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Growth Prospects for India's Cotton and Textile Industries

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Abstract

Demand for cotton and manmade fibers in India will likely strengthen in response to rising consumer demand in India and increased exports of textiles and apparel following the removal of the Multifiber Arrangement quotas. The pace of growth in cotton demand will hinge on execution of reforms to policies, including taxes that discriminate against the use of manmade fibers and regulations affecting the scale, technology use, and export competitiveness of the textile and apparel industries. Imports of raw cotton have increased in concert with rising demand in recent years, but future growth will depend on the extent to which India can boost chronically low cotton yields and improve cotton quality.

Keywords: Cotton, India, textiles, clothing, apparel, Multifiber Arrangement, synthetic fiber, spinning, weaving, China, trade policy, policy reform, seed varieties, fiber quality.

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Introduction

India, the world's third-largest producer of cotton and second-largest producer of cotton yarns and textiles, is poised to play an increasingly important role in global cotton and textile markets as a result of domestic and multilateral policy reform. Liberalization of industrial and trade policies in the early 1990s increased the competitiveness of much of India's industry and service sectors, sparking robust growth in output and consumer demand. Reforms in agriculture, the economy's major employer, and in the textile sector, the leading industrial employer, have, however, been modest. Future reforms to these heavily regulated sectors could have significant impacts on the structure and competitiveness of the textile sector and on India's supply, demand, and trade of cotton and textile products.

On January 1, 2005, developed countries removed import quotas on textile products previously sanctioned by the 1974 Multifiber Arrangement (MFA). This change provides a major opportunity for India to expand production and exports of textiles and apparel to developed country markets (see box, "[The Multifiber Arrangement and Its Impacts](#)"). The elimination of MFA quotas induced Indian policymakers to relax investment restrictions and to adopt market liberalization measures in the textile sector, although these reforms have been slower than developments in some other key countries, most notably China. However, the opportunity created by the elimination of MFA quotas, together with India's rapid economic growth and demonstrated comparative advantage in production of both raw cotton and textiles, increases the likelihood that India will continue to adopt policies aimed at expanding its capacity to produce and export cotton and textiles.

In the post-MFA era, developments in India and other developing countries that export textiles will have important implications for the United States and other cotton-exporting countries. India has already emerged as a small but growing market for U.S. cotton in recent years, driven by the price and quality consciousness of export-oriented mills and garment makers. India has, historically, been a competitive producer of raw cotton and mostly self-sufficient. It is not clear, however, if domestic producers will be able to meet the quantity and quality demands of a rapidly expanding textile sector that, according to government targets, aims to more than triple its exports by 2010.

The Multifiber Arrangement and Its Impacts

Until recently, global trade in textiles and apparel operated outside established international rules based on a system of quotas originally sanctioned by the 1974 Multifiber Arrangement (MFA). However, the Uruguay Round (UR) negotiations that concluded in 1995 included an agreement to render the sector compliant with General Agreement on Tariffs and Trade (GATT) rules, thus reversing three decades of steadily increasing protectionism. The UR's Agreement on Textile and Clothing (ATC) mandated the phaseout of quantitative import barriers on textiles over a 10-year period, with complete MFA quota removal by the end of 2004. In addition, commitments were made to reduce tariffs on imported textiles and clothing throughout the world—in both developed and developing countries.

Impacts of the MFA

In 1994, MFA quotas governed most global trade in 105 textile and garment categories. The quota restraints limited shipments from exporters, mostly developing countries, to the United States, EU, Canada, and Norway. Key impacts were as follows:

- World textile and clothing production and trade became fragmented. The quotas supported production in developed-country markets and in countries having quotas to ship to these markets. Production did not necessarily occur where costs were lowest.
- Prices were higher and consumption lower in developed-country markets than they would have been without the quotas. Studies indicate that the MFA regime added 5-10 percent to U.S. consumer prices.
- Impacts on developing countries were mixed. Production and exports by low-cost producers of textiles and clothing, such as China, India, and Pakistan, were reduced by the quotas. But in other low-income countries, like Bangladesh and Mauritius, and in higher income countries, like South Korea and Taiwan, quota access supported an export industry that otherwise would have been smaller or nonexistent.

Impacts of the End of MFA Quotas

The elimination of MFA quotas is re-orienting world production and trade of fiber, yarn, fabric, and clothing in fundamental ways:

- Textile and clothing output will accelerate among low-cost developing-country producers, including India, Pakistan, and, especially, China due to the elimination of quotas. Production in the United States and EU will continue to decline.
- Some higher cost producers will continue to receive tariff protection; others will still profit from either geographic proximity to or preferential trade arrangements with U.S. and EU markets (for example, the Caribbean Basin Initiative, the North American Free Trade Agreement, and the Customs Union between the EU and Turkey).
- Mill use of raw cotton will continue to shift toward low-cost developing-country exporters. Unless such countries as China, India, and Pakistan can also produce more cotton, cotton import demand will also shift toward these countries.
- Textile and clothing prices will fall in the United States and EU.

For more details, see: Stephen MacDonald and Thomas Vollrath, *The Forces Shaping World Cotton Consumption After the Multifiber Arrangement*, CWS-05c-01, U.S. Department of Agriculture, Economic Research Service, April 2005, 30 pp.

Cotton Demand

India is one of the largest consumers of cotton in the world, ranking second to China in production of cotton yarn and fabrics and first in installed spinning and weaving capacity (fig. 1). India is also an important global producer and consumer of synthetic fibers, ranking fifth in global production of synthetic fibers (fig. 2).

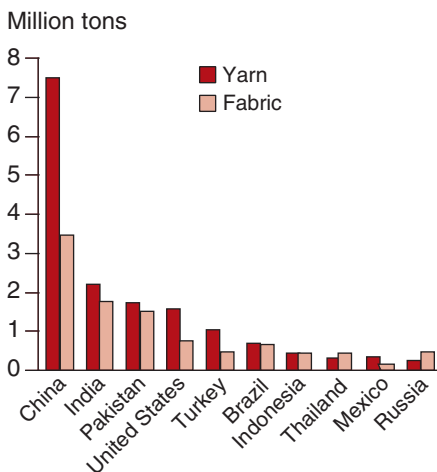
Although domestic demand accounts for most Indian cotton consumption, growth in textiles and clothing exports is outpacing domestic demand and is an increasingly important determinant of overall cotton and fiber demand in India. Cotton-based exports accounted for about 42 percent of mill use of cotton in 2000 and about 80 percent of the growth in Indian consumption of cotton fiber between 1992 and 2000.

Relatively strong recent growth in the domestic use of manmade fibers is also shaping demand for cotton. In addition, government policy interventions that influence raw material and product prices, industry structure, and technology significantly affect both the growth in domestic demand for cotton and the competitiveness of India's textile export sector. These policies are being reformed, with potentially large impacts on growth in Indian cotton demand.

Trends in Export Demand

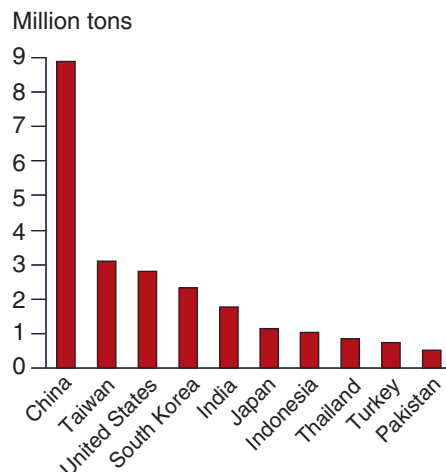
Exports of yarns, textiles, and clothing to the world market are an increasingly important source of derived demand for Indian cotton. Since 1992, Indian textile and clothing exports have grown 7.7 percent annually, reaching \$13.4 billion in 2002 and accounting for 4 percent of global trade in this sector (fig. 3). In 2002, India was the fifth-largest global exporter and the second-largest net exporter of textiles and clothing. India's net exports of \$12.1 billion in 2002 were, however, far below those of China (\$54.9 billion) (fig. 4).

Figure 1
Major world producers of cotton yarn and fabric, 2001



Source: Government of India, Ministry of Textiles, Office of the Textile Commissioner.

Figure 2
Major world producers of synthetic fibers and yarns, 2002



Source: Government of India, Ministry of Textiles, Office of the Textile Commissioner.

The bulk of India's textile and clothing exports, as well as most export growth, is in cotton-based yarns, fabrics, clothing, and household furnishings, as opposed to synthetic and blended products.

Exports of textiles and clothing now account for about 30 percent of India's domestic use of all natural and manmade fibers, a share that is likely to continue to increase. India's exports of textiles and clothing are expanding at nearly twice the rate of domestic demand. Export growth is likely to quicken as a result of the recent elimination of the MFA quotas that served to constrain India's exports to the United States and the European Union (EU). The MFA quotas were most restrictive of trade in clothing, particularly cotton-based clothing, which accounts for a large share of India's textile and apparel exports (fig. 5).

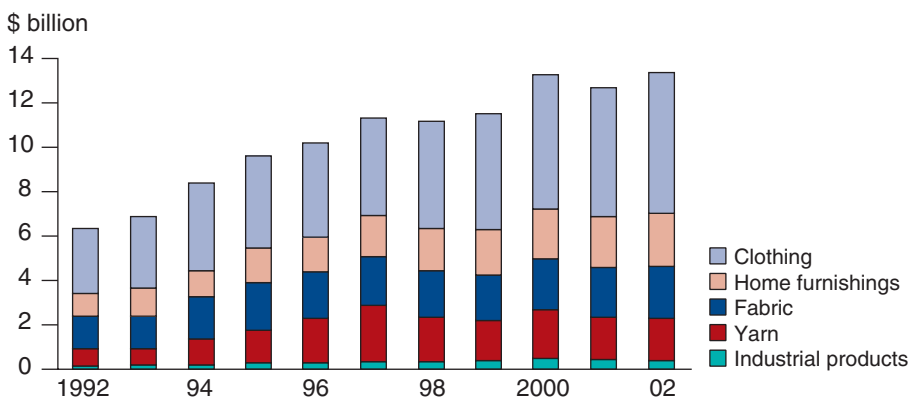
India's success in the global textile marketplace hinges greatly on the pace of internal market reforms and its ability to achieve international competitiveness in its heavily regulated spinning, weaving, and apparel sectors. Current government targets call for quadrupling exports to the United States and increasing global exports to \$50 billion by 2010.

Trends in Domestic Consumption

Domestic fiber demand has accelerated along with stronger growth in the Indian economy (fig. 6). Major reforms in domestic and trade policies during 1991-93 have led to faster growth in per capita incomes in India, helping boost annual growth in fiber consumption to 4.9 percent since 1990. Relatively rapid growth in consumption of manmade fibers, particularly since 1990, has also been an important trend in Indian fiber demand. During 1990-2001, per capita demand for manmade and blended fabrics grew 6.8 percent annually, compared with negligible growth in demand for 100-percent cotton fabrics (table 1).

As a result of this rapid growth, manmade and blended fabrics now account for the bulk of household cloth purchases. Between 1991 and 2003, the share of manmade and blended products in household cloth purchases rose from about 38 percent to 54 percent. The fastest growth has been in use of 100 percent manmade, as opposed to blended, fabrics. However, despite

Figure 3
India: Exports of textiles and clothing by use, 1992-2002

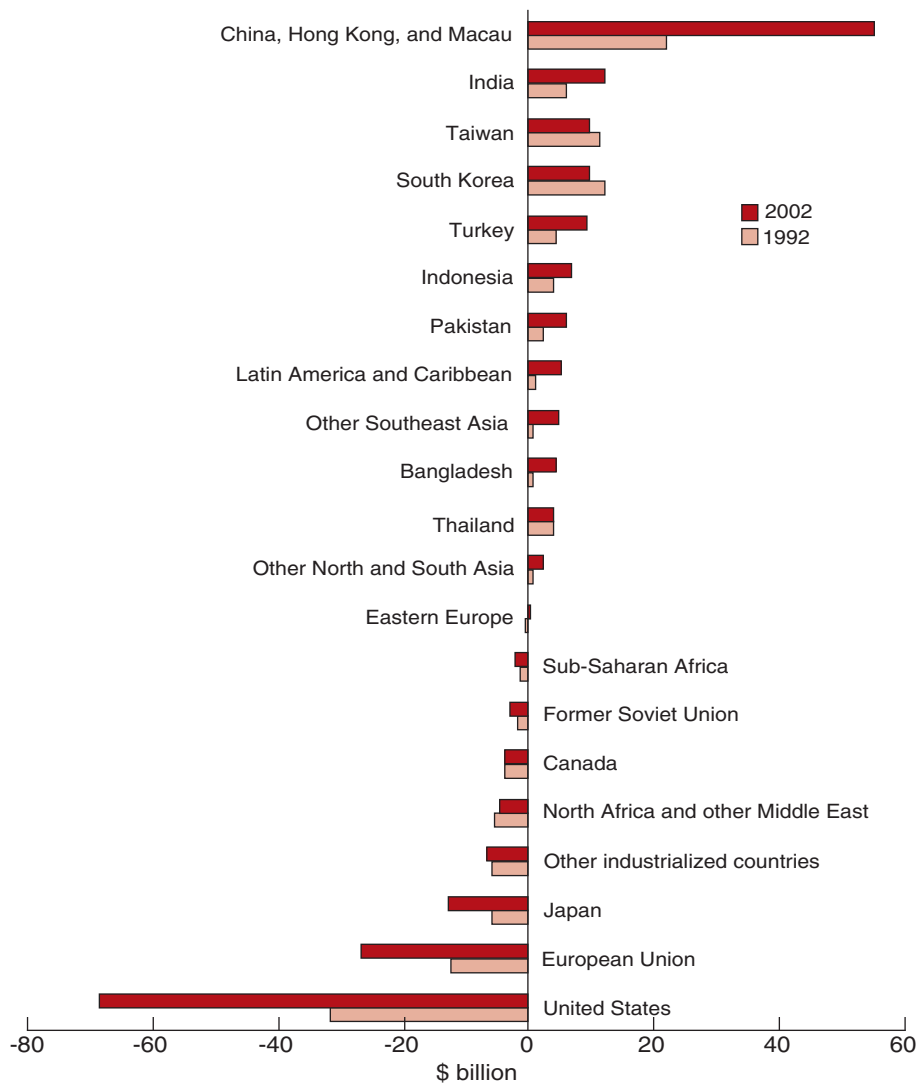


Source: U.S. Department of Agriculture, Economic Research Service, Bilateral Fiber and Textile Trade Database.

the rapid growth in use of manmade fibers, cotton continues to account for a relatively large share of total consumption in India, compared with other developing countries, as well as with developed and transition economies (fig. 7).

