan, expanded by 43 percent, to 9.3 million metric tons (table 3). China, Taiwan, and Korea accounted for most of the capacity growth in Asia, although Thailand and Indonesia recorded the fastest growth, albeit from much lower levels. Capacity increased in Thailand by 184 percent, to 529,000 metric tons in 1993, and in Indonesia by 167 percent, to just over 1 million metric tons.

Capacity increases in the Asian developing countries were offset, to a large extent, by reductions in other regions of the world. In Central Europe[19] and the Commonwealth of Independent States (C.I.S.), production capacity declined by 22 percent, reportedly due to the economic and political turmoil in that region. Capacity in the developed countries, primarily the United States, those in Western Europe, and Japan, rose by less than 2 percent between 1989 and 1993.

World manmade fiber production capacity is expected to increase by 14 percent during 1993-95.[20] Most of this increase is expected in the developing countries of Asia, particularly China, Korea, India, Indonesia, and Thailand. Capacity in the Asian developing countries is expected to increase by 25 percent. Capacity in Taiwan, the largest manmade fiber producing country in Asia, is expected to increase by only 5 percent during the period. Capacities in the United States and Western Europe are expected to increase by 7 percent and 6 percent, respectively.

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[17] U.S. Bureau of the Census, *1992 Census of Manufactures: Plastics Materials, Synthetic Rubber, and Manmade Fibers (Preliminary)*, May 1994.

[18] Information in this paragraph is mainly from Fiber Economics Bureau, Inc., *Fiber Organon*, June 1994.

[19] Central Europe primarily includes Bulgaria, the former Czechoslovakia, Hungary, Poland, Romania, and the former Yugoslavia.

[20] Capacity increases are planned for the period between March 1993 and December 1995. Fiber Economics Bureau, Inc., *Fiber Organon*, Aug. 1994.

Table 2
U.S. manmade fiber industry: Production, capacity, and capacity utilization, by fiber types, 1989-93

Item	1989	1990	1991	1992	1993	Percent change 1989-93
Polyester:						
Production (1,000 metric tons)	1,630	1,450	1,547	1,623	1,614	-1.0
Capacity (1,000 metric tons)	1,812	1,756	1,799	2,016	1,973	8.9
Capacity utilization (percent)	90	83	86	81	82	(1)
Nylon:						
Production (1,000 metric tons)	1,243	1,207	1,150	1,159	1,206	-3.0
Capacity (1,000 metric tons)	1,396	1,453	1,421	1,426	1,361	-2.5
Capacity utilization (percent)	89	83	81	81	89	(1)
Polyolefin:						
Production (1,000 metric tons)	729	821	834	894	959 31.6	
Capacity (1,000 metric tons)	936	1,026	1,060	1,105	1,175	25.5
Capacity utilization (percent)	78	80	79	81	82	(1)
Acrylic:						
Production (1,000 metric tons)	246	229	206	199	196	-20.3
Capacity (1,000 metric tons)	291	291	216	225	220	-24.4
Capacity utilization (percent)	85	79	95	88	89	(1)
Cellulosics:						
Production (1,000 metric tons)	263	229	221	225	229	-12.9
Capacity (1,000 metric tons)	327	245	249	247	265	-19.0
Capacity utilization (percent)	80	93	89	91	86	(1)
Total						
Production (1,000 metric tons)	4,111	3,936	3,958	4,100	4,204	2.3
Capacity (1,000 metric tons)	4,762	4,771	4,745	5,019	4,994	4.9
Capacity utilization (percent)	86	82	83	82	84	(1)

[1] Not applicable.

Note.—Production capacities are as of March of the specified year.

Source: Compiled by the staff of the U.S. International Trade Commission from Fiber Economics Bureau, Inc., *Fiber Organon* (Roseland, NJ: Fiber Economics Bureau, Inc., Aug. 1994 and selected back issues).

Table 3
World manmade fiber industry: Annual production and production capacity by selected countries and country groups, 1989-93

Country/group	1989	1990	1991	1992	1993	Percent change 1989-93
	1,000 metric tons					
United States:						
Production	3,383	3,115	3,124	3,205	3,245	-4.0
Production capacity	3,826	3,745	3,685	3,914	3,819	-0.2
Other Americas:						
Production	1,068	1,031	1,102	1,144	1,112	4.1
Production capacity	1,483	1,392	1,412	1,454	1,489	0.4
Western Europe:						
Production	3,119	3,168	3,072	3,213	3,048	-2.3
Production capacity	3,714	3,783	3,957	3,914	3,867	4.1
Central Europe[1] and the C.I.S.:						
Production	2,739	2,455	1,858	1,468	1,326	-51.6
Production capacity	3,470	3,384	2,989	2,830	2,701	-22.2
Japan:						
Production	1,654	1,701	1,696	1,703	1,610	-2.7
Production capacity	2,109	2,090	2,114	2,122	2,132	1.1
Taiwan:						
Production	1,671	1,769	1,991	2,183	2,254	34.9
Production capacity	1,886	1,996	2,180	2,298	2,532	34.3
Korea:						
Production	1,205	1,286	1,375	1,465	1,589	31.9
Production capacity	1,226	1,380	1,497	1,530	1,612	31.5
China:						
Production	1,427	1,557	1,701	1,804	1,908	33.7
Production capacity	1,615	1,842	1,980	2,139	2,327	44.1
Other Asia:						
Production	1,181	1,341	1,513	1,807	2,063	74.7
Production capacity	1,767	1,814	2,081	2,297	2,811	59.1
World:						
Production	17,690	17,671	17,693	18,252	18,428	4.2
Production capacity	21,501	21,814	22,286	22,897	23,716	10.3

[1] Central Europe primarily includes Bulgaria, the former Czechoslovakia, Hungary, Poland, Romania, and the former Yugoslavia. Prior to 1992, production data for the former East Germany were included under Central Europe.

Note.—Production and production capacities do not include polyolefin. Production capacities are as of March of the specified year.

Source: Compiled by the staff of the U.S. International Trade Commission from Fiber Economics Bureau, Inc., *Fiber Organon* (Roseland, NJ: Fiber Economics Bureau, Inc., Aug. 1994 and selected back issues).

World manmade fiber production rose by 4 percent during 1989-93 to 18.4 million metric tons (table 3). The United States remained the largest producer, accounting for 18 percent of 1993 output, followed by Western Europe, Taiwan, China, Japan, and Korea. Asian countries, excluding Japan, increased their share of world manmade fiber production from 31 percent in 1989 to 42 percent in 1993. In 1980, those countries accounted for just 15 percent of the total.

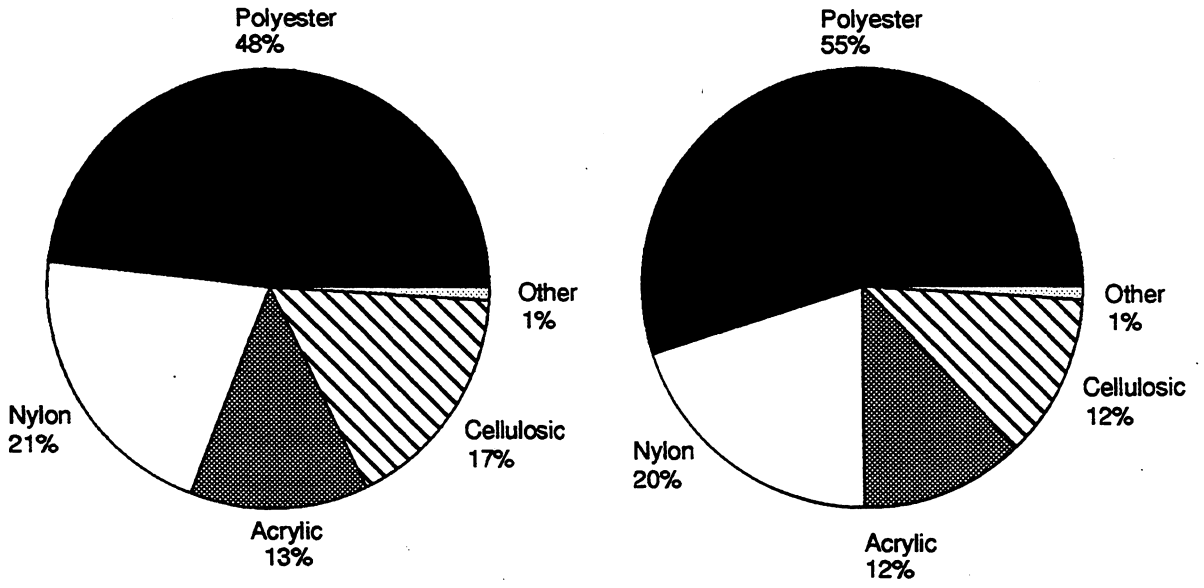
Capacity and Production by Fiber Type[21]

As in the United States, synthetics also dominate world manmade fiber production, accounting for 88 percent of total output in 1993 (figure 6). Synthetic fiber production, led by polyester, increased by 10 percent during 1989-93, to 16.2 million metric tons. In contrast, world cellulosic fiber production fell by almost 22 percent, to 2.2 million metric tons. Over the years, newer and stronger synthetic fibers have replaced cellulosics in many textile and industrial applications. In addition, during the past few years, environmental problems associated with the production of rayon has rendered many plants uneconomical to operate.

Polyolefin production is not included in total world synthetic production data above, due to inconsistencies in individual country reporting. However, available data indicate that world polyolefin production totaled roughly 3.2 million metric tons in 1993, an increase of 28 percent from 2.5 million metric tons in 1989.

[21] Information in this section is mainly from Fiber Economics Bureau, Inc., *Fiber Organon*, June and August 1994 reports.

