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# Cotton Backgrounder

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## Abstract

U.S. cotton growers, like producers of other agricultural commodities in recent years, have confronted pressures from market forces and the impacts of policy developments, both domestic and international. Most notably, the ending of the Multifiber Arrangement (MFA) sent a ripple effect throughout the global cotton industry. While adjustments in the textile and apparel sectors of many countries, including the United States, continue to evolve, dramatic changes have already been seen for some. World cotton mill use has accelerated along with economic growth since 1999, particularly in China, and U.S. cotton producers have benefited as foreign import demand has reached new heights. Government payments contribute a considerable portion of total revenue to the cotton sector, and adjustments to this program or any other commodity program in the 2007 farm legislation will be driven by factors such as domestic market conditions, multilateral trade negotiations, and the Federal budget deficit. This report provides background information related to cotton and textiles for the 2007 farm bill discussions.

**Keywords:** Cotton, supply, demand, trade, textiles, apparel, Multifiber Arrangement, farm policy, government support programs.

## Acknowledgments

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World Agricultural  
Outlook Board

## Introduction

Cotton is the single most important textile fiber in the world, accounting for about 40 percent of all fibers produced. On average, the United States produces 20 percent of the global cotton production, and is the leading supplier in the international market. However, the U.S. cotton sector has faced a number of challenges as it shifts from a domestic-oriented market to one focused largely on the global marketplace. Domestic mill demand has declined significantly from only a decade ago as competition from imported textile and apparel products has risen dramatically. Meanwhile, export demand has increased rapidly with the recent expansion of global textile production.

U.S. cotton production reached consecutive records during the 2004 and 2005 seasons, with rising global cotton demand providing a home for much of the increased output. However, the growing use of better crop production technologies overseas may narrow the gap between foreign production and mill use, constraining growth in foreign import demand and U.S. cotton exports. Meanwhile, debate over trade policy and the sustainability of current farm programs are a source of uncertainty for U.S. agricultural commodities in general and the cotton sector in particular.

This report, part of a series of ERS background reports on various commodities, surveys the cotton environment leading up to the congressional debate over the 2007 farm bill. The report analyzes the competition between crops for domestic farmland, and the international supply and demand for cotton products. Also covered are domestic and trade policy, farm program costs, and operating and financial characteristics of U.S. farms producing cotton.

## The Changing Global Cotton Market

World cotton production and mill use have soared to record highs in recent years. As yield-enhancing technology has helped reduce the cost of producing cotton around the globe, rising petroleum prices have further shifted relative fiber prices to favor cotton versus polyester. With yield prospects higher than in the past, farmers around the world have been more willing to devote area to cotton, further easing the ability of the global cotton sector to meet growing world demand for textiles. Robust global economic growth, particularly in developing Asian markets, combined with a steadier share for cotton in world fiber use, has boosted gains in cotton mill use to extraordinary rates in recent years (appendix table 1).

### New Technology Attracting Cotton Acreage

Area planted globally to cotton remained above 85 million acres (34 million hectares) for the third consecutive year in 2006, its strongest performance in over 75 years. Around the world, new technology has made cotton more attractive to farmers in many countries, while policy reforms in other countries have increased farmers' willingness to plant cotton. Outside the United States, the spread of Bt cotton has recently revolutionized India's cotton sector just as China's adoption has run its course. The cost savings of Bt cotton brought millions of hectares back into cotton production in eastern China, and has also helped India's cotton area rebound by more than 1 million hectares. Bt cotton has also been adopted in smaller producing countries like Australia, Argentina, Mexico, and South Africa.<sup>1</sup>