Demand for manmade and blended textile products in India is strong in both urban and rural households due to their durability and ease in maintenance (washability, fewer wrinkles, etc.), compared with 100-percent cotton textiles, factors very important in the Indian tropical and subtropical weather (fig. 8). Demand is, however, strongest in rural households, which account for about 78 percent of India's population. As of 2002, the share of manmade and blended products in household cloth purchases was 61 percent in rural areas and 54 percent in urban areas. In rural households, where average incomes are about half those in urban areas, and in urban low-income households, manmade fabrics are preferred because of their durability, as well as their generally low cost.

Figure 4
Net exports of textiles and clothing by global region, 1992 and 2002

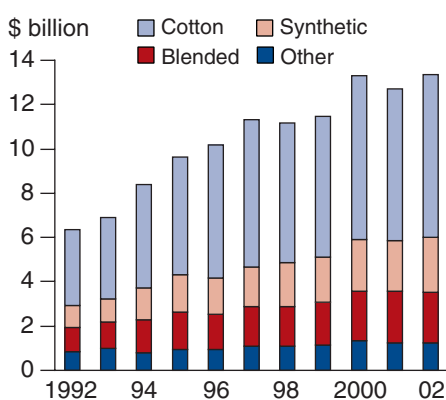


Source: U.S. Department of Agriculture, Economic Research Service, Bilateral Fiber and Textile Trade Database.

Overall growth in fiber consumption in India is also affected by the large share of household income allocated to textile purchases. According to government data, Indian households spent an average of 17 percent of their income on textiles in 1997, a share that has increased from 12 percent since 1990 (fig. 9). Urban households spent about 22 percent of income on textiles in 1997, compared with 15 percent for rural households. The higher urban share partly reflects larger purchases of higher value fabrics and readymade goods in urban households, compared with rural households.

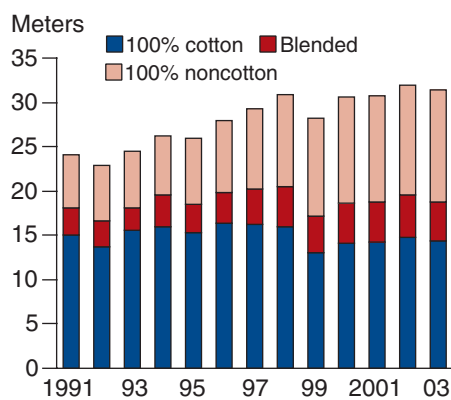
The sensitivity of consumer textile demand—and of textile sector output—to rural incomes was demonstrated by the industry slump of 1998/99. Uncharacteristic declines in yarn and cloth output in that year were associated with weak rural demand from sluggish growth in farm incomes and high cotton prices after a poor crop in 1997/98. A drop in yarn export demand resulting from the Asian financial crisis also contributed to the 1998/99 slump.

Figure 5
India: Exports of textiles and clothing by fiber type, 1992-2002



Source: U.S. Department of Agriculture, Economic Research Service, Bilateral Fiber and Textile Trade Database.

Figure 6
India: Per capita cloth availability by type, 1991-2003



Source: U.S. Department of Agriculture, Economic Research Service, Bilateral Fiber and Textile Trade Database.

Table 1
India: Growth in fabric consumption by type, 1972-2002

Period	Cotton	Manmade and blended	Total	Real gross domestic product/capita
-----Square meters-----				1993/94 Rs
Average for:				
1972-74	17.4	2.8	20.2	5,255
1979-81	14.5	6.4	20.9	5,782
1989-91	14.4	8.2	22.6	7,823
2000-02	14.5	16.9	31.3	12,166
Percent				
Growth rates: ¹				
1973-80	-2.6	12.4	.5	1.4
1980-90	-.1	2.5	.8	3.1
1990-2001	0	6.8	3.0	3.7

¹Growth rates between period average centered on years indicated.

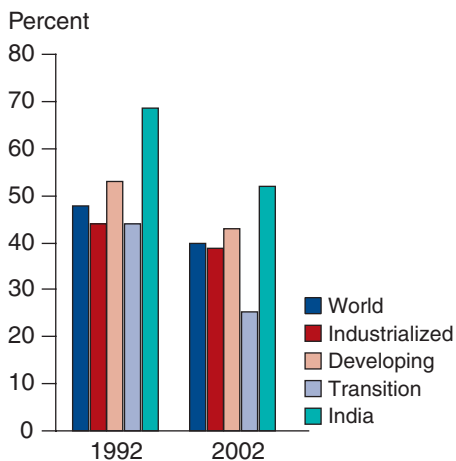
Source: Computed from data from the Government of India, Ministry of Textiles, Office of the Textile Commissioner, 2004, *Compendium of Textile Statistics*; Government of India, Ministry of Finance, *Economic Survey*, various issues.

Role of Prices in Consumer Demand

Most Indian consumers are highly price sensitive. The average Indian household spends about 55 percent of its income on food and, as a result, spends discretionary income carefully. Faster economic growth beginning in the early 1990s has led to the emergence of an expanding middle class of 150-200 million consumers, with the capacity and propensity to purchase higher priced items. But price-sensitive, lower income households continue to account for the bulk of India's more than 1 billion consumers.

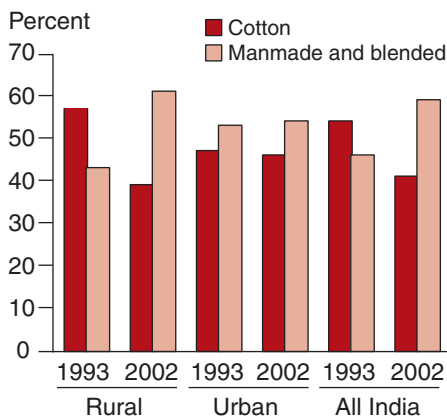
Declining real prices for yarns and textiles have likely stimulated growth in demand for textile products since the early 1990s, particularly those made of manmade fibers (fig. 10). Real prices of cotton yarns and textiles have generally declined since the mid-1990s primarily due to lower prices for

Figure 7
Cotton share of fiber use by global region, 1992 and 2002



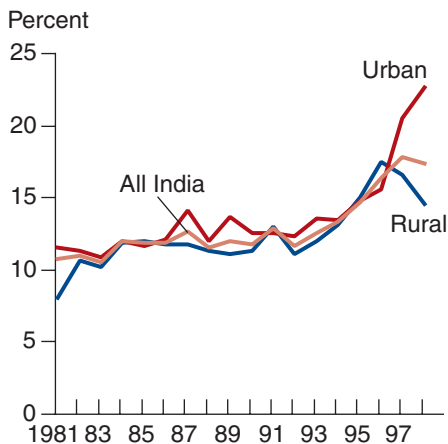
Source: International Cotton Advisory Committee.

Figure 8
India: Fiber composition of textile products purchased by households, 1993 and 2002



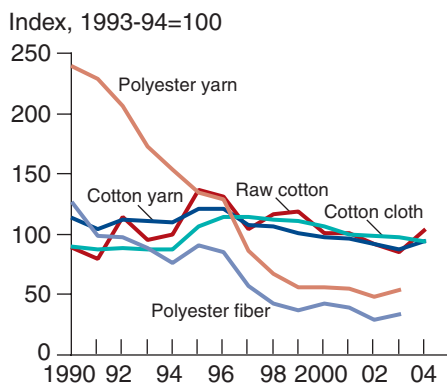
Source: Government of India, Ministry of Textiles, Office of the Textile Commissioner.

Figure 9
India: Share of household income spent on textiles, 1981-98



Source: Government of India, Ministry of Textiles, Office of the Textile Commissioner.

Figure 10
India: Deflated wholesale price indexes for textile products, 1990-2004



Source: ERS calculations based on data from Government of India, Ministry of Finance, *Economic Survey*, various.

raw cotton. Prices for manmade fibers and yarns, however, have fallen dramatically—about 10 percent annually in real terms—since 1990. The price declines for manmade fiber have been driven by increasing domestic production capacity and lower international prices of raw materials, as well as reduced Indian import tariffs and excise duties on synthetic raw materials and products.

Policies Affecting Consumer Prices

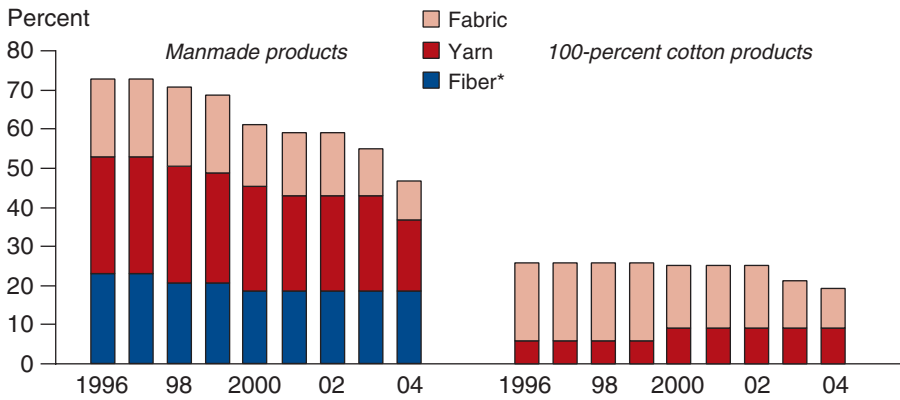
The principal government policies affecting consumer prices for textile products are excise taxes charged on products as they leave the factory and import tariffs charged on raw and intermediate products used in manufacturing. Historically, both excise taxes and tariffs have been used to discourage domestic use of manmade fibers, which are based heavily on imported raw materials, and to promote the use of cotton, most of which is produced domestically.

Both excise taxes and, to a lesser extent, tariffs on manmade fibers have been reduced during the past decade as part of policy reforms aimed at reducing protection and regulation throughout the industrial sector. Overall, excise tax rates on manmade and blended products have been reduced nearly 40 percent since the mid-1990s, while taxes on cotton goods have been reduced about 25 percent (fig. 11). Tariff reductions on manmade raw materials and goods have been more recent and less significant than the excise tax cuts (fig. 12). Despite the cuts, taxation of manmade goods remains high relative to cotton goods.

Tariff and excise tax policies that have discriminated against manmade fibers have played a key role in shaping relative consumer prices and consumption patterns for cotton and manmade products. Recent tariff and excise tax adjustments have reduced discrimination against manmade fibers, but with continued high differentials in taxes on cotton and manmade goods, there is considerable scope for future tariff and tax reductions to further reduce prices for manmade products.

Figure 11

India: Ad valorem excise taxes for manmade and 100-percent cotton products, 1996-2004

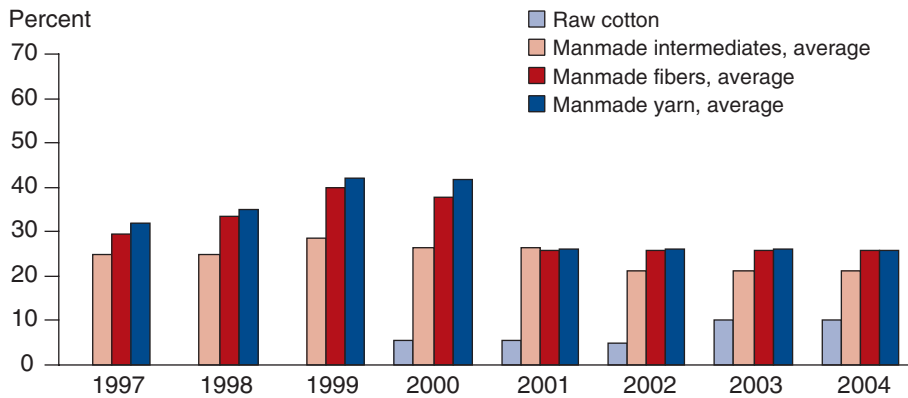


*There is no excise tax on cotton fiber.

Source: Government of India, Ministry of Textiles, Office of the Textile Commissioner.

Figure 12

India: Ad valorem import duties for raw cotton and manmade intermediates, fibers, and yarn, 1997-2004



Source: Government of India, Ministry of Textiles, Office of the Textile Commissioner.

Textile Industry Structure and Growth

India's textile industry is one of the economy's largest. In 2000/01, the textile and garment industries accounted for about 4 percent of GDP, 14 percent of industrial output, 18 percent of industrial employment, and 27 percent of export earnings (Hashim). India's textile industry is also significant in a global context, ranking second to China in the production of both cotton yarn and fabric and fifth in the production of synthetic fibers and yarns.