Figure 6
Manmade fibers: World production by fibers, 1989 and 1993



Note.—Production does not include polyolefin.

Source: Compiled by the staff of the U.S. International Trade Commission from Fiber Economics Bureau, Inc., *Fiber Organon* (Roseland, NJ: Fiber Economics Bureau, Inc., June 1994).

Polyester accounted for 53 percent of total world manmade fiber capacity in 1993. Between 1989 and 1993, world polyester capacity increased by 23 percent to 12.5 million metric tons. Polyester capacity is expected to grow more than that for other manmade fibers during 1993-95, by 17 percent compared with increases of 6 to 8 percent for the other fibers. Polyester capacity became increasingly concentrated in the developing countries of Asia, which accounted for 52 percent of world capacity in 1993 (table 4), up from 43 percent in 1989. In 1993, Taiwan surpassed the United States as having the largest polyester production capacity in the world.

World nylon production increased by 8 percent between 1989 and 1993, to 5 million metric tons. The United States is the largest producer of nylon, accounting for 27 percent of world nylon capacity in 1993. The United States has the world's largest carpet industry, a major market for nylon. Nylon production remained fairly stable in the United States between 1989 and 1992, before dropping slightly in 1993. Production capacity in the developing countries of Asia increased by 50 percent during 1989-93 to 1.1 million metric tons, largely reflecting the further industrialization of these countries and their growing use and production of products incorporating nylon fibers.

World acrylic capacity fell by 2 percent between 1989 and 1993, to 2.9 million metric tons. This decline occurred primarily in Western Europe, Central Europe and the United States; capacities increased in the developing countries of Asia. Western Europe is the largest producer of acrylic, accounting for 34 percent of world capacity in 1993.

World cellulosic fiber capacity fell by 13 percent between 1989 and 1993, to 3 million metric tons. Much of this decrease occurred in Central Europe and the C.I.S., which accounted for 22 percent of world capacity in 1993. Cellulosic capacity in most other major producing countries has remained fairly stable after sizable reductions in the 1980s; however, capacity in Indonesia and India has increased significantly since 1989.

Table 4
World manmade fiber industry: Annual production capacity by selected countries and regions and by fiber types, 1993
(1,000 metric tons)

Fiber type	United States	Other Americas	Western Europe	Central Europe[1] & C.I.S.	Japan	China	Other Asia	World
Polyester	1,973	739	1,358	773	894	1,615	4,857	12,481
Nylon and aramid[2]	1,361	356	877	914	345	190	876	5,017
Acrylic	220	216	979	320	432	170	523	2,892
Other synthetic (except polyolefin)[3]	(4)	2	22	9	129	90	3	255
Cellulosics	265	176	631	685	332	262	696	3,071
Total	3,819	1,489	3,867	2,701	2,132	2,327	6,955	23,716

[1] Central Europe primarily includes Bulgaria, the former Czechoslovakia, Hungary, Poland, Romania, and the former Yugoslavia.
[2] Production capacity data for the United States include nylon only.
[3] "Other synthetic" includes azlon, spandex or elastomer, saran, TFE-flurocarbon, vinal, and vinyon
[4] In 1993 the United States had less than 1,000 metric tons of capacity, excluding that of spandex.

Note.—Production capacities are as of March 1993.

Source: Compiled by the staff of the U.S. International Trade Commission from Fiber Economics Bureau, Inc., *Fiber Organon* (Roseland, NJ: Fiber Economics Bureau, Inc., Aug. 1994).

FOREIGN INDUSTRY PROFILES

The structure of the manmade fiber industry differs significantly by country and region. Although similarities exist among the major producing countries, each has characteristics that reflect the influences of the markets that it serves. The industries in the United States, Taiwan, and Korea are high-volume producers of commodity fibers. The U.S. industry primarily serves the large domestic market, while those in Taiwan and Korea export much of their production. The industries in Japan and Western Europe focus more on lower volume, higher value specialty fibers, and plants in these countries are, on average, considerably smaller than those in the United States, Taiwan, and Korea (table 5). The Chinese manmade fiber industry, although large, is less developed and more fragmented than the other major world producers.

Manmade fiber producers in Asia, unlike those in the United States and Western Europe, generally have close organizational ties with fabric weavers and finishers. Fibers and textiles also account for 45 to 85 percent of sales of most large Japanese producers.[22] In the United States and Western Europe, many of the major producers are chemical companies and fibers account for less than 10 percent of these firms' total sales.

Western Europe[23]

Western Europe has the largest manmade fiber capacity in the world, although actual production is slightly less than that of the United States. Western Europe had 3.9 million metric tons of capacity and produced 3.0 million tons of manmade fibers in 1993. The industry consisted of 175 plants that year; the annual capacity of the plants averaged 22,000 metric tons. An additional 100-120 plants produced polyolefin fiber. Production facilities are concentrated in Germany, Italy, Turkey, and Spain, which together accounted for 72 percent of manmade fiber production capacity in Western Europe in 1993. Compared to the U.S. industry, the West European industry is relatively dispersed, most likely because (1) producers originally served smaller, single country markets and (2) the industry has a greater emphasis on lower volume specialty fibers. Many of the major producers in Western Europe, like those in the United States, are large multinational chemical companies and several are integrated back to petroleum exploration and refining. With the exception of some nylon filament yarn producers that are integrated into the production of carpets and hosiery, the West European industry has little downstream production.

Like their counterparts in the United States, West European producers also face a mature domestic market with low growth rates, high import penetration in major end-use markets, and growing imports of manmade fibers. In recent years, West European producers have also faced weak demand for their fibers due to economic recessions in Europe and other major world markets.[24]

Largely as a result of weak sales and tight profit margins, the West European industry underwent significant restructuring during 1989-93. Many firms closed inefficient production sites and consolidated operations into fewer, more efficient facilities. Some producers withdrew from certain fiber markets and others left the market altogether. Several operations were either sold or offered for joint ventures. In 1993, DuPont purchased ICI PLC's nylon fiber business, making the U.S.-based firm the largest nylon producer in Western Europe. Partially as a result of this restructuring, employment fell by 7 percent from 83,177 in 1989 to 77,527 in 1992.[25]

Japan

The manmade fiber industry in Japan is geared more toward the production of lower volume, higher value fibers than any other world producer. An estimated 50 percent of Japan's polyester production includes advanced products, compared with 40 percent in Western Europe and 30 percent in the United States, Korea, and Taiwan.[26] R&D spending in the manmade fiber industry of Japan averages 4.2 percent of total sales, compared with less than 1 percent for Taiwan and 5 percent for the United States.[27] In 1993, Japan had 20 plants producing specialty fibers, such as spandex, vinyon, and aramid, compared with 16 in Western Europe and 14 in the United States.[28] Japan is also the sole producer of several fibers, such as saran, promix, polyarylate, and polychlal.[29]

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[22] "International Competitiveness Strengthened Again: Japanese Synthetic Fiber Industry," *JTN - The International Textile Magazine* (Osaka, Japan), Aug. 1992, p. 23.

[23] Information in this section is mainly from The Economist Intelligence Unit, *The Man-made Fibre Industry in Western Europe*, Special Report No. M196 (United Kingdom: Textiles Intelligence Ltd., 1993).

[24] USITC staff interviews with manmade fiber industry officials.

[25] Fiber Economics Bureau, Inc., *Fiber Organon*, Mar. 1994.

[26] Japan Chemical Fibres Association, "Aiming at a Life-Culture-Creative Industry: The Synthetic Fiber Industry Vision for the 21st Century," *JTN - The International Textile Magazine* (Osaka, Japan), Mar. 1992, p. 92.

[27] P.T. Bangsberg, "Taiwan's Ailing Textiles Pins Hopes on Synthetics," *Journal of Commerce*, Oct. 25, 1993, p. 3.

[28] Fiber Economics Bureau, Inc., *World Directory of Manufactured Fiber Producers - 1994-95*.

[29] Ibid.

Table 5
World manmade fiber industry: Comparison of major producers, 1993

Factors	United States	Western Europe	Japan	Taiwan	Korea	China
Annual capacity (1,000 metric tons)[1]	3,819	3,867	2,132	2,532	1,612	2,327
Production (1,000 metric tons)	3,245	3,048	1,610	2,254	1,589	1,908
Capacity utilization[2] (percent)	84	78	75	89	92	77
Employment[3]	55,000	77,527	34,538	23,547	25,643	(4)
Productivity (metric tons per employee)[5]	58	41	33	93	57	(4)
Number of plants	94	175	73	32	28	181
Average plant size (1,000 metric tons)[2]	41	22	29	80	62	14

[1] Annual production capacity as of March 1993.
[2] Based on average of annual capacities reported on March 1993 and March 1994.
[3] Employment data for 1992 include all employees. U.S. employment estimated by the staff of the U.S. International Trade Commission based on official statistics of the U.S. Bureau of Labor Statistics.
[4] Not available.
[5] Based on 1992 employment and production volume.

Note.—Data for polyolefin production are not included in this table.

Source: Compiled by the staff of the U.S. International Trade Commission from Fiber Economics Bureau, Inc., *World Directory of Manufactured Fiber Producers - 1994-95* (Roseland, NJ: Fiber Economics Bureau, Inc.) and Fiber Organon, Aug. 1994 and selected back issues, except as noted.