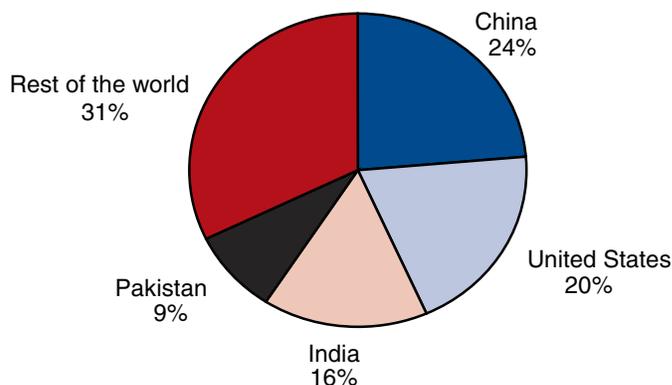
Sub-Saharan Africa's cotton area rose strongly after the 1994 devaluation of the Communauté française d'Afrique (CFA) franc. More recently, reforms in non-franc zone countries have also been important, and area in the region overall has risen more than 1 million hectares since 2000 (Meyer et al., 2005). Developments in Central Asia's cotton sector have been less dramatic, although yields and area in the region have been rising recently for the first time since the collapse of the former Soviet Union. While steady production gains by sub-Saharan Africa briefly made that region the largest export competitor for the United States in 2003, Central Asia's rebound has kept the two regions' exports essentially equal since then.

With technology sustaining global cotton area and improving yields, world cotton production has reached new heights. During the latter half of the 1990s, global production averaged 89 million bales (1 bale = 480 pounds). However, during the first half of the 2000s, the average was nearly 15 million bales higher at 103 million—including a record of 120 million bales in 2004/05. The world's four largest cotton-producing countries are China, the United States, India, and Pakistan, together accounting for nearly 70 percent of world production over the last 3 years (fig. 1). Other major cotton producers include Uzbekistan, Brazil, and Turkey.

<sup>1</sup>For more information on Bt cotton in India, see Landes et al., 2005. For more information about Bt cotton in other countries, see James, 2005.

Figure 1

### World cotton production, 2003-05



Source: USDA, Foreign Agricultural Service, Production, Supply, and Distribution Database.

### Global Economic Growth Spurs Cotton Use

World GDP has been expanding at an above-average rate since 2002, averaging 4.4 percent annually according to the International Monetary Fund, compared with a 1970-99 average of 3.6 percent. Furthermore, these gains have been concentrated in developing Asia, where lower per capita incomes mean a higher income elasticity of clothing demand. As a result, growth in total world fiber use has surged well above its longrun 2.9-percent annual growth rate, averaging 5.4 percent per year since 2002.<sup>2</sup> Cotton mill use has been growing as much as 11 percent annually during this time, as a robust global economy and favorable relative fiber prices came together to a greater extent than at any time in the last 20 years. Between 1999/2000 and 2005/06, world cotton mill use rose 25 million bales to nearly 116 million.

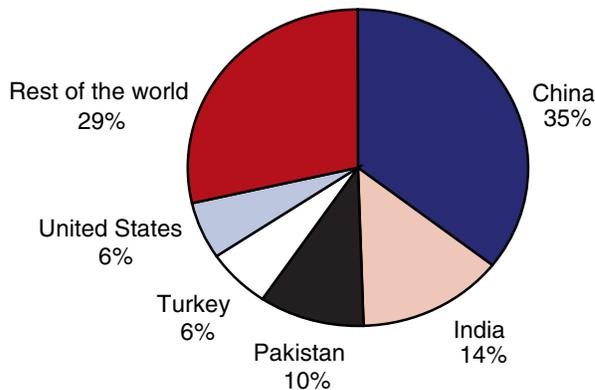
While virtually every country has a textile industry that meets at least part of its clothing demand, some have a strong export focus as well. Accordingly, the geographic distribution of gains in industrial cotton demand for textile production since 1999/2000 has been uneven as textile exporters have come to account for a larger share of global textile production. The world's three largest cotton-consuming countries—China, India, and Pakistan—accounted for 60 percent of global cotton mill demand over the last 3 years (fig. 2). China's increased mill use dwarfs that of any other country, with a 25-million-bale increase between 1999/2000 and 2005/06. Pakistan and India have seen their mill use rise by 4 and 3 million bales in that time. Turkey's mill demand is more than 1 million bales higher, while Bangladesh and Southeast Asia are each about 1 million bales higher. Some smaller countries—including Syria, Egypt, and Argentina—also increased use in recent years.