In contrast to other major textile-producing countries, India's textile sector is characterized by mostly small-scale, nonintegrated spinning, weaving, cloth finishing, and apparel enterprises, many of which use outdated technology. Some, mostly larger, firms operate in the "organized" sector where firms must comply with numerous government labor and tax regulations. Most firms, however, operate in the small-scale "unorganized" sector where regulations are less stringent and more easily evaded.

The unique structure of the Indian textile industry is due to the legacy of tax, labor, and other regulatory policies that have favored small-scale, labor-intensive enterprises, while discriminating against larger scale, more capital-intensive operations. The structure is also due to the historical orientation towards meeting the needs of India's predominately low-income domestic consumers, rather than the world market. Policy reforms, which began in the 1980s and continued into the 1990s, have led to significant gains in technical efficiency and international competitiveness, particularly in the spinning sector. However, broad scope remains for additional reforms that could enhance the efficiency and competitiveness of India's weaving, fabric finishing, and apparel sectors.

Policies Create Fragmented Industry Structure

Unlike other major textile-producing countries, large-scale, vertically-integrated, composite mills that incorporate spinning, weaving, and other operations account for a small and declining share of Indian textile production (see box, "[Structure of India's Textile Industry](#)"). Composite mills, which once accounted for 70 percent of domestic textile production, now account for only 3 percent of output as a result of policies that have favored labor-intensive, small-scale, unorganized sector enterprises. Although some regulations that discriminate against larger scale operations have been eased since textile reform began with the Textile Policy of 1985, the following past and current regulations continue to shape the structure of the industry:

- **Labor Restrictions.** "Organized" sector employers that use manufacturing processes requiring power and employ more than 10 people must adhere to wage, employment security, and other regulations. These regulations reduce flexibility and increase wages 50-60 percent relative to the unorganized sector (Anubhai).
- **Plant Size Regulations.** Earlier restrictions on loom capacity and the use of automatic looms have recently been lifted. However, they still define the structure and technology stock of the weaving industry.

- **Hank Yarn Obligation.** Spinners are required to provide a share of their output at fixed prices in the form of manually wound “hank yarn” for the handloom industry, as opposed to machine-wound “cone” yarn. The implicit tax on spinners resulting from this policy has been reduced over time but remains significant.
- **Cloth Sales Obligations.** Until recently, composite mills were required to sell a share of their output as coarse cloth at statutory prices. Compliance with this policy significantly weakened the finances of composite mills.
- **Discriminatory Excise Taxes.** Until recently, composite mills had to pay excise taxes not applicable to smaller units in the organized and unorganized sector. While all units are now subject to excise taxes, tax avoidance is a

Structure of India’s Textile Industry

Unlike other major textile-producing countries, India’s textile industry is comprised mostly of small-scale, nonintegrated spinning, weaving, finishing, and apparel-making enterprises. This unique industry structure is primarily a legacy of government policies that have promoted labor-intensive, small-scale operations and discriminated against larger scale firms:

- **Composite Mills.** Relatively large-scale mills that integrate spinning, weaving and, sometimes, fabric finishing are common in other major textile-producing countries. In India, however, these types of mills now account for about only 3 percent of output in the textile sector. About 276 composite mills are now operating in India, most owned by the public sector and many deemed financially “sick.”
- **Spinning.** Spinning is the process of converting cotton or manmade fiber into yarn to be used for weaving and knitting. Largely due to deregulation beginning in the mid-1980s, spinning is the most consolidated and technically efficient sector in India’s textile industry. Average plant size remains small, however, and technology outdated, relative to other major producers. In 2002/03, India’s spinning sector consisted of about 1,146 small-scale independent firms and 1,599 larger scale independent units.
- **Weaving and Knitting.** Weaving and knitting converts cotton, manmade, or blended yarns into woven or knitted fabrics. India’s weaving and knitting sector remains highly fragmented, small-scale, and labor-intensive. This sector consists of about 3.9 million handlooms, 380,000 “powerloom” enterprises that operate about 1.7 million looms, and just 137,000 looms in the various composite mills. “Powerlooms” are small firms, with an average loom capacity of four to five owned by independent entrepreneurs or weavers. Modern shuttleless looms account for less than 1 percent of loom capacity.
- **Fabric Finishing.** Fabric finishing (also referred to as processing), which includes dyeing, printing, and other cloth preparation prior to the manufacture of clothing, is also dominated by a large number of independent, small-scale enterprises. Overall, about 2,300 processors are operating in India, including about 2,100 independent units and 200 units that are integrated with spinning, weaving, or knitting units.
- **Clothing.** Apparel is produced by about 77,000 small-scale units classified as domestic manufacturers, manufacturer exporters, and fabricators (subcontractors).

common practice for units in the unorganized sector, providing them with a significant cost advantage. Excise tax policy also continues to discriminate against manmade and blended products, a policy that prevents firms from adapting to and profiting from consumer demand for manmade products.

Trends in Spinning

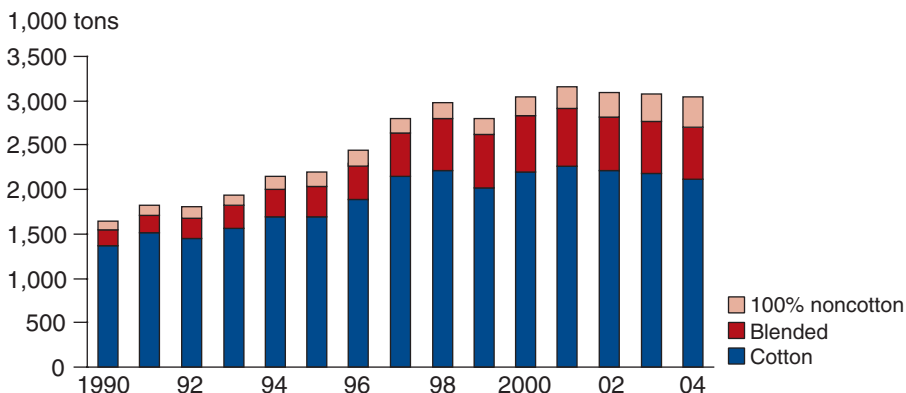
The spinning industry is the most modern and internationally competitive segment of India’s textile industry. Yarn production increased 4.5 percent annually between 1990 and 2004, as rapid gains by independent spinners more than offset declining production from composite mills. Reflecting trends in domestic demand, the most rapid growth has been in the production of blended and 100-percent manmade yarns (fig. 13). Between 1990 and 2004, production of manmade and blended yarns grew at annual rates of 8.6 percent and 9.1 percent, respectively, compared with 3.2 percent annually for cotton yarn. As a result of this growth, the share of manmade and blended yarns in total production grew from 17 percent to 30 percent.

The domestic weaving sector absorbed most of the increase in yarn output, although exports became an increasingly important source of growth in yarn demand in the 1990s. Expanding from a small base, yarn exports grew rapidly and peaked at \$2.5 billion in 1997 (fig. 14). Since 1997, yarn exports have declined because of falling prices and faster growth in domestic weaving, but still average about \$1.9 billion annually.

Yarn output by the composite mills has declined steadily, as has their share of spinning capacity. By 2003, independent spinning mills accounted for about 75 percent of capacity and 92 percent of production. Capacity use in the cotton-spinning sector averages near 80 percent, with higher rates among the independent spinners (fig. 15). Reflecting production and demand trends, growth in spinning capacity and capacity use has been highest for manmade yarns. Between 1990 and 2004, spinning capacity for manmade yarns grew about 7 percent annually, while capacity use averaged near 90 percent (fig. 16).

The performance of the yarn-spinning industry has been less affected by restrictive labor policies, capacity restrictions, and price controls, largely because it is inherently capital intensive. The modern spinning mills first

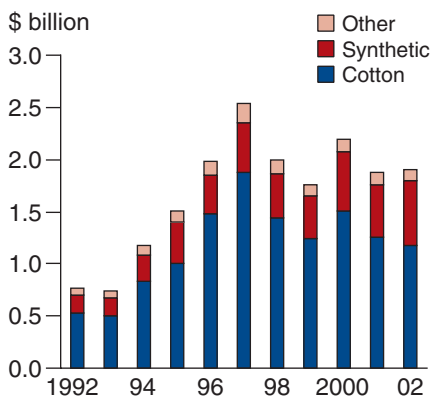
Figure 13
India: Yarn production by type, 1990-2004



Source: Government of India, Ministry of Textiles, Office of the Textile Commissioner.

appeared in response to the Textile Policy of 1985, which removed entry and exit barriers, encouraged the importation of modern machinery, and lowered

Figure 14
India: Yarn exports by fiber type, 1992-2002

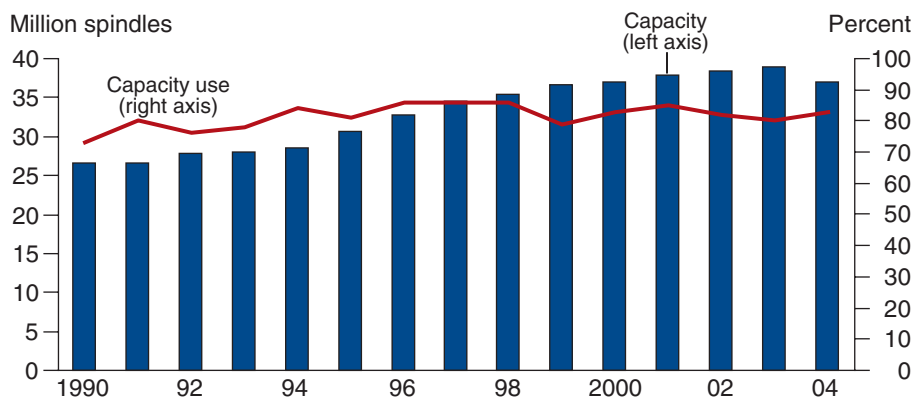


Source: U.S. Department of Agriculture, Economic Research Service, Bilateral Fiber and Textile Trade Database.

duties on synthetic raw materials (The World Bank). Since 1985, additional reforms, including the 1991 Industrial Policy, the 1992 Textile Order, and the 1996 Tax Policy, aided the sector by removing restrictions on domestic and foreign investment, easing industry entry, and reducing tax differentials between cotton and manmade fiber and yarn (Chakraborty et al.).

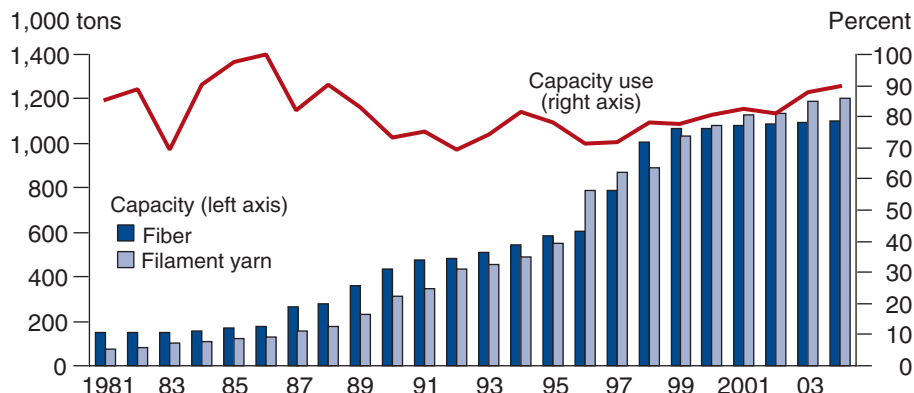
Although the spinning sector now includes a number of technologically advanced spinning mills of recent vintage able to compete on international

Figure 15
India: Capacity and use in the cotton-spinning sector, 1990-2004



Source: Government of India, Ministry of Textiles, Office of the Textile Commissioner.

Figure 16
India: Capacity and use in the manmade fiber industry, 1981-2004



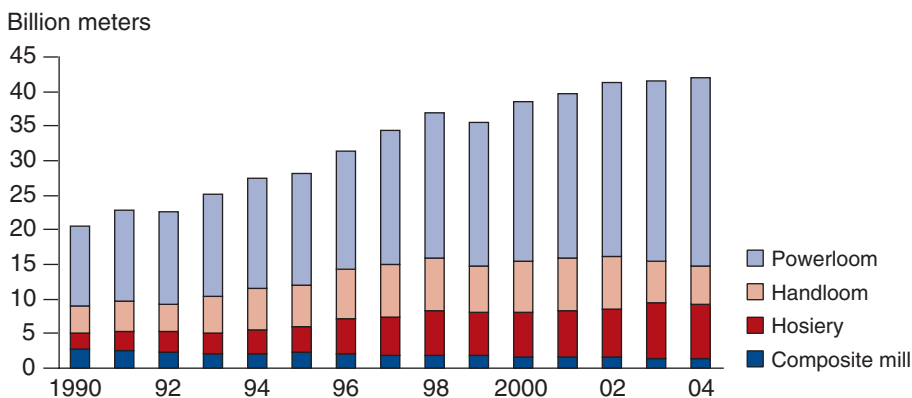
Source: Government of India, Ministry of Textiles, Office of the Textile Commissioner.

markets, average plant size and level of modernization remain low by international standards. In addition to the legacy of past policies promoting small-scale, labor-intensive enterprises, a number of policies, including the Hank Yarn Obligation and high excise taxes on manmade fibers, still constrain the sector's growth and competitiveness.