Manmade fiber producers in Japan work closely with contract fabric weavers and finishers.[30] As a result, a significant portion of manmade filament fabric produced in Japan is contracted out and then distributed by the manmade fiber producers. These close ties to domestic fabric weavers and finishers likely have contributed greatly to Japanese producers' ability to develop new, more advanced products. Shin-gosen fabrics, which were developed in this integrated system, are among the most advanced synthetic fabrics in the world.[31]

Manmade fiber production in Japan grew by almost 3 percent during 1989-92 before falling by slightly more than 5 percent in 1993, largely reflecting the recession in the domestic market. Manmade fiber capacity is expected to increase by only 1 percent during 1993-95.[32] Manmade fiber imports are low in Japan, although imports of manmade fiber yarn, fabric, and finished textile and apparel products, mainly from China, have increased significantly in recent years.[33]

Japanese manmade fiber producers have significant investment in Malaysia, Thailand, and Indonesia. Japanese operations in these countries also tend to have cooperative arrangements with downstream fabric weavers and finishers; some also have upstream polymer production.[34] A large portion of the fabric produced by Japanese companies in these countries is exported to Europe and the Middle East, and more recently to China and Japan. Although Japan has no major manmade fiber production operations in China, several companies have established yarn spinning and fabric weaving mills in that country. These operations are generally supplied with fiber from Japan. As the Chinese textile industry becomes more developed, it is likely that Japanese producers will move fiber production to that country as well.[35]

Taiwan and Korea

The manmade fiber industries in Taiwan and Korea are high-volume producers of commodity fibers for export, either in the form of fiber or spun yarn and woven fabric. Exports accounted for 78 percent of Korea's total polyester filament production in 1990, with 83 percent of these exports in the form of woven fabric. Exports accounted for 94 percent of Korea's polyester staple production, with 53 percent of these exports in the form of yarn and fabric.[36] The declining competitiveness of yarn spinning in Korea in recent years likely has contributed to the larger share of direct polyester staple exports.

Largely due to the increasing production of commodity fibers in Asia, many producers in Taiwan and Korea have begun to diversify into higher value products, such as microfibers, tire cord yarns, flame retardant fibers, and spandex.[37] Producers also have increased fiber production in other countries in order to gain access to overseas markets. Much of this investment in foreign production has been in Asia, although a Taiwanese firm made a significant investment in polyester production in the United States in the early 1990s. Capacity is still expected to continue to increase significantly in Korea and to a lesser extent in Taiwan during 1993-95.

The manmade fiber industries in Taiwan and Korea are based largely on technology transferred from abroad, as well as on joint ventures with foreign producers. R&D expenditures in these industries are relatively low, averaging less than 2 percent of sales, compared with 4 to 5 percent in Japan and the United States.[38] Until recently, Taiwan and Korea also imported much of their raw materials for manmade fibers. However, due to the rapid expansion of manmade fiber production in these countries, domestic production of raw materials has increased. Much of the investment in raw material production has come from Western chemical companies. In 1991, Korea became self-sufficient in PTA, the major raw material for polyester.

China

The Chinese manmade fiber industry is the least developed of the major world manmade fiber producers, lagging behind in terms of product quality, production management, and labor productivity. The industry is highly fragmented and plants, on average, are less than one-fourth the size of those in Korea and Taiwan.

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[30] Information in this paragraph is based on USITC staff interview with an official of Japan's Ministry of International Trade and Industry (MITI) on Dec. 1, 1994.

[31] Shin-gosen fabrics incorporate advanced fibers and special weaving and finishing processes to achieve various performance characteristics and visual and tactile effects.

[32] Fiber Economics Bureau, Inc., *Fiber Organon*, Aug. 1994.

[33] Japan Chemical Fibres Association, *Man-made Fibers of Japan - 1994/1995* (Tokyo: Japan Chemical Fibres Association, 1994).

[34] "Synthetic Fiber Producers in Borderless Age," *JTN - The International Textile Magazine* (Osaka, Japan), Mar. 1993, pp. 18-20.

[35] Ibid.

[36] Data in this paragraph are from "Korean Textile Industry," *JTN - The International Textile Magazine* (Osaka, Japan), June 1991, pp. 91-94.

[37] See, for example, "Polyester in Korea," *Textile Asia*, Mar. 1993, pp. 129-31; "Rapid Expansion in Synthetic Fiber Facilities," *JTN - The International Textile Magazine* (Osaka, Japan), Feb. 1993, pp. 14-17; and "Prospects for Technical Textiles in Taiwan, South Korea, and China, *Technical Textile Markets* (United Kingdom: Textiles Intelligence Ltd., Jan. 1993).

[38] Soukil Mah, "Polyester in Korea," *Textile Asia*, Mar. 1993, p. 130, and P.T. Bangsberg, "Taiwan's Ailing Textiles Pins Hopes on Synthetics," *Journal of Commerce*, Oct. 25, 1993, p. 3.

The Chinese manmade fiber industry has undergone rapid growth in recent years. Between 1989 and 1993, the number of plants producing manmade fibers tripled from 59 to 181 and capacity increased by 44 percent from 1.6 million to 2.3 million metric tons. Most of the expansion occurred in the production of polyester, for which the number of plants increased from 20 in 1989 to 96 in 1993. The number of nylon plants also rose rapidly, from 12 to 56.[39]

China supplied 85 percent of its domestic manmade fiber consumption in 1991, up from 32 percent in 1980. China also supplied 82 percent of the raw materials used by its manmade fiber industry in 1991, up from 40 percent in 1980.[40]

China's manmade fiber industry has depended largely on the purchasing and licensing of fiber and raw material technology from major chemical and engineering companies in the developed countries.[41] Foreign direct investment in China's manmade fiber industry is relatively low. In the past, much of the foreign investment in China's fiber/textile/apparel complex has been in less capital-intensive downstream operations, particularly in cotton and wool textile and apparel production. However, because of China's large and rapidly growing market for fibers, there has been increased interest in manmade fiber production in China by foreign producers. Furthermore, China's less stringent environmental controls and abundant raw materials are likely to favor future foreign investment in manmade fiber production there.

Canada and Mexico

The manmade fiber industries in Canada and Mexico are relatively small, together accounting for less than one-fifth of the capacity of that in the United States. However, the Canadian and Mexican industries play a major role in the U.S. industry's overall global network. Through production sites in these countries, U.S. producers supply the local markets, as well as that of the United States and other countries in the region.

U.S.-based or controlled manmade fiber producers dominate the Canadian industry. Hoechst Celanese is the sole producer of polyester and acetate in Canada and DuPont is the only producer of spandex. BASF, DuPont, and Bridgestone/Firestone, Inc. account for most of the nylon production. As a result, the structure of the industry in Canada greatly resembles that in the United States, but on a smaller scale. Most U.S. trade with Canada in manmade fibers consists of intracompany transfers between the U.S. parent companies and their Canadian affiliates. In 1993, the United States accounted for 73 percent of Canada's manmade fiber imports and 68 percent of its exports.[42]

U.S. producers also have a major presence in the Mexican industry. DuPont and Hoechst Celanese are major producers of nylon and polyester in Mexico. DuPont is also the sole producer of spandex. Major producers in Mexico, including U.S. affiliates and those owned locally, have large, highly efficient operations, and are integrated back into petrochemicals.[43] The major acrylic producer, which is locally owned, is integrated downstream into the production of finished apparel, such as socks and sweaters. As with U.S. trade with Canada, intracompany transfers also account for a significant share of U.S. trade with Mexico in manmade fibers.[44]

Manmade fiber production capacity in Mexico grew by 18 percent during 1989-94.[45] This growth reportedly was encouraged, in part, by the prospects for increased demand resulting from the North American Free-Trade Agreement (NAFTA). Eventual tariff elimination on Mexican exports under NAFTA is expected to encourage increased manmade fiber shipments to the United States, but more significantly, it is expected to provide Mexican-produced textile and apparel products a competitive advantage over Asian-produced goods in the U.S. market.[46] The likely result would be increased demand for manmade fibers by downstream textile and apparel production in Mexico. Regional trade has also increase in recent years and preferential trade agreements between Mexico and other Latin American countries would likely encourage increased demand for Mexican manmade fibers.

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[39] Data in paragraph reported in Fiber Economics Bureau, Inc., *World Directory of Manufactured Fiber Producers - 1994-95*.

[40] Data in paragraph reported in Josephine Bow, "Competition, Bad Economy Threaten Rapid Growth of China's M-MF Biz," *Daily News Record*, Mar. 9, 1994, p. 9.

[41] Information in this paragraph is mainly from "China Stresses Industrial Uses," *Textile Asia*, July 1994, pp. 118-22; "Prospects for Technical Textiles in Taiwan, South Korea, and China, *Technical Textile Markets* (United Kingdom: Textiles Intelligence Ltd., Jan. 1993), pp. 53-57; and Josephine Bow, "Competition, Bad Economy Threaten Rapid Growth of China's M-MF Biz," *Daily News Record*, Mar. 9, 1994, p. 9.

[42] Fiber Economics Bureau, Inc., *Fiber Organon*, Apr. 1994.

[43] USITC staff interviews with manmade fiber industry officials.

[44] Ibid.

[45] Fiber Economics Bureau, Inc., *Fiber Organon*, Dec. 1994, p. 256.

[46] See, for example, U.S. International Trade Commission, *Potential Impact on the U.S. Economy and Selected Industries of the North American Free-Trade Agreement*, USITC publication 2596, Jan. 1993, pp. 8-1 to 8-6.

U.S. MARKET

The United States is the world's largest single-country market for manmade fibers, accounting for 17 percent of total consumption in 1992. U.S. consumption of manmade fibers rose by 11 percent during 1989-93 to almost 4.7 million metric tons. By value, however, U.S. consumption fell by 3 percent during the period to $12.1 billion (table 6). This decline was partially due to weak domestic prices and the increased use of lower priced imported fibers.