In addition to growing textile exports, increased domestic demand for clothing is driving increased cotton mill use in most of these regions. Areas with declining mill demand, on the other hand, have been largely driven by developments in textile trade rather than domestic demand. While domestic demand for textiles in the United States has tended to rise, it has not been growing as strongly as in developing Asia. However, U.S. mill use of cotton has fallen as imported cotton products increasingly supplant goods produced

<sup>2</sup>See MacDonald and Vollrath, 2005, for more details on the factors driving global fiber and cotton consumption.

Figure 2

**World cotton mill use, 2003-05**



Source: USDA, Foreign Agricultural Service, Production, Supply, and Distribution Database.

in North America. Lower industrial mill use of cotton has also occurred in the EU, Russia, Mexico, Japan, and South Korea. Textile trade reforms, like the end of the Multifiber Arrangement (MFA) quotas in December 2004, account for some of this shift in cotton mill demand, but the trend is longstanding.

### Trade's Rising Importance

With cotton mill demand growing dramatically, international trade is increasingly important in global cotton markets. Not only has the liberalization of textile trade helped boost world cotton demand through increased efficiency, but geographic shifts in cotton mill use have increased the role of trade in meeting the global textile industry's need for cotton. Imported cotton comprised a larger share of the world's cotton mill use in 2005/06 than in any year since the 1980s. Also, world cotton stocks outside of China have been rising in recent years, partly as a consequence of real interest rates that have been at their lowest levels since the mid-1970s, but possibly also reflecting the increasing role of trade and just-in-time inventory management in manufacturing.

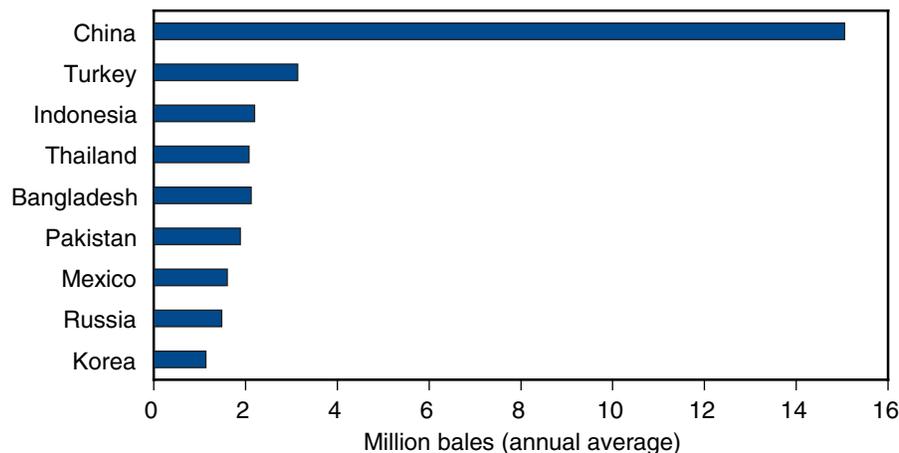
World trade's importance to cotton has rebounded in recent years as China's and (to a lesser extent) Pakistan's textile sectors have grown substantially faster than their cotton production (fig. 3). In 1999/2000, 30 percent of the cotton consumed in the world was first shipped across international borders; by 2005/06, this share had risen to 38 percent. China's imports have surged from negligible levels in 1999/2000 to 19 million bales in 2005/06. With these imports, the tariff-rate quota (TRQ) negotiated with China's 2001 World Trade Organization (WTO) accession (4.5 million bales) has turned out to account for only a small proportion of China's import needs. However, the TRQ is 2.6 times larger than China's average imports during the 10 years prior to its accession. China has opened additional TRQs regularly in recent years, which has increased the role of traded cotton in world cotton mill demand to levels not seen on a sustained basis since the late 1970s.

On the export side of the world trade equation, the United States has accounted for the lion's share of global gains, with 11 million bales of increased exports since 1999/2000 (fig. 4). India's exports are also on the upswing, 3 million bales higher in 2005/06 than in 1999/2000, and sub-

Saharan Africa’s exports grew nearly 2 million bales, a 50-percent increase. Central Asia’s exports are also higher, after falling for several years; the region’s 2005/06 exports were 800,000 bales higher than in 1999/2000. In addition, Brazil’s exports reached levels not seen since the late 1960s, 2 million bales higher than in 1999/2000.