Trends in Weaving

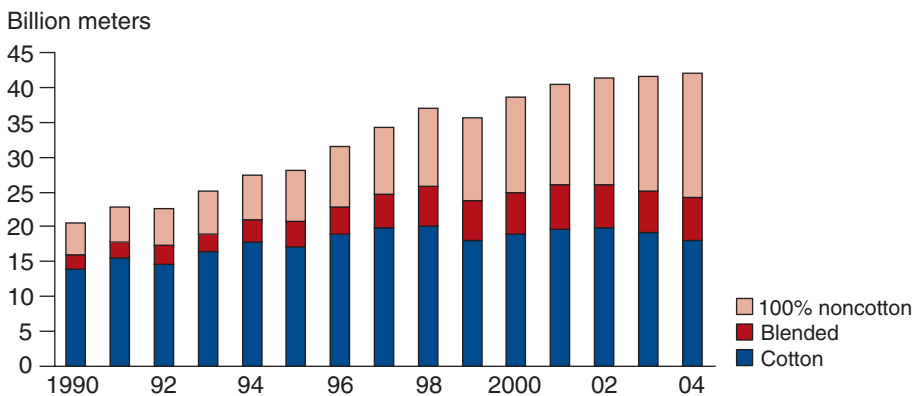
In contrast to the spinning sector, the weaving industry remains highly fragmented and small scale and characterized by the use of outdated technology. Growth in fabric output, however, has been strong, with output expanding about 5.5 percent per year between 1990 and 2003 (fig. 17). The small-scale, independent powerloom sector, which now accounts for about 78 percent of cloth production, grew about 7 percent annually and the relatively small hosiery subsector grew nearly 10 percent annually during this period. Meanwhile, high growth among powerloom and hosiery units offset a 4-percent annual contraction of output from composite mills and the relatively slow 3-percent expansion of handloom fabric production. Reflecting trends in spinning and final demand, output of 100-percent manmade (9 percent) and blended cloth (6 percent) led annual growth since 1990, while annual growth in output of 100-percent cotton cloth was only about 0.6 percent (fig. 18).

Figure 17
India: Cloth production by sector, 1990-2004



Source: Government of India, Ministry of Textiles, Office of the Textile Commissioner.

Figure 18
India: Cloth production by type, 1990-2004



Source: Government of India, Ministry of Textiles, Office of the Textile Commissioner.

The unorganized powerloom sector filled the void created by the decline of the organized composite mills. The proliferation of powerlooms stemmed largely from the ability of small-scale operators to avoid or evade government-imposed labor restrictions and excise taxes and, in some cases, payment for electrical power. Over time, however, government regulations, coupled with credit constraints among small-scale operators, led to a sector characterized by the use of obsolete technology and the lack of backward or forward integration with spinning or finishing.

India remains internationally competitive in the production and export of low- and medium-quality “grey” (or unfinished) fabrics in relatively small production runs. Between 1990 and 2000, exports of powerloom cotton cloth and “madeups” (items such as household linens that require minimal manufacturing) grew 27 percent annually in value and became an increasingly important source of final demand and foreign exchange. However, the current small-scale, nonintegrated, low-technology structure is ill-equipped to compete in high-quality markets or to meet the needs of large buyers.

In recent years, progressive powerloom operators have upgraded their operations through investment in modern shuttleless looms. Shuttleless looms—70 percent of which are imported into India as second-hand equipment from the United States, Italy, and Japan—produce superior-quality fabric and reduce labor costs by 75 percent, compared with traditional shuttle looms. However, the powerloom sector currently has about only 15,000 shuttleless looms, accounting for less than 1 percent of loom capacity.

Technology Upgradation Fund Scheme (TUFS)

To facilitate needed structural transformation, the Government established TUFS to provide subsidized, low-interest loans (6 percent versus the 12-percent market rate) to purchase imported shuttleless looms. However, use of TUFS subsidies within the unorganized sector has been limited largely because small-scale producers either do not qualify to receive concessional financing under the scheme or perceive the benefits of participating to be less than the costs associated with increased exposure to government taxes and regulations, as well as the possibility of penalties for past evasion (www.fibre2fashion.com, 2003c). To encourage additional participation, the Government recently reduced interest rates to 2.5-3.0 percent for investments made by larger cotton-processing units (www.fibre2fashion.com, 2004a).

Handlooms

The heavily protected handloom sector is growing much more slowly (about 3 percent annually) than the powerloom and hosiery sectors but still accounts for about 13 percent of cloth output. Handlooms, which are highly labor intensive and viewed as a source of employment and supplementary income for 6-7 million people in over 3 million weaver households, will likely continue to receive preferential policy treatment (The World Bank; Kathuria and Bhardwaj). The Government provides handloom operations with tax exemptions, low-interest loans, and rebates on fabrics sold through cooperatives, and also “reserves” exclusive rights for handloom operators to produce 11 items, such as nonterry towels and some varieties of bed sheets (rediff.com). In addition, through the Hank Yarn Obligation, handloom operators receive a subsidy on inputs of cotton yarn from the organized spinners.

Fabric Finishing

As in the weaving sector, most fabric finishing, or processing, is conducted by small-scale, nonintegrated firms in the unorganized sector using outmoded technology. Only about 200 of the roughly 2,300 processors are integrated with weavers or apparel firms. The current structure allows India to be competitive in the production and export of “grey” fabrics and relatively small lots of medium-quality finished textiles, but not in supplying high-quality product or in meeting the needs of large international buyers.

Tough environmental standards, in addition to the tax and power cost benefits that small-scale finishers receive, have affected modernization in the cloth-finishing sector. Fabric finishing involves use of dyes and chemicals that are hazardous pollutants unless properly treated. In some areas, including the intensive textile zone in Tamil Nadu, regulations that include zero or very low emission tolerances discourage the entry of modern, large-scale firms and boost incentives for finishers to remain in the unorganized sector and outside the regulatory net.

Apparel Manufacturing

The apparel sector, like weaving and finishing, is characterized by a large number of independent, small-scale firms. While it is not unusual for apparel manufacturing to be both relatively small-scale and independent from the upstream segments of the textile supply chain, India’s apparel firms tend to be smaller and more labor intensive than other major exporters. Unlike the other segments of the textile industry, the apparel sector is relatively new because, traditionally, most Indian garments were made in the home or on a custom basis by local tailors. One study found that about 93 percent of the apparel firms that existed in 1990 did not exist before 1980 (Tait).

The small-scale nature of India’s apparel industry has been shaped directly by policies that, until removed in 2001 and 2002, restricted woven and knitted apparel firms to the small-scale-industry (SSI) sector.² In 1999, the apparel sector was made up of about 58,000 firms, of which about 48,000 produced woven products and 10,000 produced knitted products (Hashim). Only 6 percent of firms operate with more than 50 machines, and more than 80 percent operate with less than 20 machines. While some firms produce exclusively for either the domestic or export market, most are “fabricators,” or independent contract producers, that produce for both markets. Even export-oriented manufacturers are small by international standards. According to a 2002 study, the average Indian garment exporter had about 119 machines, compared with 698 in Hong Kong and 605 in China (Verma).

Because of the predominance of very small-scale fabricators in the apparel sector, most apparel is produced on a contractual basis for large manufacturers/exporters. The fabricators specialize in low-wage, labor-intensive sewing and have the flexibility to meet small custom orders but are much less competitive with large orders and those typically involving high levels of automation. It is not clear if the current structure of the Indian industry, with many small-scale firms that are not suited to meeting the needs of large international buyers in a timely manner, will remain competitive in the post-MFA world (Kathuria and Bhardwaj).

²SSI investment limits have ranged over time from Rs6-Rs30 million (\$130,000-\$670,000), not including land and building costs.

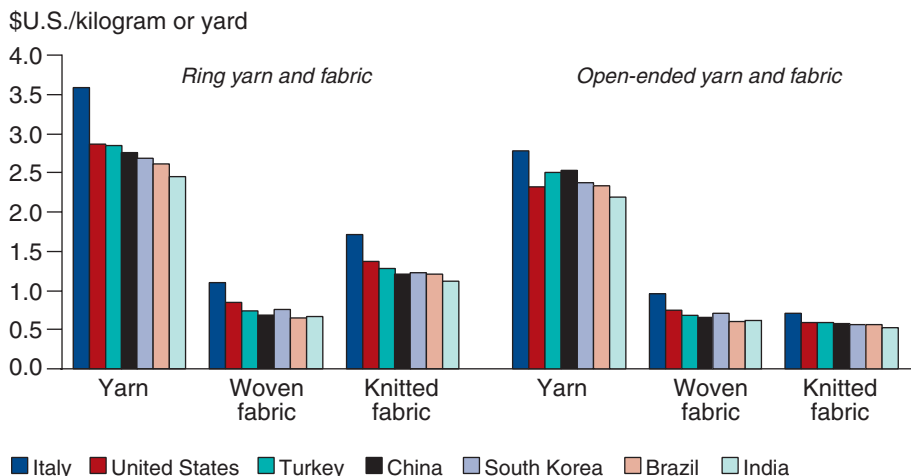
Indian apparel producers are increasingly cognizant of emerging challenges and opportunities. Some firms, including a number of the largest firms in the textile business, are increasing investment in larger scale apparel enterprises, as well as in integrated operations involving some combination of spinning, weaving, finishing, and apparel making. But domestic and foreign direct investments to build capacity and strengthen competitiveness in the apparel sector have been small, compared with investments in some other countries, particularly China.

Competitiveness of Spinning and Weaving

Yarn and fabric cost of production data for selected major producing countries indicate that India is a highly competitive producer of yarn and unfinished cloth, despite the small-scale, low-technology, and nonintegrated structure of the industry. Based on 2003 data, India is particularly competitive in the production of yarns and fabrics based on both the “Ring” and “Open-ended (O-E)” spinning methods—two standard manufacturing technologies (fig. 19). Ring spinning is an older, relatively labor intensive method that produces a smooth yarn, while the O-E technology produces a less smooth yarn at a faster speed with less labor intensity. India’s cost advantages stem from its comparatively low costs of labor and raw materials, as well as low wastage. These advantages are partially offset by relatively high power costs. Compared with China, India’s most important competitor, India has significantly lower raw material and wastage costs and similar labor costs but higher costs of power and capital.

The cost competitiveness of the Indian spinning and weaving industries, even with the current scale and state of technology, suggests that India will continue to be a highly competitive global player. Access to low-priced supplies of domestically produced cotton appears to be a significant advantage currently not matched by other key countries with competitive labor costs, including China and Brazil. Advantages in raw material and labor costs provide a foundation for India to maintain and even increase competitiveness, especially if complemented with investments to improve technology, scale, integration, and quality.

Figure 19
International cost comparisons for production of ring yarn, fabric, and open-ended yarn and fabric, 2003



Source: International Textile Manufacturers Federation.

Policy Developments and Private-Sector Initiatives

India has moved more slowly than other key textile exporters, most notably China, to restructure government policy and boost private investment to compete more effectively in post-MFA markets. Despite the numerous post-1985 reforms in the textile sector and except for modernization in the spinning sector, India's industry structure, technology use, and global export market share have changed little. The policy environment, particularly high rates of excise taxation, continues to favor small-scale firms in the unorganized sector that face less regulation and can avoid taxation.

A number of Indian companies have recently been investing in larger scale operations that use modern technology, but the pace has been slow, compared with that of China and some other countries. Data on trade in textile machinery indicate the level and pace of investment in upgrading spinning, weaving, and processing technology. During 1992-2002, China's imports of textile machinery accounted for about 25 percent of world trade in textile machinery and far outpaced those of India and other major developing-country textile exporters (fig. 20). During this period, India's imports of textile machinery averaged about one-fifth of China's, with no upward trend. However, a number of policy and private investment trends, including the increasing interest shown by foreign textile buyers (see box, "[Foreign Firms May Play Role in Developing India's Garment Exports](#)"), could affect the pace of domestic investment and industry restructuring.

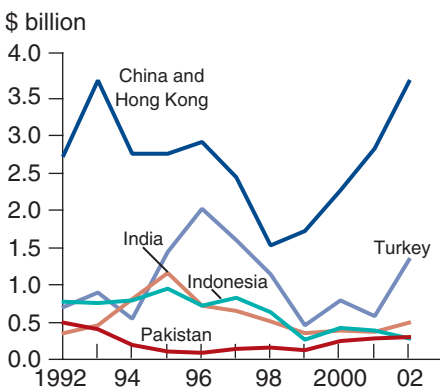
Export Zones and Technology Parks

Two government schemes, Apparel Parks for Exports (APE) and the Textile Centers Infrastructure Development Scheme (TCIDS), now provide firms with incentives to establish themselves in apparel export zones. Economies can be achieved in these zones with the formation of geographic clusters of textile firms specializing in the various aspects of production. To encourage development of export parks, the Government exempts firms from some labor regulations and provides them with concessions on land purchases, credit,

and taxes. Although established long before the introduction of the APE scheme, one such geographic cluster in Tirapur, Tamil Nadu, has captured scale economies that have enhanced India's competitiveness in knitwear. Tirapur now supplies 35-40 percent of India's knitwear exports and has helped India achieve a dominant position in this export market (www.fibre2fashion.com, 2003b).

Figure 20

Textile machinery imports by major developing textile exporters, 1992-2002



Source: U.S. Department of Agriculture, Economic Research Service, Bilateral Fiber and Textile Trade Database.

Removal of Small-Scale Industry Reservation for Apparel Manufacturing

The removal of the SSI reservation for the woven apparel business in 2001 and for knitted

apparel in 2002 could significantly affect India's clothing sector. In a related move in 2002, the Government also removed a regulation that restricted clothing exports to firms that exported at least half of their output, opening exports to all apparel firms. These reforms allow the formation of larger scale firms and permit investment in the more capital-intensive production systems used to produce some apparel items.