U.S. producers supply all but a small share of apparent U.S. consumption of manmade fibers, although imports doubled their share of the market during 1989-93 to an estimated 9.3 percent (table 6). U.S. producers benefit from proximity to U.S. customers, which not only allows for lower transportation costs, but also facilitates better customer service and quicker response to market changes. Customer service and quick response likely will continue to gain in importance in the manmade fiber industry, as major downstream customers adopt new technology and production methods to reduce the time and cost of producing textile and apparel products in the United States.

Consumer Characteristics and Factors Affecting Demand

Demand for manmade fibers during 1989-93 rose in the two largest end-use markets, carpets and rugs and industrial and miscellaneous consumer products (figure 7). Demand either fell or remained flat in the other two major markets, apparel and home textiles. The growth in demand for carpets and rugs in 1992 and 1993 largely reflected increased spending on carpeting for replacement and for new homes and commercial buildings. Increased sales of U.S.-produced automobiles[47] and increased activity in the construction industry accounted for a large portion of the increased demand for manmade fibers in the industrial market. U.S. automobile imports, which generally incorporate less U.S. manmade fibers than do domestic autos, have fallen significantly during 1989-93.

With the exception of automobiles, imports generally have little impact on U.S. demand for manmade fibers in the carpet and rug market and the industrial and miscellaneous consumer goods market. Imports in these markets tend to be limited by the relatively high costs involved in shipping and by technical requirements and certification processes required in many of the end uses.

Manmade fibers dominate the carpet and rug market and the industrial and miscellaneous consumer goods market, accounting for 99 percent of the total fibers used in the former and 88 percent in the latter in 1993.[48] The development of new or improved manmade fibers and end-use applications has been a major factor in the growing demand for manmade fibers in these markets. In the carpet and rug market, manmade fiber producers have developed many fibers with special properties designed specifically for that market. The more significant recent developments include stain-resistant and crush-resistant carpet fibers and yarns. New industrial applications for manmade fibers include air bags in cars.

[47] Roughly 20 percent of the industrial and miscellaneous consumer products market is accounted for by the automotive market, which includes fibers and yarns for reinforcement in automotive tires, hoses, and belts and in seat belts and car seat upholstery.

[48] National Cotton Council of America, *Cotton Counts Its Customers* (Memphis, TN), 1994 ed.

Table 6
Manmade fibers: U.S. shipments, exports of domestic merchandise, imports for consumption, and apparent U.S. consumption, 1989-93

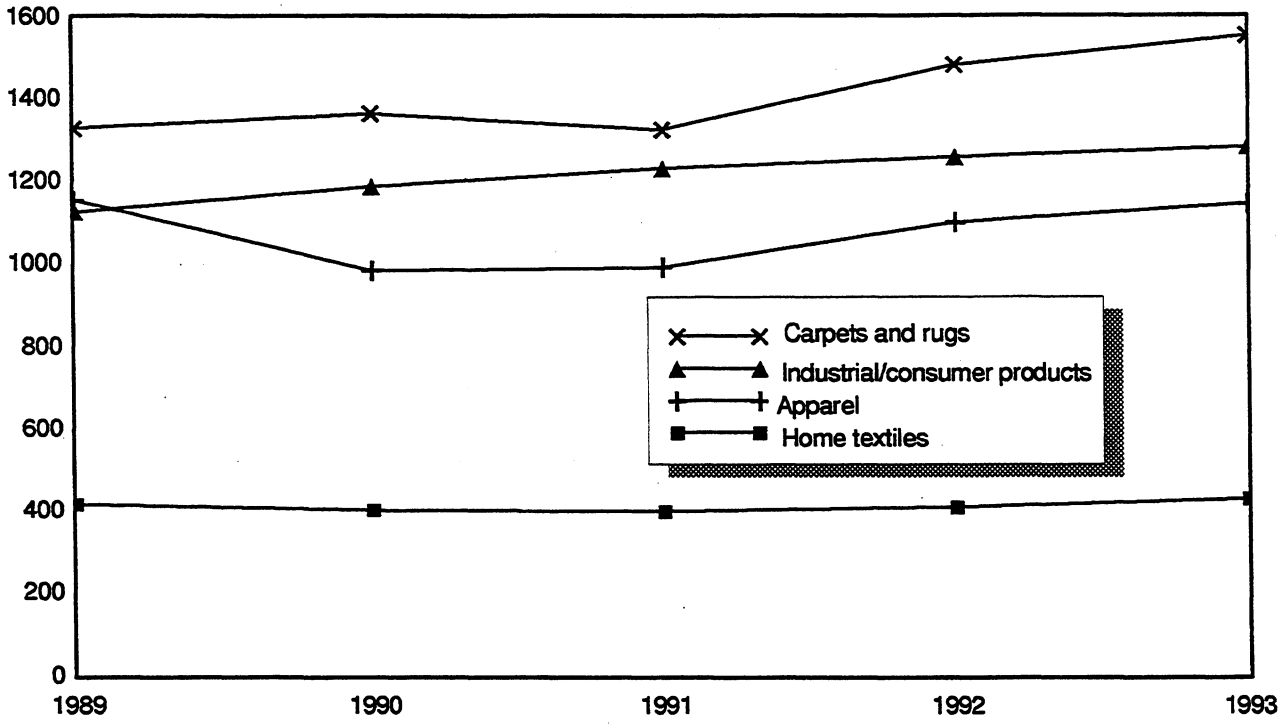
Year	U.S. shipments[1]	U.S. Exports	U.S. Imports	Apparent U.S. consumption	Ratio of imports to consumption
	Million dollars				*Percent*
1989	13,265.7	1,419.2	580.3	12,426.8	4.6
1990	12,883.8	1,570.3	699.8	12,013.3	5.8
1991	12,580.5	1,608.3	779.9	11,752.1	6.6
1992	12,862.0	1,434.3	899.5	12,327.2	7.3
1993	[1]12,350.0	1,393.2	1,125.7	[1]12,082.5	[1]9.3

[1] Estimated by the staff of the U.S. International Trade Commission.

Source: Compiled from official statistics of the U.S. Department of Commerce, except as noted.

Figure 7
Manmade fibers: U.S. end-use markets, 1989–93

Thousand metric tons



Source: Compiled by the staff of the U.S. International Trade Commission from Fiber Economics Bureau, Inc., *Fiber Organon* (Roseland, NJ: Fiber Economics Bureau, Inc., Sept. 1994).

The apparel and home textiles markets accounted for a combined 34 percent of U.S. manmade fiber shipments in 1993. Manmade fiber use in the apparel market fell by 14 percent during 1990-91 to slightly below 1 million metric tons, before rebounding in 1992 to 1.1 million metric tons. Manmade fiber usage in the home textiles market remained relatively unchanged during 1989-93 (figure 7). The sluggish demand for manmade fibers in these markets reflected, to a large extent, the generally weak retail market. Demand for manmade fibers in the apparel market and, to a lesser extent, in the home textiles market was also affected by imports and by consumer demand for cotton products.

Real growth in consumer spending on clothing during 1989-93 slowed considerably from that during 1980-89.[49] Much of the additional spending likely was on imported apparel and on apparel made of fibers other than manmade. Cotton accounted for most of the growth in demand for fiber in the U.S. apparel and home textiles markets during 1989-93. In apparel, cotton accounted for 65 percent of total fiber use in 1993, up from 57 percent in 1989.[50] Cotton's strength in this market was primarily due to the continued popularity of knit apparel, particularly T-shirts, and denim jeans. Cotton also got a boost in 1993 from the nation-wide promotion of 100-percent cotton, wrinkle-resistant pants for men. Similarly, the use of cotton in home textiles increased from 53 percent in 1989 to 58 percent in 1993.[51]

U.S. Tariff and Nontariff Measures

The principal U.S. trade measures for manmade fibers are import tariffs listed in the Harmonized Tariff Schedule of the United States (HTS).[52] In 1994, U.S. column 1 rates of duty on imports of manmade fibers ranged from 2.1 to 13 percent ad valorem. Under the Uruguay Round Agreement (URA), which entered into force on January 1, 1995, the United States agreed to reduce tariffs on manmade fibers over a 10-year

[49] U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, July 1994 and selected back issues.

[50] National Cotton Council of America, *Cotton Counts Its Customers*, 1992 and 1994.

[51] Ibid. Data for home textiles were calculated by subtracting the data for carpets and rugs from that of home furnishings.

[52] See appendix A for an explanation of tariff and trade agreement terms.

period to a range of free to 8.8 percent ad valorem.[53, 54] The U.S. rates of duty for manmade fibers in 1995 are shown in appendix B.

On January 1, 1994, the United States, Canada, and Mexico implemented NAFTA.[55] Under NAFTA, U.S. tariffs on several manmade fibers produced in Mexico and meeting NAFTA rules of origin were immediately eliminated. Tariffs on most of the remaining manmade fibers from Mexico will be phased out by January 1, 1999. The phaseout of U.S. duties on imports of manmade fibers from Canada began in 1989 under the United States-Canada Free Trade Agreement (CFTA), the duty phaseout schedules of which were incorporated in and continued under NAFTA. Other preferential trade agreements that have resulted in lower U.S. duties for certain countries are listed in appendix B.

Quotas are the principal U.S. nontariff measure relating to textile products, including some manmade fibers. Bilateral quota agreements negotiated under the Multifiber Arrangement (MFA) governed most U.S. imports of textile products until it expired on December 31, 1994. Under the MFA, developed countries negotiated bilateral agreements with exporting developing countries for the purpose of setting quotas and quota growth rates for textile and apparel products of cotton, other vegetable fibers, wool, manmade fibers, and silk blends. These quotas are being phased out over a 10-year period under the Uruguay Round Agreement on Textiles and Clothing.[56] In 1993 the United States did not have any quotas specifically on imports of manmade fibers.