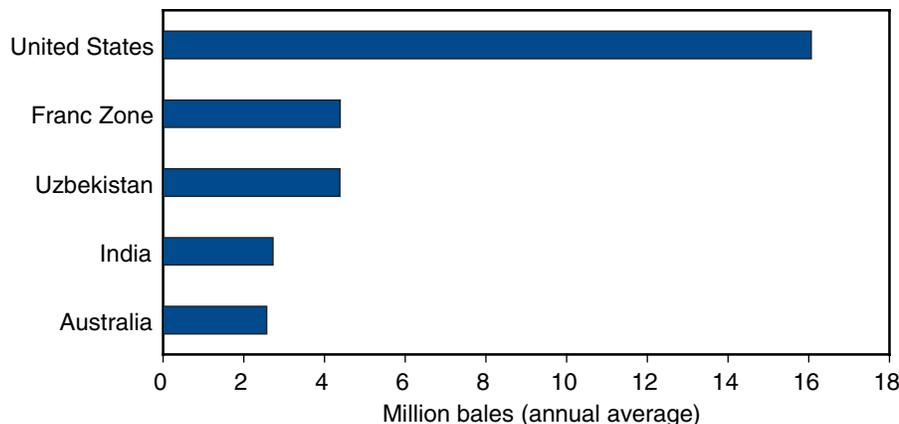
More than half the world’s cotton is now imported by countries that also produce significant amounts of cotton. Early in the 1990s, only 15 percent of world imports went to cotton-producing countries. Therefore, the world market has become increasingly dominated by countries potentially interested in the well-being of their own cotton sectors. This occurred just as U.S. cotton production became significantly more dependent on the world market. Traditionally, trade barriers to cotton have been low around the world, but as markets have shifted, the average tariff facing U.S. cotton exports has risen, and the importance of open and fair trade has grown.

Figure 3  
**Leading cotton importers, 2004-06**



Note: These 9 countries account for 75 percent of world imports.  
 Source: *World Agricultural Supply and Demand Estimates*, WAOB, USDA.

Figure 4  
**Leading cotton exporters, 2004-06**



Note: These 5 countries account for 75 percent of world exports. Franc Zone includes Benin, Burkina Faso, Cameroon, Chad, Central African Republic, Cote d'Ivoire, Mali, Senegal, Togo, and Niger.  
 Source: *World Agricultural Supply and Demand Estimates*, WAOB, USDA.

## U.S. Cotton Market Background

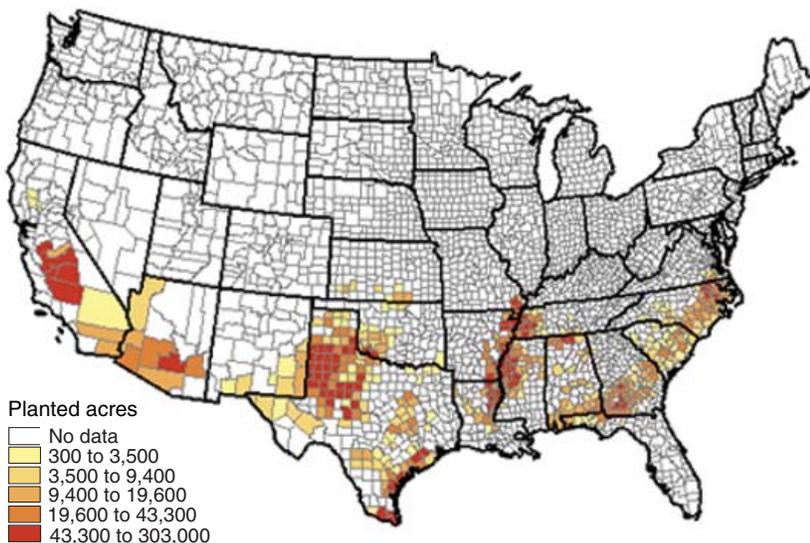
The U.S. cotton sector has experienced dramatic changes in supply and demand over the past decade. While technology has boosted cotton productivity in the United States, demand prospects have shifted from a domestic market sourced mainly with U.S. cotton to an export-oriented market where U.S. raw cotton helps supply a growing consumer demand for cotton products around the globe (appendix table 2).