Excise Tax Reform

The Government has made limited progress in recent years in reducing the high level of excise taxation in the textile sector—levels that discourage formation of larger, organized-sector firms—and in reducing the tax bias against use of synthetic fibers. In 2003, the Government equalized excise taxes for large- and small-scale yarn producers. The Government has also revived the Central Value Added Tax (CENVAT) scheme that will level the playing field by unifying an assortment of state-level schemes and assessing taxes—including excise taxes—on intermediate and final products based on value addition along the supply chain. Implementation of the CENVAT is, however, facing stiff resistance because it requires states to conform with one

Foreign Firms May Play Role in Developing India's Garment Exports

Today, the world clothing market is dominated by buyer-driven commodity chains (Gereffi, 2000).¹ Large retailers and branded marketers play pivotal roles along global supply chains by setting up decentralized production networks linked to countries in the developing world and by coordinating the range of activities involved in clothing design, production, and marketing. Many of these firms are interested in creating larger scale operations located in fewer countries than was necessary before removal of bilateral quotas. So far, China has been the supplier of choice as the industry has begun adjusting to the post-MFA environment. But, international firms are also increasingly interested in India as a source of supply, both to reduce risk through diversification and because of the growing perception of India as a competitive clothing supplier with domestic sources of fabric.²

Interest in India has intensified due to the removal of MFA quota constraints. Large global retailers, such as Wal-Mart, J.C Penney, The Gap, Ikea (Sweden), Cades (France), OTTO (Germany), and branded marketers, such as Calvin Klein, Lacoste, and Sara Lee, are attracted to India because of its potential to provide one-stop shopping. Wal-Mart has expressed willingness to buy goods worth \$7-\$10 billion from India over the next 2 years provided local companies assure quality products, make timely delivery, and offer competitive prices (www.fibre2fashion.com, 2004c). J.C. Penney also plans to make India an important sourcing hub for apparel, recently expressing willingness to buy \$2 billion worth of products annually (www.fibre2fashion.com, 2004b).

¹By contrast, global auto, computer, and aircraft industries are driven by producer commodity chains in which oligopolistic, capital- and technology-intensive manufacturers exert control over raw material suppliers as well as distributors and retailers.

²A recent World Trade Organization study estimates that, with the elimination of MFA quotas, India could nearly quadruple its share of the U.S. import clothing market to 15 percent while China could triple its share to 50 percent (Nordas). This study estimates that the share of the EU import clothing market captured by both India and China could increase 1.5 fold due to quota removal, rising to 9 and 29 percent, respectively.

scheme, and because it will require firms operating in the unorganized sector to shift to the organized sector and report their activities in order to receive CENVAT refunds on the inputs they purchase. The CENVAT, along with the Government's 2003/04 decision to equalize excise taxes on large- and small-scale yarn producers, could significantly affect industry structure. But it is unclear how effectively either one of these reforms will be implemented.

Excise taxes have recently been reduced on some manmade products, but taxes on products made of synthetic fiber remain considerably higher than for those made from cotton. In the 2004-05 budget, the Government reduced the CENVAT rates for products made of pure cotton to 4 percent and the rate for products made of blended fibers to 8 percent. However, while the tax on polyester filament yarn fell from 24 to 16 percent, taxes on all other manmade filament fiber and yarn were raised from 12 to 16 percent.

Foreign Direct Investment Constraints

India has relaxed many restrictions on private foreign investment, both economywide and in the textile sector, within the last decade. The Government removed a 49-percent cap on foreign ownership of individual firms in the weaving sector in 2001, although a 24-percent cap on foreign investment in apparel-sector firms remains in effect. Total inflows of foreign direct investment (FDI) for all sectors have increased in response to the economic reforms begun in the early 1990s, averaging about \$4 billion annually during 2002-04, but FDI remains small relative to domestic investment. Moreover, since 1991, the textile sector has accounted for only about 1 percent FDI inflows in India (Government of India, 2004a). According to a World Bank survey, bureaucracy and multiplicity of regulations are seen as major impediments to FDI in both the textile sector and other areas of India's economy (Government of India, 2005).

Labor Reform

Indian labor policies are cited by Indian companies as a principal constraint on firm size, industry investment, and international competitiveness. These policies include minimum-wage requirements and rules that prevent firms larger than 100 employees from laying off workers. Because of these policies, a number of public- and private-sector composite mills that have not operated since the 1980s are still obligated to financially support the workers they employed. As a result, it is not uncommon for larger firms to organize into small-scale units for the purpose of avoiding labor regulations.

Although private industry has tried repeatedly to change these policies, primarily by raising the employment level at which the regulations apply, labor reforms have proven politically difficult to achieve. The current government has proposed that state governments be permitted to substantially ease labor regulations for firms operating in export zones, but this controversial legislation is still pending.

MFA Quota Removal and Indian Textile Exports

In the world market, bilateral quotas sanctioned under the MFA restricted developed-country imports from India in various product categories until the quotas were eliminated in January 2005. In India, the lowering of these trade barriers is viewed as an opportunity as well as a threat. It is an opportunity

because markets will no longer be restricted and a threat because markets will no longer be guaranteed by quotas and even the domestic market will be open to competition (Kathuria and Bhardwaj). India is, however, likely to be a net beneficiary of the elimination of MFA quotas for two reasons:

- Evidence indicates that India's exports have been constrained by MFA quotas.
- The MFA quotas may have discriminated against export of cotton products, products in which India appears to have a strong comparative advantage.

Under the MFA regime, about three-quarters of Indian garment exports were destined for the United States and the EU, where most quotas were levied. In 2002, the MFA quotas were binding on eight product categories exported to the United States and five categories exported to the EU (USITC). The degree to which the MFA quotas restricted Indian exports can be analyzed using export tax equivalents (ETEs), which quantify the implicit tax on India's exports in specific product categories in specific markets.³ In 2002, the most recent year for which estimates are available, ETEs for Indian apparel exports averaged 12.5 percent, lower than for Bangladesh (21.5 percent), China (19.7), and Hong Kong (18.6), but higher than for other developing-country exporters (Andriamananjara et al.). The 2002 ETEs for India's textile exports averaged 18.4 percent, the highest among the developing-country exporters.

The ETE estimates suggest that the removal of the MFA quotas will provide potentially significant benefits to Indian exporters in a number of important product categories, such as knitwear and men's shirts. The overall significance of these potential gains are borne out in model-based economic analysis (see box, "[Model-Based Assessment of the Impacts of MFA and Domestic Reforms on India](#)"). Success is not, however, a foregone conclusion partly because of nonquota constraints and emerging developments in the international market:

- **China.** China is generally viewed as posing the biggest threat to the expansion of textile and apparel exports by India and other potential suppliers. The World Trade Organization (WTO) predicts that, in a free market, China could capture half of the world market for textiles and apparel by 2007, up from 16 percent in 2002 (Nordas). China's clothing sector is significantly more competitive than India's. On average, Chinese factories are 20 times larger than those in India. China benefits from the management expertise of firms from Hong Kong now operating in China and from foreign direct investment inflows that are 10 times larger than in India (*The Economist*). By contrast, India's underdeveloped infrastructure, high costs of doing business, and stringent labor laws hinder investment and competitiveness.
- **Tariffs.** Even with quotas removed, steep tariffs on textiles and clothing continue to be widely used to protect many countries' markets from imports. Tariffs are as high as 12 percent in the European Union (EU), 33 percent in the United States, and higher still in many developing countries (*Financial Times*, 2004). In the United States, the average tariff on clothing made from cotton is 28 percent, while the average rate for clothing made from manmade fibers is 17 percent (U.S. Department of State and U.S. Central Intelligence Agency).

³ETE is defined as the ratio of the quota premium (QP) to the unit value or price of export (UV) minus the quota premium: $ETE = [QP/(UV - QP)] * 100$. Calculation of an ETE requires data on prices at which quotas are transferred by product, information that can be secured from firm records.

- **Regional Trade Agreements.** Many textile-producing developing countries, such as Mexico, Mauritius, and Guatemala, have duty-free access to developed-country markets because they belong to regional preferential trade agreements, like the North American Free Trade Agreement (NAFTA), the African Growth and Opportunity Act (AGOA), and the Caribbean Trade Partnership Basin Act (CTPB). The South Asian Association Regional Cooperation (SAARC), the regional agreement to which India belongs, is planning a consortium on textile and apparel. However, such a consortium is unlikely to significantly benefit India given the similar economic profiles

Model-Based Assessment of the Impacts of MFA and Domestic Reforms on India

The impacts on India of the elimination of MFA quotas and of selected reforms to domestic textile policies have been analyzed by Elberhi et al. using a global general equilibrium model. The impacts of MFA quota removal are analyzed based on the terms of the Agreement on Textiles and Clothing, which called for the removal of all quotas by January 2005. The package of domestic reforms analyzed included removal of restrictions on imports and exports of cotton and cotton-based products and removal of the Hank Yarn Obligation. These reforms were assumed to lead to an increase in labor productivity in India's apparel sector to levels achieved by China.

The results of the analysis indicate substantial increases in output and net exports of textiles and apparel as a result of the package of domestic reforms, resulting in total annual welfare gains of about \$810 million. Gains are particularly large for cotton-based products, and percentage increases in output and exports of cotton-based products exceed increases in raw cotton output. The estimated benefits of domestic reforms are increased substantially when the impacts of MFA quota removal are included. With MFA quota removal and domestic reform, annual welfare gains more than double to \$1.97 billion.

This model-based assessment likely results in an underestimate of the potential gains from domestic reform because it excludes any impacts of increased productivity of factors of production other than labor. It also excludes the impacts of potential improvements in efficiency from integration and restructuring in other segments of the value chain, particularly weaving.

Impacts on India of domestic and Multifiber Arrangement (MFA) quota reforms, 2003

Sector	Domestic reforms only			Domestic and MFA reform		
	Output	Exports	Imports	Output	Exports	Imports
	<i>Percent change</i>					
Cotton clothing	5.9	8.3	-14.0	15.1	20.1	-7.3
Noncotton clothing	5.7	8.8	-14.1	10.8	14.5	-7.7
Cotton textiles	5.1	36.7	2.2	10.1	60.9	7.4
Noncotton textiles	.2	-8	1.4	-.2	-6.3	4.9
Cotton	3.2	77.5	3.5	4.8	66.9	8.1

Source: USDA/ERS calculations based on data from Aziz Elbehri, Thomas Hertel, and Will Martin, 2003, "Estimating the Impact of WTO and Domestic Reforms on the Indian Cotton and Textile Sectors: a General-Equilibrium Approach," *Review of Development Economics* 7:343-59.

of the South Asian countries. The preferential tariffs among members of various regional trade agreements will continue to pose a barrier to Indian exports even in the absence of the MFA quotas.

- ***Domestic Trade Remedy Laws.*** Trade-remedy measures, such as anti-dumping duties (ADs) and countervailing duties (CVDs), adopted by importing countries to shield domestic firms from foreign competition represent a growing problem for Indian exports. Between 1997 and 2001, the EU imposed ADs ranging from 7 to 20 percent on Indian bed linens. Following the WTO case ruling against such duties, the EU used CVDs ranging from 4.4 to 10.4 percent to constrain imports of Indian bed linen (www.fibre2fashion.com, 2003a). Trade remedies were also imposed on Indian imports by South Africa (acrylic blankets) and South Korea (cotton yarn) in 2003. In the absence of the MFA quotas, trade remedy action may become an increasingly important barrier to Indian exports, particularly in markets formerly protected by the quotas.

Cotton Production

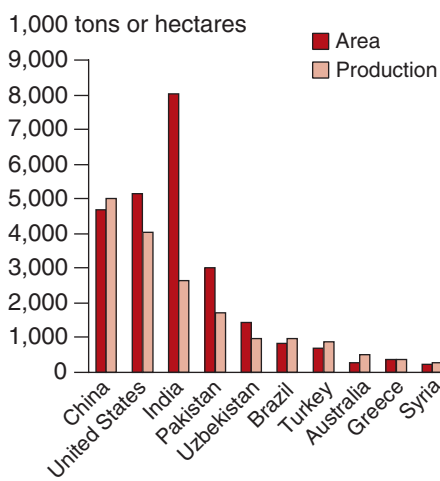
Although India is a major cotton producer with significant potential to expand output, it is not clear if domestic production will keep pace with the quantity and quality needs of an expanding textile and apparel industry. India is the third-largest cotton producer in the world (fig. 21). Cotton area is significantly larger than any other country in the world—accounting for about 25 percent of global cotton area—but average yields are the lowest among the top-10 global cotton producers (fig. 22). Area and yield gains have boosted cotton production 2.4 percent annually since 1990, but progress in raising yields toward levels achieved by other major producers has been slow. In addition to low yields, the quality of India's cotton is often poor because of an array of technical, economic, and institutional factors. The extent to which these productivity and quality factors can be addressed will be critical in determining India's competitiveness in global textile markets and whether rising cotton demand will be supplied by domestic producers or by global markets.

Production Trends

Cotton production has grown significantly since the mid-1980s due to improvements in both area and yield, but growth slowed in the 1990s because of a sharp slowdown in yield gains (fig. 23 and table 2). Since 2000, rising yields and, more recently, a rebound in area planted have again restored stronger growth in production, but it is uncertain if these gains will be sustained. Output continues to show large annual variations due primarily to weather-induced fluctuations in average yields. About 65 percent of cotton area is not irrigated and is dependent on erratic monsoon rainfall, a share that has remained relatively constant since the late 1980s.