Trade-Related Investigations

The U.S. International Trade Commission conducted two antidumping investigations on imports of manmade fibers during 1990-94: (1) high-tenacity rayon-filament yarn from Germany (investigation No. 731-TA-530, USITC publication 2525 (June 1992)) and (2) aramid fiber formed of poly para-phenylene terephthalamide from the Netherlands (investigation No. 731-TA-652, USITC publication 2783 (June 1993)). In both cases, the Commission made affirmative final determinations that the respective domestic industry was materially injured by imports that the U.S. Department of Commerce had found were being sold in the United States at less than fair value (LTFV) (i.e., dumped). As a result of the Commission's determinations, Commerce issued antidumping orders.[57]

U.S. Imports

U.S. imports almost doubled during 1989-93 to just over $1.1 billion in 1993 (table 7). Although imports from all the major suppliers increased during the period, most of the growth involved intracompany transfers of U.S. producers in Canada and Mexico. Market conditions were also better in the United States relative to those in Europe and Japan, where economic recessions led to reduced fiber demand. As a result, manmade fiber producers throughout the world focused more on the U.S. market for sales opportunities. Also, an oversupply of polyester fiber in Asia likely led to the sharp increase in U.S. imports from Korea and Taiwan.[58]

Canada is the largest single-country supplier of manmade fibers to the United States, accounting for 24 percent of the value of total imports in 1993 (table 7). Between 1989 and 1993, imports from Canada increased by 133 percent, although most of this growth occurred during the first years of reduced tariffs under the CFTA.

Manmade fiber imports from Mexico increased by 70 percent during 1989-93 to nearly $74 million (table 7). Imports from Mexico are expected to continue to increase, largely reflecting an increase in manmade fiber capacity by U.S. producers there. In the past year, Hoechst Celanese moved its polyester carpet yarn production to Mexico and plans to supply the U.S. market from its Mexican facility. Among other things, the prospect of free trade between Mexico and the United States under NAFTA likely encouraged such shifts in production.[59]

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[53] The United States did not cut tariffs for filament yarn of viscose rayon, which will remain at 9.1 and 10 percent ad valorem.

[54] The United States implemented the URA through the enactment of the Uruguay Round Agreements Act, Public Law 103-465, approved on December 8, 1994. For more information on the URA, see U.S. International Trade Commission (USITC), *Potential Impact on the U.S. Economy and Industries of the GATT Uruguay Round Agreements (investigation No. 332-353)*, USITC publication 2790, June 1994.

[55] The United States implemented NAFTA through the enactment of the North American Free Trade Agreement Implementation Act, Public Law 103-182, approved on December 8, 1993.

[56] For an explanation of the Uruguay Round Agreement on Textiles and Clothing, see the Statement of Administrative Action, at p. 108, submitted to the Congress by the Administration with the Uruguay Round Agreements Act. The Statement was approved by the Congress when it passed the legislation.

[57] Under the antidumping law, Commerce issues an antidumping order when (1) Commerce has found that merchandise is being sold in the United States at LTFV and (2) the Commission has found that an industry is materially injured or threatened with material injury, or the establishment of an industry is materially retarded, by reason of such LTFV sales. Dumping duties equal to the margin of dumping are then collected. See 57 F.R. 21770, May 22, 1992 and 59 F.R. 23684, May 6, 1994.

[58] USITC staff interviews with manmade fiber industry officials.

[59] Ibid.

Table 7
Manmade fibers: U.S. imports for consumption, by principal sources, 1989-93[1]

Source	1989	1990	1991	1992	1993
	Quantity (1,000 kilograms)				
Canada	52,126	63,900	74,319	88,506	87,108
Germany	26,426	24,095	25,023	27,995	43,146
Japan	19,342	19,448	20,522	25,013	28,384
United Kingdom	20,108	22,794	21,926	27,434	34,602
Korea	21,464	24,478	34,265	57,907	72,199
Taiwan	16,613	20,777	24,598	39,205	58,684
Mexico	21,950	26,711	24,289	29,405	40,878
Austria	2,303	7,261	7,965	6,666	17,079
Netherlands	4,379	4,189	3,523	3,910	5,299
France	7,897	8,966	7,376	6,970	8,041
All other	24,998	38,323	29,252	36,587	54,236
Total	217,606	260,940	273,059	349,597	449,654
	Value (1,000 dollars)				
Canada	115,402	171,803	221,367	252,303	268,670
Germany	92,151	94,875	98,010	99,751	145,898
Japan	84,681	80,807	95,184	108,089	116,891
United Kingdom	64,998	75,845	83,285	91,470	101,721
Korea	28,498	29,022	44,281	71,054	88,330
Taiwan	30,634	33,456	34,643	48,759	73,700
Mexico	43,224	42,003	41,806	47,746	73,639
Austria	7,210	21,481	24,824	22,258	44,034
Netherlands	13,951	19,228	28,503	30,772	38,157
France	26,441	30,406	24,623	26,011	29,317
All other	73,074	100,899	83,367	101,292	145,392
Total	580,265	699,826	779,894	899,503	1,125,747
	Unit value (per kilogram)				
Canada	$2.21	$2.69	$2.98	$2.85	$3.08
Germany	3.49	3.94	3.92	3.56	3.38
Japan	4.38	4.16	4.64	4.32	4.12
United Kingdom	3.23	3.33	3.80	3.33	2.94
Korea	1.33	1.19	1.29	1.23	1.22
Taiwan	1.84	1.61	1.41	1.24	1.26
Mexico	1.97	1.57	1.72	1.62	1.80
Austria	3.13	2.96	3.12	3.34	2.58
Netherlands	3.19	4.59	8.09	7.87	7.20
France	3.35	3.39	3.34	3.73	3.65
All other	2.92	2.63	2.85	2.77	2.68
Average	2.67	2.68	2.86	2.57	2.50

[1] Import values are based on customs value. U.S. trade with the former East Germany is included in "Germany."

Note.—Because of rounding, figures may not add to the totals shown.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Manmade fiber imports from Western Europe increased by 83 percent during 1989-93 to $436 million. These imports were largely supplied by Germany, the United Kingdom, and Austria (table 7). A major part of the increase in imports from these three countries consisted of rayon. Fiber imports from the major suppliers in Western Europe during 1989-93 were, on average, moderately priced compared with total fiber imports. The principal exception was imports from the Netherlands, which largely comprised higher priced specialty fibers such as aramids and other industrial fibers.

As indicated in table 9, imports of manmade fibers from Asia almost doubled from $157 million in 1989 to $307 million in 1993. Shipments from Japan, the largest Asian supplier in terms of value, have steadily increased since 1990; they consisted mostly of higher value specialty fibers. Imports from Korea and Taiwan, the second and third largest volume suppliers, respectively, after Canada in 1993, consisted largely of commodity fibers, especially polyester staple. Falling average unit values for imports from Taiwan most likely reflected price cuts resulting from the large buildup of polyester capacity in Asia.[60] The growth in imports from Asia is expected to slow down in 1994, reflecting the increasing demand for polyester in that region.

[60] Ibid.

U.S. manmade fiber imports consisted largely of polyester staple and high tenacity nylon filament. Polyester staple imports were mostly from Korea and Taiwan, which have significantly expanded their shipments of this product since 1989. Nylon filament imports were almost evenly split between Canada and Western Europe.

FOREIGN MARKETS

World consumption of all textile fibers has shown little growth in recent years, rising from 38.1 billion metric tons in 1989 to 38.2 billion metric tons in 1992.[61] Manmade fibers (excluding polyolefin) accounted for 48 percent, or 18.3 billion metric tons, of 1992 world fiber consumption. Natural fibers, primarily cotton, accounted for the remainder.

The developed countries accounted for 45 percent of world manmade fiber consumption in 1992.[62] Western Europe accounted for 18 percent of world manmade fiber consumption in 1993 and the United States, 17 percent. Manmade fibers generally represent a higher portion of fiber consumption in the developed countries than in the developing countries, accounting for 59 percent of total fiber consumption in the United States, 66 percent in Western Europe, and 68 percent in Japan. Consumption of manmade fibers was also high in Taiwan and Korea, reflecting their relatively developed economies, as well as the large quantity of manmade-fiber textile and apparel products that these countries export. Asia, excluding Japan, accounted for 39 percent of the world manmade fiber consumption in 1992, up from 32 percent in 1989.

Future growth in world demand is likely to occur largely in the developing countries.[63] Growth in demand depends on long-term patterns of population and income increases in these countries. At higher income levels, people consume more fibers in the form of apparel, home textiles, and other consumer goods. As discretionary income increases, consumers also demand higher quality fibers and more variety. Furthermore, as these countries become more industrialized, consumption of industrial textiles, largely of manmade fibers, will increase. Little growth is expected in the mature markets of the United States, Japan, and Western Europe.

[61] Fiber Economics Bureau, Inc., *Fiber Organon*, Jan. 1994 and selected back issues.
[62] Ibid.
[63] See, for example, "Outlook for the U.S. Man-Made Fibre Industry," *Technical Textile Markets* (United Kingdom: Textiles Intelligence Ltd., Jan. 1995), and "Fiber Companies Are Moving on a Fast Track," *Textile World* (Chicago: Maclean Hunter Publishing Co.), May 1994, p. 57.

The major world markets for manmade fibers, with the exception of China, are relatively self-sufficient. Many developing countries with sizable textile and apparel industries generally rely on imported manmade fibers. For the most part, those in Asia are supplied by Korea and Taiwan.

Foreign Tariff and Nontariff Measures

Tariffs are the principal trade barrier affecting U.S. exports of manmade fibers in major world markets. Canada and Mexico, the two largest foreign markets for U.S. exports, are phasing out their tariffs on U.S. goods under NAFTA. Canada began to phase out its tariffs on U.S. products in 1989, when the CFTA entered into force. In 1994, Canada's tariff rates on manmade fibers from the United States ranged from free to 8 percent ad valorem plus 8 cents per kilogram. Under NAFTA, Mexico's duties on U.S. manmade fibers are being phased out over 6 to 10 years. In 1994, Mexico's tariffs on U.S. manmade fiber imports ranged from free to 11.3 percent ad valorem.

Under the Uruguay Round Agreement, major U.S. trading partners have agreed to reduce their ad valorem tariff rates on manmade fibers as follows:

Country	Pre-URA tariff rates	Post-URA (2004) tariff rates
European Union	3.8% - 9.5%	4%
China.	50% - 90%	[1]
Hong Kong	Free	Free
Korea.	20% - 50%	2% - 30%
Japan	Free - 10%	Free - 7%
Australia	2% - 40%	1% - 20%

[1] Not available.

Developing countries with relatively new manmade fiber industries tend to apply more restrictive barriers to imports. In the past, India has prohibited imports of certain fibers and had rates of duty ranging from 100 percent to 175 percent ad valorem.

U.S. Exports

Since U.S. manmade fiber producers focus primarily on the U.S. market, exports have accounted for only 11 to 12 percent of U.S. manmade fiber shipments in recent years. Many large U.S. producers that serve foreign markets do so from overseas operations, and it is expected that foreign markets primarily will continue to be served from regional production sites rather than from the United States

U.S. exports of manmade fibers declined continuously during 1989-92 before rebounding sharply in 1993 to a record 374,000 metric tons (table 8). The value of exports showed divergent trends, however, increasing to a high of $1.6 billion in 1991,

Table 8
Manmade fibers: U.S. exports of domestic merchandise, by principal markets, 1989-93[1]

Market	1989	1990	1991	1992	1993
	Quantity (1,000 kilograms)[2]				
Canada	58,678	66,388	74,418	82,095	110,835
Belgium	24,188	29,239	24,715	34,860	34,264
Mexico	26,053	29,198	26,511	21,748	19,668
China	18,783	17,036	17,046	10,645	11,910
Hong Kong	12,942	12,431	10,321	11,037	10,767
Korea	17,209	15,090	15,968	13,562	14,582
Japan	1,954	3,920	5,593	2,355	12,824
Australia	4,776	3,993	3,461	8,260	8,597
Germany	5,038	6,153	8,231	7,981	20,647
Netherlands	18,690	4,374	7,417	7,352	16,256
All other	179,960	176,279	167,544	135,581	113,350
Total	368,272	364,100	361,224	335,476	373,699
	Value (1,000 dollars)				
Canada	171,959	217,158	240,778	260,244	315,271
Belgium	175,315	175,515	159,964	126,831	99,488
Mexico	62,822	74,242	70,976	93,493	88,335
China	102,783	97,573	105,507	83,405	75,606
Hong Kong	51,477	74,113	118,338	83,562	66,868
Korea	61,750	60,477	60,198	61,051	62,929
Japan	70,922	66,838	72,979	47,167	60,853
Australia	66,320	63,266	55,606	58,925	57,747
Germany	73,361	89,930	73,825	51,882	48,693
Netherlands	44,301	45,485	52,724	55,639	45,986
All other	538,175	605,715	597,371	512,076	471,467
Total	1,419,184	1,570,311	1,608,265	1,434,276	1,393,245
	Unit value (per kilogram)				
Canada	$2.88	$3.24	$3.20	$3.13	$2.81
Belgium	2.59	2.54	2.86	2.63	2.57
Mexico	5.01	4.70	5.04	5.17	4.13
China	3.78	3.91	4.27	4.42	5.10
Hong Kong	4.48	4.42	4.52	4.45	4.36
Korea	2.68	3.02	2.92	2.90	2.87
Japan	4.59	4.15	3.12	6.88	2.41
Australia	3.64	7.97	6.00	3.95	3.08
Germany	2.54	1.55	1.64	1.65	1.14
Netherlands	1.48	2.28	2.31	1.85	1.42
All other	2.25	2.37	2.42	2.53	2.44
Average	2.74	2.96	3.00	3.03	2.71

[1] Export values are based on f.a.s. value, U.S. port of export. U.S. trade with the former East Germany is included in "Germany."

[2] Does not include exports under HTS subheadings 5403.33.00 and 5502.00.00, for which no quantity data are reported.

Note.—Because of rounding, figures may not add to the totals shown.

Source: Compiled from official statistics of the U.S. Department of Commerce.

and then decreasing to just under $1.4 billion in 1993. U.S. exports consisted primarily of nylon and polyester filament yarn and polyester staple.

The largest U.S. export market is Canada, which accounted for 111,000 metric tons, or 30 percent of total exports, in 1993 (table 8). U.S. exports to Canada grew by 89 percent between 1989 and 1993. Exports to Mexico, the third largest single-country market for U.S. manmade fibers, peaked at 29,000 metric tons in 1990 before falling to just under 20,000 metric tons in 1993. This decline largely reflected the buildup of capacity of U.S. affiliates in Mexico and the weak textile market in that country. Exports to Mexico were largely polyester staple.

U.S. manmade fiber exports to Western Europe have fallen sharply in recent years, declining by 38 percent from $520 million in 1990 to $323 million in 1993. Demand for U.S. fibers in Western Europe was affected mainly by the recession in the region. Belgium and Germany accounted for a large part of the decline in U.S. manmade fiber exports to Western Europe (table 8). U.S. exports to Asia peaked at $509 million

in 1991 and then declined to $406 million in 1993. Major Asian markets included China, Hong Kong, Korea, and Japan. Falling exports to Asia reflected the weak economy in Japan, as well as the growing fiber producing capacities in other Asian countries.

Export opportunities for the U.S. industry may increase in the developing countries as consumption of manmade fibers grows and as these countries liberalize their tariff and non-tariff barriers.

U.S. TRADE BALANCE

The U.S. trade surplus in manmade fibers has fallen sharply in recent years as imports rose to successively higher record levels during 1989-93 and exports fell to their lowest level in at least 5 years. The U.S. trade surplus in manmade fibers declined from its peak of $870 million in 1990 to $267 million in 1993 (table 9). This decrease is believed to have occurred mainly because economic activity in the United States gained strength while demand for manmade fibers in many major U.S. export markets remained weak.[64]

On a geographic basis, the reduction in the U.S. trade surplus was broad based. The U.S. trade balance with Western Europe deteriorated by $356 million during 1989-93, as U.S. imports rose by 83 percent, or by $197 million, and U.S. exports fell by 33 percent, or by $159 million. The U.S. trade surplus with Asia also declined sharply during 1989-93, falling by 67 percent, or by roughly $200 million. Declining prices led to substantial growth in U.S. imports from Korea and Taiwan. The United States posted a trade surplus with Korea of slightly more than $30 million in 1989 and 1990, but incurred a trade deficit of $25 million in 1993. The United States had a trade deficit of less than $1 million with Taiwan in 1989; by 1993 the deficit had widened to nearly $50 million. The U.S. trade balance with the other major Asian trading partners, Japan and China, also deteriorated during 1989-93. The trade deficit with Japan widened as a result of an increase in U.S. imports and a decrease in U.S. exports while the surplus with China fell mostly because of a drop in U.S. exports.

The U.S. trade surpluses in manmade fibers with Canada and Mexico fluctuated widely during 1989-93. U.S. bilateral trade with Canada rose steadily in both directions, though a big gain in U.S. exports in 1993 pushed the U.S. trade surplus higher. The trade surplus with Mexico of just under $15 million in 1993 was the smallest bilateral surplus during 1989-93, largely reflecting a surge in U.S. imports. A major portion of bilateral trade with these two countries involved intracompany transfers.

[64] The Economist Intelligence Unit, *Textiles Intelligence - Technical Textile Markets* (United Kingdom: Textile Intelligence Ltd.), Jan. 1995.

Table 9
Manmade fibers: U.S. exports of domestic merchandise, imports for consumption, and merchandise trade balance, by selected countries and country groups, 1989-93[1]

(1,000 dollars)

Item	1989	1990	1991	1992	1993
U.S. exports of domestic merchandise:					
Canada	171,959	217,158	240,778	260,244	315,271
Germany	73,714	90,334	73,825	51,882	48,693
Japan	70,922	66,838	72,979	47,167	60,853
Mexico	62,822	74,242	70,976	93,493	88,335
Korea	61,750	60,477	60,198	61,051	62,929
United Kingdom	46,888	47,728	50,210	44,387	44,112
Belgium	175,315	175,515	159,964	126,831	99,488
Taiwan	30,435	21,112	28,162	26,994	24,074
Netherlands	44,301	45,485	52,724	55,639	45,986
China	102,783	97,573	105,507	83,405	75,606
All other	578,295	673,849	692,943	583,182	527,897
Total	1,419,184	1,570,311	1,608,265	1,434,276	1,393,245
OECD	797,476	871,861	862,017	764,618	761,719
Western Europe	481,347	519,565	489,431	392,481	322,627
Asia	457,718	467,186	509,331	427,231	405,851
U.S. imports for consumption:					
Canada	115,402	171,803	221,367	252,303	268,670
Germany	92,447	94,875	98,010	99,751	145,898
Japan	84,681	80,807	95,184	108,089	116,891
Mexico	43,224	42,003	41,806	47,746	73,639
Korea	28,498	29,022	44,281	71,054	88,330
United Kingdom	64,998	75,845	83,285	91,470	101,721
Belgium	8,652	8,273	3,528	4,469	6,224
Taiwan	30,634	33,456	34,643	48,759	73,700
Netherlands	13,951	19,228	28,503	30,772	38,157
China	1,419	1,222	2,463	1,211	1,109
All other	96,357	143,290	126,823	143,882	211,410
Total	580,265	699,826	779,894	899,503	1,125,747
OECD	439,586	538,792	616,370	679,037	821,451
Western Europe	238,273	287,127	302,520	318,990	435,753
Asia	157,383	69,877	196,698	252,490	307,094
U.S. merchandise trade balance:					
Canada	56,557	45,355	19,411	7,941	46,601
Germany	-18,733	-4,541	-24,185	-47,869	-97,205
Japan	-13,759	-13,969	-22,205	-60,922	-56,038
Mexico	19,598	32,239	29,170	45,747	14,696
Korea	33,252	31,455	15,917	-10,003	-25,401
United Kingdom	-18,110	-28,117	-33,075	-47,083	-57,609
Belgium	166,663	167,242	156,436	122,362	93,264
Taiwan	-199	-12,344	-6,481	-21,765	-49,626
Netherlands	30,350	26,257	24,221	24,867	7,829
China	101,364	96,351	103,044	82,194	74,497
All other	481,938	530,559	566,120	439,300	316,487
Total	838,919	870,485	808,371	534,773	267,498
OECD	357,890	333,069	245,647	85,581	-59,732
Western Europe	243,074	232,438	186,911	73,491	-113,126
Asia	300,335	297,309	312,633	174,741	98,757