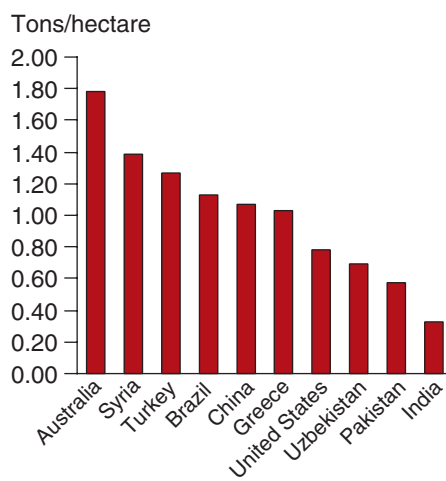
Area, yield, and production trends have varied sharply across each of India's distinctly different cotton-producing regions (fig. 24). The overall slowdown

Figure 21
Major world cotton producers,
2001-03 average



Source: U.S. Department of Agriculture, Foreign Agricultural Service, Production, Supply, and Distribution database.

Figure 22
Yields of major world cotton
producers, 2001-03 average

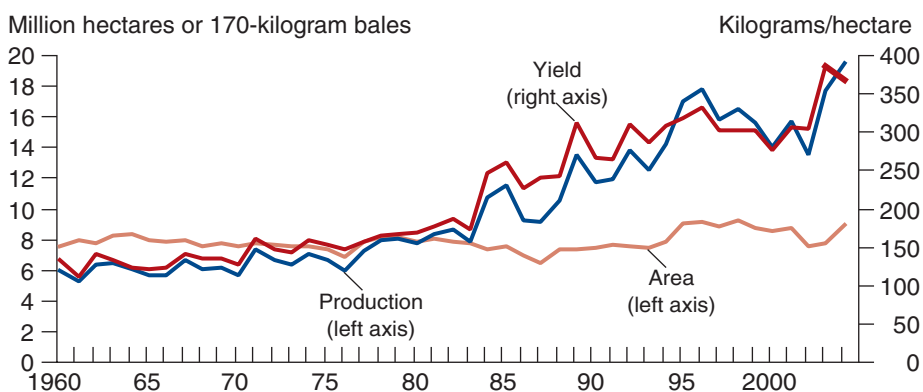


Source: U.S. Department of Agriculture, Foreign Agricultural Service, Production, Supply, and Distribution database.

in growth of cotton production during the 1990s was due primarily to declines in area and yields in the North zone (Haryana, Punjab, and Rajasthan) that began after 1995 (fig. 25). Most cotton in this zone is irrigated, explaining why the North has traditionally achieved the highest yields. But both area and yield fell in this region during the late 1990s because of adverse weather and pest infestations, as well as a lack of suitable high-yielding, short duration, and pest-resistant varieties (fig. 26). Crop competition also played a role, as increased support prices for wheat and rice tended to shift area out of cotton, as well as reduce the harvest period. During the last several years, yields have improved significantly in the North zone, largely due to the availability and increased planting of higher yielding, short-duration hybrid varieties.

Figure 23

India: Cotton area, production, and yield, 1960-2004



Source: U.S. Department of Agriculture, Foreign Agricultural Service, Production, Supply, and Distribution database.

Table 2

India: Trends in cotton area, yield, and production, 1969-2004

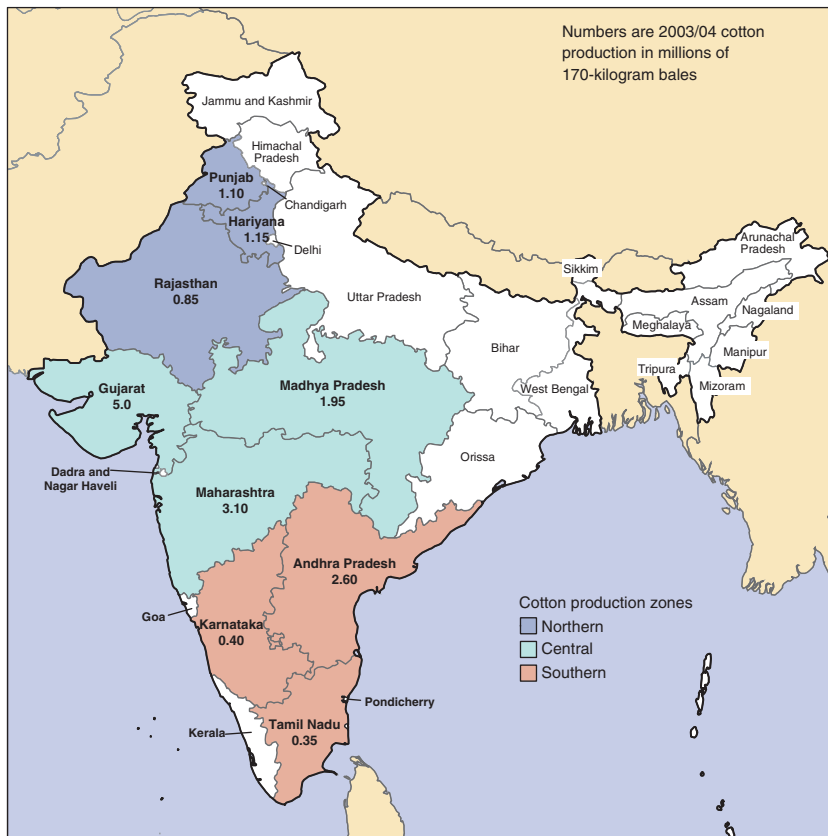
Item	Area	Yield	Production
	<i>Million hectares</i>	<i>Kilograms/hectare</i>	<i>Million 170-kilogram bales</i>
1969-71	7.71	141	6.41
1979-81	8.00	171	8.07
1989-91	7.48	281	12.37
1999-01	8.70	295	15.12
2002-04	8.13	353	16.91
		<i>Percent</i>	
Growth rates: ¹			
1970s	.4	2.0	2.3
1980s	-.7	5.1	4.4
1990s	1.5	.5	2.0
1990-2003	.6	1.8	2.4
Regional growth rates, 1990-2003:			
North	-.9	-2.9	-3.9
Central	1.5	3.5	5.1
South	-.2	.7	.5

¹Annual growth rates between period average centered on years indicated.

Sources: USDA/ERS calculations based on U.S. Department of Agriculture, Foreign Agricultural Service, Production, Supply, and Distribution database and data from U.S. Department of Agriculture, Foreign Agricultural Service, GAIN Reports.

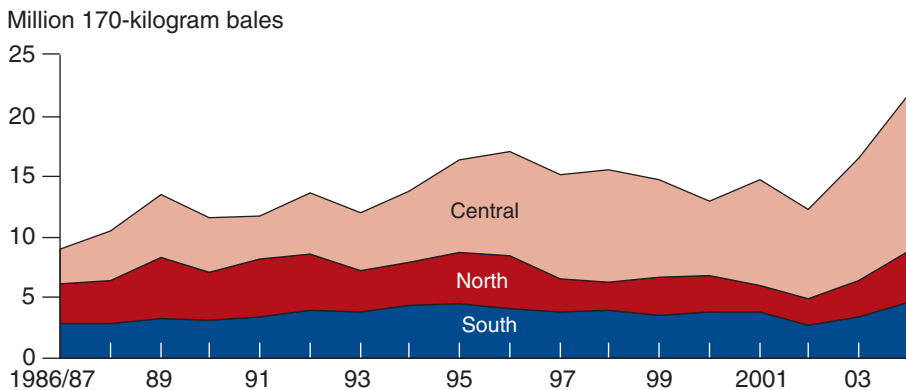
Cotton production showed relatively strong growth in the Central zone (Gujarat, Maharashtra, and Madhya Pradesh), India's major cotton region, throughout much of the 1990s. The Central zone, which accounts for about 63 percent of all cotton area and where only 16 percent of cotton area is irrigated, has had the fastest growth in output (5.0 percent) and yields (3.4 percent) since 1990. Yields in the Central zone, traditionally the lowest in

Figure 24
India: Cotton production by state



Source: U.S. Department of Agriculture, Foreign Agricultural Service, GAIN Reports.

Figure 25
India: Cotton production by region, 1986/87-2004



Source: U.S. Department of Agriculture, Foreign Agricultural Service, GAIN Reports.

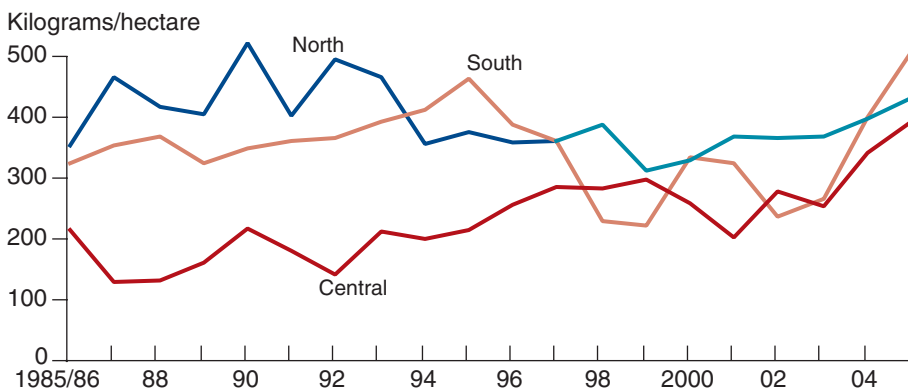
India, have now gained substantially on those in the North and South zones, but remain vulnerable to the most annual weather-induced variation. India's highest cotton yields since the mid-1990s have generally been in the South zone (Andhra Pradesh, Karnataka, and Tamil Nadu), where about 20 percent of cotton area is irrigated and about 60 percent of area is planted to hybrid varieties. Yields in the South zone, however, showed little growth during the 1990s, partly due to significant problems with pest resistance to insecticides in some areas, but have shown a modest upward trend since 2000.

Factors Contributing to Low Yields

The relatively rapid gains in productivity in the predominately rainfed Central zone since 1990 are due to technological advances that, if combined with a continuation of recent modest growth in the North and South zones, could lead to a substantial hike in national average yields and production. Current yields in farmers' fields are well below not only the theoretical peak yields of the major varieties cultivated, but also the average yields achieved in demonstration plots under both irrigated and unirrigated conditions (table 3). While this productivity gap indicates that significant further onfarm yield improvements are possible, a range of technical, economic, and institutional factors prevent realization of the potential of the varieties cultivated (table 4):

- **Delayed Sowing.** Late sowing of cotton reduces yields by providing less optimal sunlight conditions for crop development and, in some areas, by allowing less time for picking the mature crop before clearing the field for the following crop. Sowing delays are caused either by the late arrival of seasonal rainfall needed for sowing or by delays in harvesting the preceding crop. Yield losses associated with late sowing and shortened harvest times may be reduced by new shorter duration varieties and better management, but crop competition will likely continue to limit yields in some areas.
- **Monsoon Dependence.** Erratic monsoon rainfall affects 60-70 percent of cotton area, reducing yields through moisture stress and creating risk that reduces investment in seed, fertilizer, and pesticide inputs. Even with improved varieties and management, average yields in the mostly rainfed Central and South zones are likely to remain below those achieved in other countries with more reliable rainfall.

Figure 26
India: Cotton yield by region, 1985/86-2005



Source: U.S. Department of Agriculture, Foreign Agricultural Service, GAIN Reports.

- **Poor Seed Quality.** Poor seed quality is a pervasive problem in cotton cultivation. Only about 35 percent of cotton area is sown with certified seed with assured varietal purity and germination. Commercially available seeds are often of poor quality, with sale of uncertified, substandard, and second generation (F2) hybrid seeds not uncommon. Although supplies of certified seed are generally available, financial constraints lead most farmers to use retained seeds or lower priced uncertified seeds from the market.

The proliferation of cotton varieties in markets and farmers' fields confounds efforts to improve seed quality, maintain varietal purity, and improve crop management practices. Roughly 100-130 cotton varieties developed in both the public and private sectors are now cultivated in India. A study by the Central Institute for Cotton Research (CICR) indicates that the average cotton farmer in the Central and South zones plants 3-4 varieties on farms averaging about 2 hectares, a practice that greatly complicates crop and seed management.

- **Plant Protection.** Insect and disease infestations, including bollworms, white fly, jassids, and leaf curl virus, are significant problems in India's three cotton production zones. Although per hectare use of pesticides is higher for cotton than for any other crop, effective plant protection is constrained by poor farm management, pesticide subsidies that encourage indiscriminate use, and problems with pesticide quality. Improved onfarm pest management practices, including appropriate crop rotations, pest surveillance, pesticide applications, and adoption of Integrated Pest Management (IPM) practices have proved difficult to implement on small, resource-constrained farms.

Table 3
India: Yield gaps for major cotton varieties

Zone/state	Varieties	Share of state production	Potential yield	Yield gap range
		<i>Percent</i>	<i>Kilograms/hectare</i>	
North:				
Punjab	F414/F1054, J34/F846	91	1,200	700-800
Haryana	H777, J34/F846	88	1,000	600-650
Rajasthan	J34/RST-9	71	1,000	700-775
Central:				
Gujarat	H6	61	1,000	150-750
Madhya Pradesh	H6/JKHy-1	41	600	300-500
Maharashtra	NHH44	35	500	225-350
	LRA 5166	28	400	225-350
South:				
Andhra Pradesh	MCU5, JKHy1/H4	24	800	400-650
	MECH 1 and 11, LK861	72	600	400-650
Karnataka	DCH32	49	1,200	200-1,000
Tamil Nadu	DCH32, TCHB2	13	1,200	150-900
	MCU5, LRA5166	82	1,000	150-900

Source: USDA/ERS calculations based on data from P. Ramasundaraman and H. Gajbhiye, 2001, *Constraints to Cotton Production in India*, Nagpur, India: Central Institute for Cotton Research, January 2001, 27 pp.

- **Crop Management.** Large gaps between average onfarm yields and the potential of existing varieties also stem from poor management practices, including use of inappropriate varieties, seed rates, seed spacing, and fertilizer dosages. As in the case of plant protection, improvement of crop management practices is complicated by the need to extend recommended practices to large numbers of small, limited-resource farmers.
- **Lack of Suitable Varieties.** Cotton yields are affected by lack of varieties—or genotypes—suitable for some agronomic conditions. Indian scientists cite three priorities for plant breeding efforts: (1) higher yielding, short-duration, and pest-resistant cultivars for the irrigated North zone, (2) higher yielding varieties for the drought-prone Central zone, and (3) varieties suited for the soils on rice fallow common in the South zone.

Table 4

India: Factors constraining cotton yields

Factor	Cotton area affected
	Percent
Delayed sowing	70
Dependence on monsoon	60
Noncertified seeds	60
Improper plant protection	55
Low input use	40
Nonrecommended seed rate	30
Improper spacing	30
Multiplicity of genotypes	25
Unsuitable soils	20
Nonrecommended genotypes	15

Source: P. Ramasundaraman and H. Gajbhiye, 2001, *Constraints to Cotton Production in India*, Nagpur, India: Central Institute for Cotton Research, January 2001, 27 pp.

Bt Cotton and Implications for Yield Improvement

The most significant recent technological development affecting Indian cotton production is the approval of insect-resistant hybrid *Bacillus thuringiensis* (Bt) cotton for cultivation in India. Initially, the Government's Genetic Engineering Approval Committee (GEAC) approved three Bt varieties developed by a joint venture between Monsanto and Mahyco, an Indian seed company, in March 2002 (table 5). In April 2004, a fourth variety developed by the Indian company Rasi Seeds was approved by the GEAC. During April-May 2005,

Table 5

India: Approved varieties of Bt cotton by producing region

Region/state	Varieties approved before 2005	Varieties approved in 2005	Total approved varieties
North (Punjab, Haryana, Rajasthan)	None	RCH 134, 138 MRC 6301, 6304 Ankur 651, 2534	6
Central (Gujarat, Maharashtra, Madhya Pradesh)	MECH 12, 162, 184 RCH 2	RCH 138, 144, 118 MRC 6301 Ankur 9, 681	10
South (Andhra Pradesh, Karnataka, Tamil Nadu)	MECH 12, 162, 184 RCH 2	RCH 20, 368 MRC 6322, 6918	Andhra Pradesh—5 Karnataka and Tamil Nadu—7

Source: U.S. Department of Agriculture, Foreign Agricultural Service, GAIN Reports.

the GEAC approved an additional 14 varieties from Monsanto, Rasi, and Ankur Seeds. Importantly, while all varieties approved earlier were for cultivation only in the Central and South zones, the 2005 approvals included six varieties for the North zone. In May 2005, the GEAC also withdrew its approval for one of the original Monsanto varieties in all southern states and for the two others in Andhra Pradesh because of reports of poor performance. However, with the recent approvals, there are still five Bt varieties available for Andhra Pradesh and seven for the other Southern states. In addition to the 19 officially approved Bt varieties, approximately 50 unapproved Bt varieties developed and sold by farmers and private seed companies are reportedly being cultivated in the South, Central, and North zones.

With only 3 years of cultivation, including a very poor weather year in 2002, and no official area or yield data that differentiate conventional and Bt cotton, assessing the performance and impact of Bt cotton is difficult. Available information indicates that adoption has been rapid. Approved Bt cotton varieties were planted on an estimated 525,000 hectares in 2004/05, with an additional 600,000 hectares planted to various illegal varieties. In 2005/06, Bt cotton planting is projected at 1.6 million hectares, including 900,000 hectares of government-approved varieties and 700,000 hectares of illegal varieties. Reports on yields, and economic benefits to farmers, have been inconsistent, owing to erratic weather and pest infestation conditions during the initial years of cultivation, the proliferation of unregulated varieties, and whether the source is an opponent or supporter of the technology.

The rapid growth in adoption of Bt varieties implies that farmers see economic benefit from planting Bt cotton, despite the fact that the cost of Bt seed—about Rs1,600 (\$36.80) per 450-gram package—is more than three times the cost of non-Bt hybrids (U.S. Department of Agriculture, Foreign Agricultural Service, GAIN Report). Two recent scientific studies also provide evidence that Bt cotton is effective in preventing damage caused by bollworms on Indian cotton fields and, hence, in improving yields. The studies indicate that the financial benefits of planting Bt cotton in India stem from higher yields rather than reduced costs; the savings from reduced insecticide use are roughly offset by the higher cost of Bt seed. Qaim and Zilberman analyzed data collected in 2001 from Bt field plots designed by Mahyco in seven states and supervised by regulatory authorities. Subsequently, Bennett et al. evaluated data collected from large samples of farmers growing both conventional and Bt cotton under commercial field conditions in the state of Maharashtra in 2002 and 2003. Both studies showed not only a substantial reduction in insecticide use on fields planted with Bt varieties but also significantly higher yields. Qaim and Zilberman found that the average yield in controlled field trials of Bt cotton exceeded those of non-Bt counterparts by 80-87 percent. Bennett et al. found that the average increase in yield on farmer's fields for Bt cotton over non-Bt cotton was about 45 percent in 2002 and 63 percent in 2003.

Two factors suggest that widespread adoption of Bt cotton could significantly affect cotton production in India:

- First, by affording built-in protection from bollworms, Bt cotton helps address one of the most important yield-loss factors in all three

cotton-producing zones. The Bt technology should permit more effective protection from bollworm damage more quickly than would extension efforts to boost use of conventional and IPM methods among the large number of small-scale, resource-poor farmers. In developed countries, the primary benefits of Bt technology have been to reduce costs of both labor and pesticides. In India, by contrast, the evidence suggests that the more effective plant protection afforded by Bt technology will result in higher yields. Adoption of recently approved Bt varieties for the highly bollworm-prone North zone could lead to significantly faster yield growth under the irrigated conditions in those states.

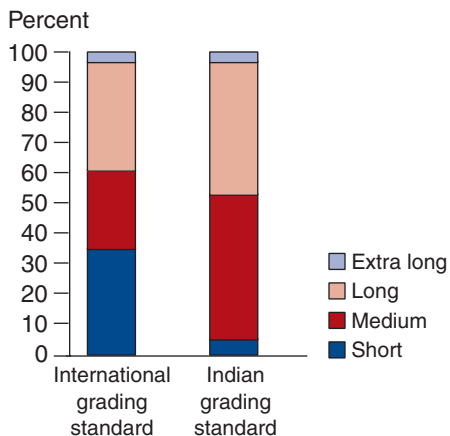
- Second, by reducing pesticide and associated labor costs, Bt technology should be affordable for resource-poor farmers, freeing up resources to purchase other needed inputs, including quality seed. State-level cost of production data for cotton for 1998 and 1999 (the most recent available) indicate that pesticides account for 10-27 percent of production costs. In addition, labor costs—a significant share of which are for pesticide application—account for 44-59 percent of costs (Government of India, Ministry of Agriculture, 2004). Although Bt seed costs more than other varieties and some pesticide applications would still be needed, cost savings may prove to be significant.

Characteristics of Cotton Produced

India is unique among major cotton-producing countries because a broad range of agro-climatic and soil conditions permit cultivation of all varieties and staple lengths of cotton. Indian and international standards use different staple length definitions for classifying cotton. By Indian standards, about one-half of Indian cotton is medium staple length, but, by international standards, only about one-quarter of Indian cotton is considered medium staple (fig. 27). The North zone tends to produce mostly short and medium staple varieties, the South zone mostly long and extra-long staples, and the Central zone a range of medium and long staple varieties.

Figure 27

India: Share of cotton production by staple length



Source: ERS calculations based on data from the Government of India, Ministry of Textiles, Office of the Textile Commissioner, and Cotlook, Ltd., 2005, *Cotton on the Net, Glossary of Terms*.

India has the capacity to produce the full range of staple lengths of cotton needed to meet the needs of its textile industry. And India's hand-picked cotton is considered superior to mechanically harvested cotton in terms of sheen of finished fabric, amenability to spinning, tensile strength, etc. India, however, has significant problems in meeting other quality needs. In particular, Indian cotton is generally contaminated with other fibers and foreign matter and often consists of admixtures of multiple varieties with different fiber characteristics. These problems reduce efficiency (yarn

realization) in the spinning process and result in higher levels of yarn impurities and imperfections. A 2001 survey by the International Textile Manufacturer's Federation indicated that 5 of the world's 10 most contaminated traded cotton types came from India.

Problems with contamination and other quality attributes of Indian cotton have been a key factor behind the upward trend in cotton imports by India's export-oriented textile mills since the late 1990s. The risk associated with the unreliable quality of domestic cotton leads some textile producers to prefer imported cotton to meet export orders that demand consistent quality.

The significant problems with admixture of varieties and contamination stem from practices on farms and in market yards that are not amenable to quick solution. Improvements in quality require better onfarm seed management; improved technology of handling, transportation, and ginning; investments in market infrastructure; and a marketing system that provides price premiums that reflect the costs of supplying quality cotton. Accomplishing these changes will likely require implementation of grades and standards for domestic cotton and improvements in marketing that provide adequate incentives to producers, ginners, and traders to adopt quality-related practices.

Production Policy and Incentives

The principal mechanism to support domestic farm prices is the system of Minimum Support Prices (MSPs), in which the Government sets minimum prices for cotton and other major crops. Cotton MSPs are set for all major varieties and revised annually by the Government in accordance with the recommendations of the Commission on Agricultural Costs and Prices (CACP). CACP recommendations are based on assessments of changes in production costs and trends in domestic and world prices.

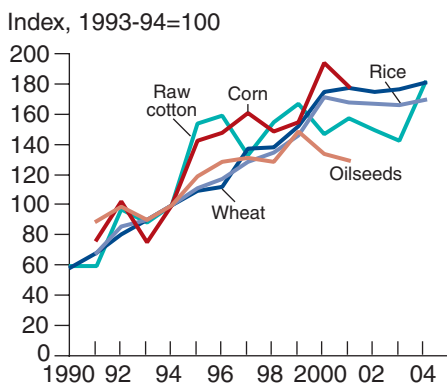
Cotton MSPs, which are defended by market purchases by the Cotton Corporation of India (CCI) when necessary, generally have little influence on producer prices of cotton because market prices are typically well above the MSPs. By contrast, MSPs have significantly influenced market prices for wheat and rice in the principal surplus areas, including most of the North zone (wheat and rice) and Andhra Pradesh in the South zone (rice). The MSPs set for wheat and rice can directly affect area allocated to cotton by affecting relative returns to growers. Returns to wheat and rice production can also affect cotton yield by influencing the portion of the growing season that farmers are willing to devote to cotton production and, hence, the duration of the varieties cultivated and the time available for picking before planting the next crop.

Recent trends in domestic market prices for cotton and competing crops show that cotton prices tend to be more volatile than those for wheat and rice (fig. 28). In addition, market prices of wheat and rice increased 7-9 percent annually between 1995 and 2001 because of unusually large increases in wheat and rice MSPs. By contrast, market prices for cotton increased only 2 percent during the same period. More recently, however, increases in wheat and rice MSPs have slowed and relative market prices of cotton have begun to strengthen.

While the MSP system has generally had little direct impact on cotton production incentives, a number of other domestic regulatory measures have, historically, tended to suppress domestic cotton prices. Over the last 10 years, however, reforms have phased out these regulations and created an environment for stronger incentives to produce cotton:

- **Reform of Maharashtra Monopoly Procurement Scheme.** Until procurement was opened to private traders in 2003, all cotton in Maharashtra, India's second-largest producing state, had to be sold at fixed prices. While protecting farmers against low prices in some years, the policy also led to lower returns in years of high market prices and in delayed payments to farmers when the scheme ran large financial deficits. The 2003 reform, in addition to reducing financial costs, has clarified and strengthened price signals to farmers.
- **Legalization of Futures Trading.** Futures trading in cotton was legalized in 1997 and in 2003 for most other farm commodities. Although illicit forward contracting in cotton was a common practice prior to legalization, expanded futures trading is likely to make price discovery more efficient and transparent while also providing a means to manage price risk. To date, futures trading in cotton remains small, but trading volumes may increase, as they have for several other commodities.
- **Elimination of Export Quotas.** Until their elimination in 2002, India used annual cotton export quotas to limit exports and ensure low and stable raw material prices for the domestic textile industry. The quotas tended to suppress domestic cotton prices by restricting exports, and uncertainty regarding annual quota levels was a source of price risk for growers and traders. Removal of the quotas will strengthen links between domestic and world prices, likely boosting grower returns and eliminating a source of price risk.
- **Elimination of Ginning Regulations.** Regulation of variety-specific ginning fees ended in 1997. The fee-setting mechanism raised costs by preventing competition among gins, encouraged contamination by ginners, and reduced incentives for investment in the industry.

Figure 28
India: Wholesale price indexes for selected crops, 1990-2004



Source: ERS calculations based on data from Government of India, Ministry of Finance, *Economic Survey*, various.

- **Elimination of Credit Controls.** Until lifted in 1996, government regulations restricted use of credit by cotton traders, effectively limiting private storage of cotton lint and yarn and reducing market prices.
- **Elimination of Cotton Control and Transport Orders.** Until elimination in 1995, these controls gave the Government authority to direct domestic movement and storage of cotton, including confiscation of cotton under certain market conditions.