[1] Import values are based on customs value; export values are based on f.a.s. value, U.S. port of export. U.S. trade with the former East Germany is included in "Germany."

Note.—The countries shown are those with the largest total U.S. trade (U.S. imports plus exports in these products).

Source: Compiled from official statistics of the U.S. Department of Commerce.

APPENDIX A
EXPLANATION OF TARIFF AND TRADE AGREEMENT TERMS

The ***Harmonized Tariff Schedule of the United States*** (HTS) replaced the Tariff Schedules of the United States (TSUS) effective January 1, 1989. Chapters 1 through 97 are based upon the internationally adopted Harmonized Commodity Description and Coding System through the 6-digit level of product description, with additional U.S. product subdivisions at the 8-digit level. Chapters 98 and 99 contain special U.S. classification provisions and temporary rate provisions, respectively

Rates of duty in the ***general*** subcolumn of HTS column 1 are most-favored-nation (MFN) rates; for the most part, they represent the final concession rate from the Tokyo Round of Multilateral Trade Negotiations. Column 1-general duty rates are applicable to imported goods from all nonembargoed countries except those enumerated in general note 3(b) to the HTS Afghanistan, Azerbaijan, Cuba, Kampuchea, Laos, North Korea, and Vietnam— whose goods are dutiable at the rates set forth in ***column 2***. Goods from Albania, Armenia, Belarus, Bosnia, Bulgaria, the People's Republic of China, Croatia, the Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Macedonia, Moldova, Mongolia, Poland, Romania, Russia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan are now eligible for MFN treatment. Among goods dutiable at column 1-general rates, particular products of enumerated countries may be eligible for reduced rates of duty or for duty-free entry under one or more preferential tariff programs. Such tariff treatment is set forth in the ***special*** subcolumn of HTS column 1. Where eligibility for special tariff treatment is not claimed or established, goods are dutiable at column 1-general rates

The ***Generalized System of Preferences*** (GSP) affords nonreciprocal tariff preferences to developing countries to aid their economic development and to diversify and expand their production and exports. The U.S. GSP, enacted in title V of the Trade Act of 1974 and renewed in the Trade and Tariff Act of 1984, applies to merchandise imported on or after January 1, 1976 and before September 30, 1994. Indicated by the symbol "A" or "A*" in the special subcolumn of column 1, the GSP provides duty-free entry to eligible articles the product of and imported directly from designated beneficiary developing countries, as set forth in general note 4 to the HTS.

The ***Caribbean Basin Economic Recovery Act*** (CBERA) affords nonreciprocal tariff preferences to developing countries in the Caribbean Basin area to aid their economic development and to diversify and expand their production and exports. The CBERA, enacted in title II of Public Law 98-67, implemented by Presidential Proclamation 5133 of November 30, 1983, and amended by the Customs and Trade Act of 1990, applies to merchandise entered, or withdrawn from warehouse for consumption, on or after January 1, 1984; this tariff preference program has no expiration date. Indicated by the symbol "E" or "E*" in the special subcolumn of column 1, the CBERA provides duty-free entry to eligible articles, and reduced-duty treatment to certain other articles, which are the product of and imported directly from designated countries, as set forth in general note 7 to the HTS.

Preferential rates of duty in the special subcolumn of column 1 followed by the symbol "IL" are applicable to products of Israel under the ***United States-Israel Free Trade Area Implementation Act*** of 1985 (IFTA), as provided in general note 8 to the HTS. Where no rate of duty is provided for products of Israel in the special subcolumn for a particular provision, the rate of duty in the general subcolumn of column 1 applies.

Preferential nonreciprocal duty-free or reduced-duty treatment in the special subcolumn of column 1 followed by the symbol "J" or "J*" in parentheses is afforded to eligible articles the product of designated beneficiary countries under the ***Andean Trade Preference Act*** (ATPA), enacted in title II of Public Law 102-182 and implemented by Presidential Proclamation 6455 of July 2, 1992 (effective July 22, 1992), as set forth in general note 11 to the HTS.

Preferential rates of duty in the special subcolumn of column 1 followed by the symbol "CA" are applicable to eligible goods of Canada, and those followed by the symbol "MX" are applicable to eligible goods of Mexico, under the ***North American Free Trade Agreement***, as provided in general note 12 to the HTS, effective January 1, 1994.

Other special tariff treatment applies to particular ***products of insular possessions*** (general note 3(a)(iv)), goods covered by the ***Automotive Products Trade Act*** (APTA) (general note 5) and the ***Agreement on Trade in Civil Aircraft*** (ATCA) (general note 6), and ***articles imported from freely associated states*** (general note 10).

The ***General Agreement on Tariffs and Trade*** (GATT) (61 Stat. (pt. 5) A58; 8 UST (pt. 2) 1786) is a multilateral agreement setting forth basic principles governing international trade among its

signatories. The GATT's main obligations relate to most-favored-nation treatment, the maintenance of scheduled concession rates of duty, and national (nondiscriminatory) treatment for imported products; the GATT also provides the legal framework for customs valuation standards, "escape clause" (emergency) actions, antidumping and countervailing duties, and other measures. Results of GATT-sponsored multilateral tariff negotiations are set forth by way of separate schedules of concessions for each participating contracting party, with the U.S. schedule designated as Schedule XX.

Officially known as "The Arrangement Regarding International Trade in Textiles," the ***Multifiber Arrangement*** (MFA) provides a framework for the negotiation of bilateral agreements between importing and producing countries, or for unilateral action by importing countries in the absence of an agreement. These bilateral agreements establish quantitative limits on imports of textiles and apparel, of cotton and other vegetable fibers, wool, man-made fibers and silk blends, in order to prevent market disruption in the importing countries—restrictions that would otherwise be a departure from GATT provisions. The United States has bilateral agreements with many supplying countries, including the four largest suppliers: China, Hong Kong, the Republic of Korea, and Taiwan

APPENDIX B
STATISTICAL TABLE

Table B-1
Manmade fibers: Harmonized Tariff Schedule subheading; description; U.S. col. 1 rate of duty as of Jan. 1, 1995; U.S. exports, 1993; U.S. imports, 1993

HTS subheading	Description	Col. 1 rate of duty as of Jan. 1, 1995		U.S. exports, 1993	U.S. imports, 1993
		General	Special[1]	1,000 dollars	
	Synthetic filament yarn (other than sewing thread), not put up for retail sale, including synthetic monofilament of less than 67 decitex:				
	High tenacity yarn of nylon or other polyamides:				
5402.10.30	Single yarn	9.9%	Free (CA,IL) 7.2% (MX)	[2]27,786	125,809
5402.10.60	Multiple (folded) or cabled yarn	9%	Free (IL) 2.7% (CA) 6.6% (MX)	[2]18,524	2,493
	High tenacity yarn of polyesters:				
5402.20.30	Single yarn	9.9%	Free (CA,IL) 7.2% (MX)	[2]27,632	33,784
5402.20.60	Multiple (folded) or cabled yarn	8.9%	Free (IL) 2.7% (CA) 6.6% (MX)	[2]18,422	2,746
	Textured yarn:				
	Of nylon or other polyamides, measuring per single yarn not more than 500 decitex:				
5402.31.30	Single yarn	9.9%	Free (IL) 3% (CA) 7.2% (MX)	[2]18,483	8,434
5402.31.60	Multiple (folded) or cabled yarn	9%	Free (IL) 2.7% (CA) 6.6% (MX)	[2]18,482	12,333
	Of nylon or other polyamides, measuring per single yarn more than 500 decitex:				
5402.32.30	Single yarn	9.8%	Free (IL) 3% (CA) 7.2% (MX)	[2]44,892	81,554
5402.32.60	Multiple (folded) or cabled yarn	9%	Free (IL) 2.7% (CA) 6.6% (MX)	[2]44,892	1,717
	Of polyesters:				
5402.33.30	Single yarn	9.9%	Free (IL) 3% (CA) 7.2% (MX)	[2]43,590	16,033
5402.33.60	Multiple (folded) or cabled yarn	9%	Free (IL) 2.7% (CA) 6.6% (MX)	[2]43,590	1,631

See footnotes at end of table.