These regulations and their erratic use increased uncertainty and marketing costs, thus reducing and destabilizing grower returns.

Technology Mission on Cotton

Slowed growth in cotton production during the late 1990s, together with the opportunity created by the termination of the MFA, raised the priority for addressing factors that constrain cotton production and quality in India. In 2001, the Government established the high-level Technology Mission on Cotton (TMC) to direct, coordinate, and fund initiatives to raise the productivity and quality of Indian cotton and strengthen returns to growers. TMC activities focus on four program areas, including (1) research and technology generation, (2) transfer of technology to farmers, (3) improvement of marketing infrastructure, and (4) modernization of gins. Although it is too early to evaluate TMC impacts on research and extension, progress in improving market facilities and, particularly, cotton gins is evident in cotton-producing areas.

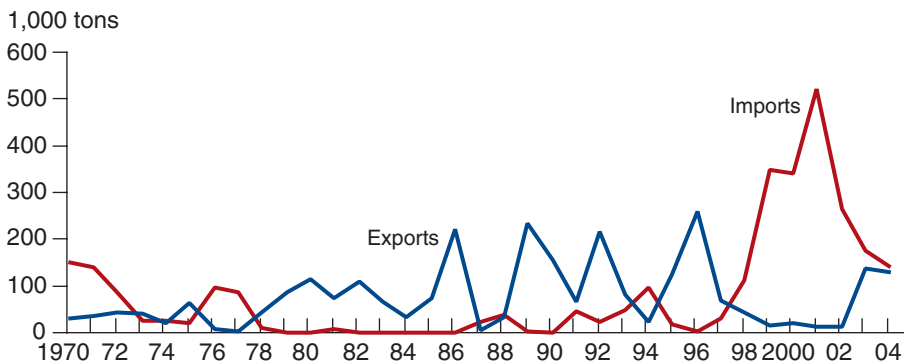
Cotton Trade

India has traditionally been a net cotton exporter, but emerged as a significant net importer in 1998 (fig. 29). Increased import demand has been associated with a combination of steady growth in domestic consumption, rising exports of cotton-based textiles, and a period of stagnating cotton production during 1997-2002 (fig. 30). Rising imports have also been supported by more liberal import policies for cotton since the early 1990s and, in the late 1990s, by increased demand for quality cotton not available in India. Although imports declined in 2003 and 2004 along with the recovery in cotton production, it remains uncertain if the recent gains in production can be sustained.

Import Policy

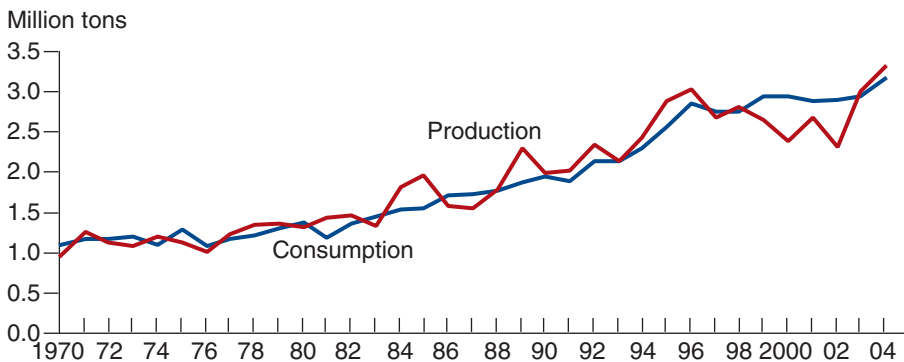
Cotton imports were liberalized in 1991, when the import monopoly of the Cotton Corporation of India was terminated and imports were placed on Open General License, allowing unrestricted imports by private traders. The import duty was originally set at zero, but little import trade occurred until the late 1990s, when world prices declined and India faced domestic supply shortfalls (fig. 31). The import duty was raised to 5.5 percent in 2000 and to

Figure 29
India: Cotton imports and exports, 1970-2004



Source: U.S. Department of Agriculture, Foreign Agricultural Service, Production, Supply, and Distribution database.

Figure 30
India: Cotton production and consumption, 1970-2004



Source: U.S. Department of Agriculture, Foreign Agricultural Service, Production, Supply, and Distribution database.

10 percent in 2002 but remains low relative to tariffs imposed on most other agricultural products. Export-oriented textile units, which are exempt from the import duty, account for most, if not all, of India's cotton imports.

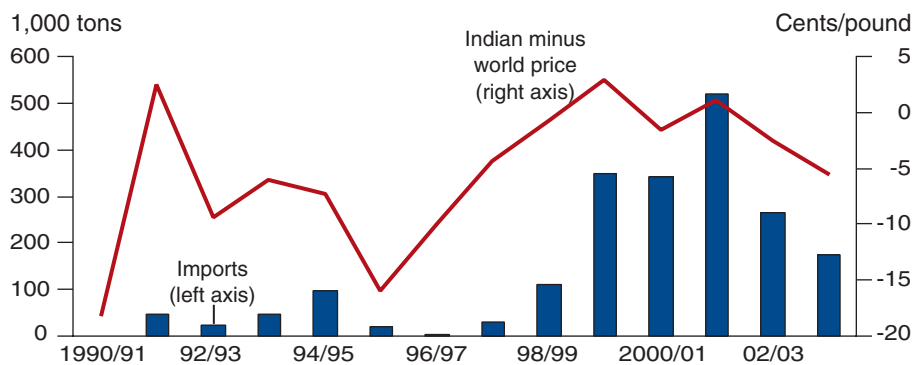
Textile Exporters and the Role of Cotton Quality

Cotton importers and export-oriented textile firms indicate that both price and quality are important factors in decisions to purchase imported versus domestic cotton. Premiums over domestic prices are generally only paid when the desired quality is not available in the domestic market. Typically, large crops have yielded sufficient amounts of quality cotton to meet domestic demand, while small crops result in shortages of quality cotton. But, with textile exports now accounting for a rising share of cotton use, quality needs may be a more consistent driver of imports unless substantial improvements are made in the quality of domestically produced cotton.

Two quality factors of most concern to export-oriented spinners, weavers, and apparel firms are (1) consistency of fiber quality and (2) lack of contamination with other fibers. Both factors pose chronic problems with a large proportion of domestically produced cotton. Indian cotton suffers from inconsistent quality because of the many varieties cultivated and the large numbers of small farmers contributing to each bale. Contamination with other fibers, primarily jute and synthetic fibers from the sacks used by farmers for picking and transport, is a chronic problem that is difficult to identify and rectify once it occurs. Contaminated cotton cannot be used to produce some exported products, such as white and pastel shirting, and, as a result, imported cotton is often used to produce certain items destined for the export market.

In addition to quality, more favorable credit and contracting terms for imported cotton also provide an inducement for export-oriented mills to use imported cotton. Imported cotton typically is purchased with 3-6 months of supplier credit, compared with 15-30 days of credit for domestic cotton.

Figure 31
India: Cotton imports and domestic/world price spreads, 1990/91-2003/04¹



¹Domestic price is average of two Indian cotton varieties, Shankar-6 and H-4, converted to U.S. dollars. World price is an average of the cheapest 5 quotations out of 19 of the principal upland cottons traded internationally (Cotlook Limited's A-Index).

Sources: U.S. Department of Agriculture, Foreign Agricultural Service, GAIN Reports.; Cotlook Limited.

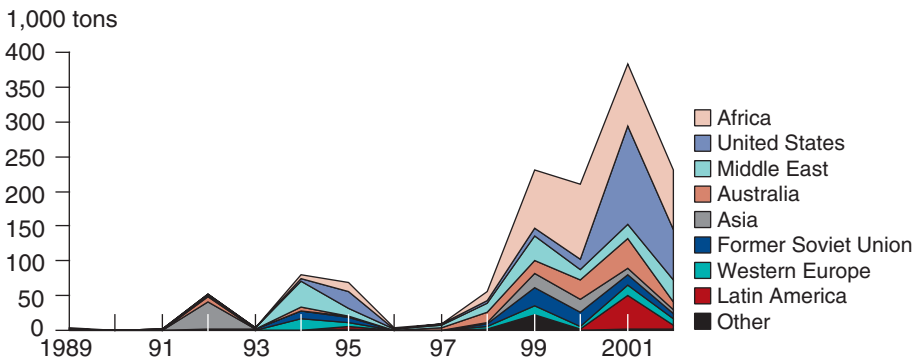
And delivery of imported cotton can typically be arranged over a longer period at a fixed contracted price than can domestic cotton.

U.S. Market Share

India is a diversified and price-sensitive buyer of cotton. The United States, with an average market share of 22 percent during 1998-2002, has been the single largest supplier since large-scale cotton imports began in 1998 (figs. 32 and 33). Other major suppliers during the same period have been Australia (11 percent), Benin (7 percent), Cote d'Ivoire (7 percent), and Egypt (5 percent). On a regional basis, African countries, known to be producers of high-quality, long-staple cotton, have been the largest supplier, with an average share of 34 percent.

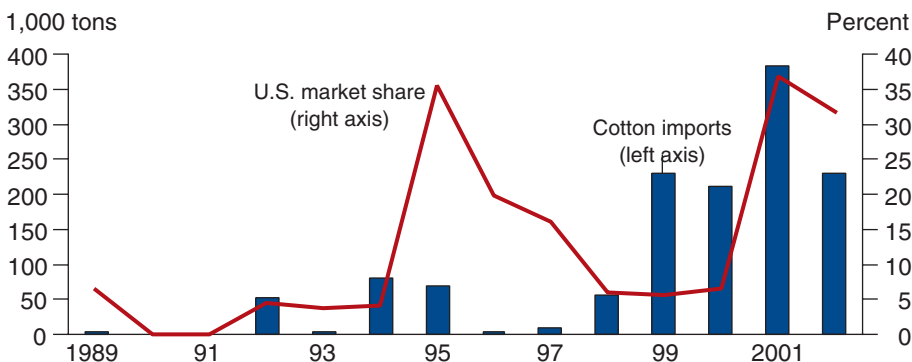
According to Indian traders and textile industry representatives, U.S cotton is favored among many Indian buyers because of its grade uniformity, fiber strength, and lack of contamination. However, many, if not most, Indian buyers base their sourcing decisions primarily on landed price. U.S. cotton holds a relatively strong position within the highly quality-oriented segment of the market, but must be price competitive with Africa and an array of other suppliers with closer geographic proximity to maintain the largest share of the market.

Figure 32
India: Cotton imports by region of origin, 1989-2002



Source: U.S. Department of Agriculture, Economic Research Service, Bilateral Fiber and Textile Trade Database.

Figure 33
India: Total cotton imports and U.S. market share, 1989-2002



Source: U.S. Department of Agriculture, Economic Research Service, Bilateral Fiber and Textile Trade Database.

Implications for Cotton Demand and Trade

Demand for cotton and manmade fibers in India will likely rise as a result of strong growth in incomes in India, as well as increased Indian exports of textiles and apparel associated with the end of MFA quotas. The pace of demand growth for cotton will depend heavily on implementation of reforms in the domestic textile industry, including taxes that discriminate against the use of manmade fibers and the array of past and current regulations that have affected the scale, technology use, and export competitiveness of the textile and apparel industry. Imports of raw cotton have increased in concert with rising demand in recent years, but future growth will depend on the extent to which India can boost chronically low cotton yields and improve cotton quality.

Low per capita use and the significant shares of income devoted to textile consumption indicate that fiber demand will continue to respond to the now rapid growth in rural and urban incomes. Fiber demand will, however, also be responsive to changing prices, so further reductions in the relatively high excise taxes on manmade fibers, coupled with strong rural demand for durable manmade fiber products, will likely continue to slow relative growth in domestic consumer demand for cotton fiber.

The end of MFA quotas is likely to result in significantly faster growth in India's exports of cotton-based textiles and apparel. India's fundamental cost competitiveness in cotton-based textiles and its large share of exports destined for the historically quota-constrained U.S. and EU markets support prospects for significant export growth even without major reforms in the domestic textile industry. Growth in export-based cotton demand would, however, be substantially higher with implementation of measures to boost investment and improve technology, scale, and integration in the weaving, finishing, and apparel sectors to levels of efficiency achieved by China and other major producers. The recent trend in government policy has been to reform the sector, but the pace of reform can be expected to be slowed by political concerns with the adjustment costs associated with restructuring an industry that accounts for a large share of industrial employment.

India has the agronomic potential to meet much, if not all, of its future growth in cotton demand domestically. However, it is unclear if and when the necessary productivity gains will be achieved. The advent of Bt cotton, which appears to be yield enhancing and is being adopted rapidly, should lead to significant gains in production in the medium term. The combination of erratic moisture conditions in rainfed producing areas and weak institutions for delivery of seed, technology, and other inputs seem equally likely to slow the pace of productivity growth. In addition, meeting rising demand for quality cotton—particularly contamination-free cotton—will require changes in the cotton supply chain that are unlikely to be implemented quickly.

To the extent that textile and apparel exporters, such as India, can meet rising export demand with domestically produced cotton, the elimination of MFA quotas is likely to lead to diminished prospects for net cotton exporters, such as the United States. Recent yield increases in India, due in part to Bt technology, may signal slower growth in cotton imports in the

medium term as the technology is more widely adopted. However, the quality needs of India's export-oriented textile firms will likely sustain a market for quality cotton for the foreseeable future. Market shares for the Indian cotton market appear to be sensitive to both price and quality. U.S. cotton, with a reputation for consistent quality, can maintain its market share provided it remains price competitive.

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