Table B-1—*Continued*
Manmade fibers: Harmonized Tariff Schedule subheading; description; U.S. col. 1 rate of duty as of Jan. 1, 1995; U.S. exports, 1993; U.S. imports, 1993

HTS subheading	Description	Col. 1 rate of duty as of Jan. 1, 1995		U.S. exports, 1993	U.S. imports, 1993
		General	Special[1]		
				1,000 dollars	
	Synthetic filament yarn (other than sewing thread), not put up for retail sale, including synthetic monofilament of less than 67 decitex—*Continued:*				
	Textured yarn—Continued:				
	Of synthetic fiber not specified above:				
5402.39.30	Single yarn	9.9%	Free (IL) 3% (CA) 7.2% (MX)	[2]7,532	12,701
5402.39.60	Multiple (folded) or cabled yarn	9%	Free (IL) 2.7% (CA) 6.6% (MX)	[2]7,531	489
	Yarn, excluding high tenacity and textured, single, untwisted or with a twist not exceeding 50 turns per meter:				
	Of nylon or other polyamides:				
5402.41.10	Colored multifilament, untwisted or with a twist of less than 5 turns per meter, measuring not less than 22 decitex per filament, certified by the importer to be used in the manufacture of wigs for dolls	Free	[3]	[3]	
5402.41.90	Other	9.8%	Free (IL) 3% (CA) 8% (MX)	[3]62,011	[3]124,993
5402.42.00	Of polyesters, partially oriented	9.9%	Free (CA,IL) 7.2% (MX)	13,053	10,979
	Of polyesters, other than partially oriented:				
5402.43.10	Wholly of polyester, measuring not less than 75 decitex but not more than 80 decitex, and having 24 filaments per yarn	9.8%	Free (IL) 3% (CA) 7.2% (MX)	[2]4,801	[2]13,739
5402.43.90	Other	9.8%	Free (IL) 3% (CA) 7.2% (MX)	[2]4,801	[2]13,738
	Of synthetic fiber not specified above:				
5402.49.10	Colored multifilament, of modacrylic, untwisted or with a twist of less than 5 turns per meter, measuring not less than 22 decitex per filament, certified by the importer to be used in the manufacture of wigs for dolls	Free	[3]	[3]	
5402.49.90	Other	9.8%	Free (IL,MX) 3% (CA)	[3]82,415	[3]44,552

See footnotes at end of table.

Table B-1—*Continued*
Manmade fibers: Harmonized Tariff Schedule subheading; description; U.S. col. 1 rate of duty as of Jan. 1, 1995; U.S. exports, 1993; U.S. imports, 1993

HTS subheading	Description	Col. 1 rate of duty as of Jan. 1, 1995		U.S. exports, 1993	U.S. imports, 1993
		General	Special[1]	*1,000 dollars*	
	Synthetic filament yarn (other than sewing thread), not put up for retail sale, including synthetic monofilament of less than 67 decitex—*Continued:*				
	Yarn, excluding high tenacity and textured, single, with twist exceeding 50 turns per meter—Continued:				
5402.51.00	Of nylon or other polyamides	9.9%	Free (IL,MX) 3% (CA)	826	579
	Of polyesters:				
5402.52.10	Wholly of polyester, measuring not less than 75 decitex but not more than 80 decitex, and having 24 filaments per yarn	9.9%	Free (IL,MX) 3% (CA)	[2]1,096	[2]1,951
5402.52.90	Other	9.9%	Free (IL,MX) 3% (CA)	[2]1,096	[2]1,951
5402.59.00	Of synthetic fiber not specified above	9.8%	Free (IL) 3% (CA) 7.2% (MX)	780	1,517
	Other yarn, multiple (folded) or cabled:				
5402.61.00	Of nylon or other polyamides	8.9%	Free (IL) 2.7% (CA) 6.6% (MX)	10,496	775
5402.62.00	Of polyesters	8.9%	Free (IL) 2.7% (CA) 6.6% (MX)	4,799	1,896
5402.69.00	Of synthetic fiber not specified above	8.9%	Free (IL) 2.7% (CA) 6.6% (MX)	5,615	1,296
	Artificial filament yarn (other than sewing thread), not put up for retail sale, including artificial monofilament of less than 67 decitex:				
	High tenacity yarn of viscose rayon:				
5403.10.30	Single yarn	10%	Free (CA,IL) 8% (MX)	[2]257	7,686
5403.10.60	Multiple (folded) or cabled yarn	9.1%	Free (CA,IL) 7.2% (MX)	[2]172	442
	Textured yarn:				
5403.20.30	Single yarn	10%	Free (CA,IL) 7.2% (MX)	[2]1,186	2
5403.20.60	Multiple (folded) or cabled yarn	9.1%	Free (CA,IL) 7.2% (MX)	[2]1,185	51

See footnotes at end of table.

Table B-1—*Continued*
Manmade fibers: Harmonized Tariff Schedule subheading; description; U.S. col. 1 rate of duty as of Jan. 1, 1995; U.S. exports, 1993; U.S. imports, 1993

HTS subheading	Description	Col. 1 rate of duty as of Jan. 1, 1995		U.S. exports, 1993	U.S. imports, 1993
		General	Special[1]		
				1,000 dollars	
	Artificial filament yarn (other than sewing thread), not put up for retail sale, including artificial monofilament of less than 67 decitex—*Continued:*				
	Yarn, excluding high tenacity and textured, single:				
5403.31.00	Of viscose rayon, untwisted or with a twist not exceeding 120 turns per meter	10%	Free (IL) 3% (CA) 8% (MX)	1,606	42,341
5403.32.00	Of viscose rayon, with a twist exceeding 120 turns per meter	10%	Free (IL) 3% (CA) 8% (MX)	3,873	851
5403.33.00	Of cellulose acetate	9.9%	Free (CA,IL,MX)	53,339	34,551
5403.39.00	Of artificial fiber not specified above	9.8%	Free (CA,IL) 7.2% (MX)	1,375	7,457
	Yarn, excluding high tenacity or textured, multiple (folded) or cabled:				
5403.41.00	Of viscose rayon	9.1%	Free (IL) 2.7% (CA) 7.2% (MX)	756	6,256
5403.42.00	Of cellulose acetate	9%	Free (CA,IL,MX)	1,873	1,247
5403.49.00	Of artificial fiber not specified above	8.9%	Free (IL) 2.7% (CA) 6.6% (MX)	1,555	1,449
	Synthetic monofilament of 67 decitex or more and of which no cross-sectional dimension exceeds 1 mm; strip and the like (for example, artificial straw) of synthetic textile materials of an apparent width not exceeding 5 mm:				
	Monofilament:				
5404.10.10	Racket strings	3.1%	Free (A,CA,E,IL, J,MX)	[2]4,007	152
	Other than racket strings:				
5404.10.40	Of polypropylene, not over 254 mm in length	7.7%	Free (A,E,IL,J,MX) 2.3% (CA)	[2]4,007	92
5404.10.80	Other	7.7%	Free (IL) 2.3% (CA) 5.7% (MX)	48,160	45,893
5404.90.00	Strip and the like	4.6%	Free (A,E,IL,J,MX) 1.5% (CA)	9,931	5,510

See footnotes at end of table.

Table B-1—*Continued*
Manmade fibers: Harmonized Tariff Schedule subheading; description; U.S. col. 1 rate of duty as of Jan. 1, 1995; U.S. exports, 1993; U.S. imports, 1993

HTS subheading	Description	Col. 1 rate of duty as of Jan. 1, 1995		U.S. exports, 1993	U.S. imports, 1993
		General	Special[1]		
				1,000 dollars	
	Synthetic staple fibers, not carded, combed or otherwise processed for spinning—*Continued:*				
5503.30.00	Of acrylic or modacrylic	4.8%	Free (CA,IL,MX)	39,055	20,290
5503.40.00	Of polypropylene	4.8%	Free (IL) 1.4% (CA) 3.7% (MX)	36,924	3,778
	Of synthetic fiber not specified above:				
5503.90.10	Of vinyon	Free			
5503.90.90	Other	4.8%	Free (CA,IL) 3.7% (MX)	12,674	16,817
	Artificial staple fibers, not carded, combed or otherwise processed for spinning:				
5504.10.00	Of viscose rayon	4.8%	Free (CA,IL,MX)	14,253	82,455
5504.90.00	Of artificial fiber, other than viscose rayon	4.8%	Free (CA,IL,MX)	33,062	2,035
	Waste (including noils, yarn waste and garnetted stock) of manmade fibers:				
5505.10.00	Of synthetic fibers	1.9%	Free (CA,IL,MX)	56,763	9,319
5505.20.00	Of artificial fibers	1.9%	Free (CA,IL) 1.6% (MX)	4,871	349

[1] Programs under which special tariff treatment may be provided, and the corresponding symbols for such programs as they are indicated in the "Special" subcolumn, are as follows: United States-Israel Free Trade Area (IL); North American Free Trade Agreement, goods of Canada (CA) and Mexico (MX); Generalized System of Preferences (A); Caribbean Basin Economic Recovery Act (E); and Andean Trade Preference Act (J).

[2] Trade data are available at the 6-digit HTS level only. Allocations at the 8-digit level were made by the staff of the U.S. International Trade Commission.

[3] HTS subheadings 5402.41.10, 5402.41.90, 5402.49.10, 5402.49.90, 5503.10.10, and 5503.10.90 were established effective January 1, 1995, in order to implement the trade agreements concluded in the Uruguay Round of Multilateral Trade Negotiations. The 1993 trade data for HTS subheadings 5402.41.10, 5402.49.10, and 5503.10.10 are included in the data shown for subheadings 5402.41.90, 5402.49.90, and 5503.10.90, respectively.

Source: U.S. exports and imports compiled from official statistics of the U.S. Department of Commerce.