Cotton is produced across 17 Southern States—from Virginia to California—but is increasingly concentrated. Major area concentrations occur on the Texas Plains; in the Mississippi, Arkansas, and Louisiana Delta; California's San Joaquin Valley; central Arizona; and southern Georgia (fig. 5). In 2002, the latest year for which census data were available, the number of farms harvesting cotton had declined 26 percent from 1997, while the area per farm had expanded 22 percent. The predominant type of cotton grown in the United States is American upland—which accounts for about 97 percent of U.S. production—with the balance commonly referred to as American Pima or extra-long staple (ELS). ELS cotton is produced chiefly in California, with small amounts grown in southwest Texas, New Mexico, and Arizona.

### Demand for U.S. Cotton Shifting

U.S. cotton demand has reached new heights during the past several seasons and become more dependent upon the strength of economic conditions around the world. During the 1990s, cotton mill use in the United States accounted for 60 percent of the total demand for U.S. cotton, while exports accounted for the remainder (fig. 6). Cotton exports have become more important—accounting for about 70 percent of U.S. cotton demand over the last several seasons—as restructuring in the U.S. textile industry continues to unfold. U.S. cotton mill use peaked in 1997/98 at a record 11.3 million

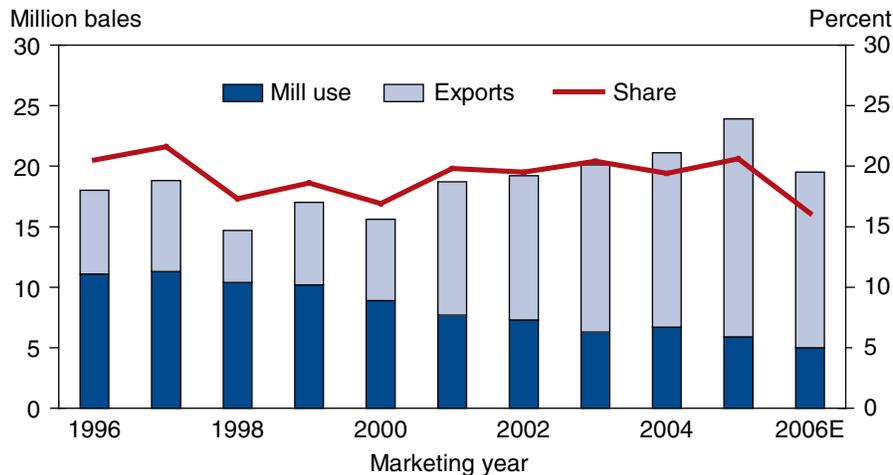
Figure 5  
U.S. cotton, planted acres, 2005



Source: USDA/ERS.

Figure 6

**Demand for U.S. cotton and U.S. share of world mill use**



Note: 2006 is estimated.

Source: *World Agricultural Supply and Demand Estimates*, WAOB, USDA.

bales, but has since been cut by more than half as lower trade barriers and lower labor costs outside the United States boosted apparel imports.

The United States remains the leading cotton exporter to the world, accounting for 40 percent of global cotton trade over the last 5 years. The expansion of global cotton mill use—particularly in China—has altered world cotton trade in general and U.S. cotton exports specifically. China has reemerged as the leading importer of U.S. cotton over the last several years as their cotton mill use has outpaced cotton production. During the 2003-05 seasons, China, Turkey, and Mexico were the leading importers of U.S. cotton, with shipments to China far exceeding any other country.

Despite the dramatic gains posted in U.S. export volumes and global trade shares over the past 5 years, total demand (mill use plus exports) for U.S. cotton as a share of world mill use has remained stable (fig. 6). The increase in U.S. exports has been offset by a decline in U.S. mill use, resulting in U.S. cotton’s share of global use equaling about 20 percent over the last 5 years. This share is projected to decline in 2006/07 as foreign countries draw down stocks to fill rising demand.

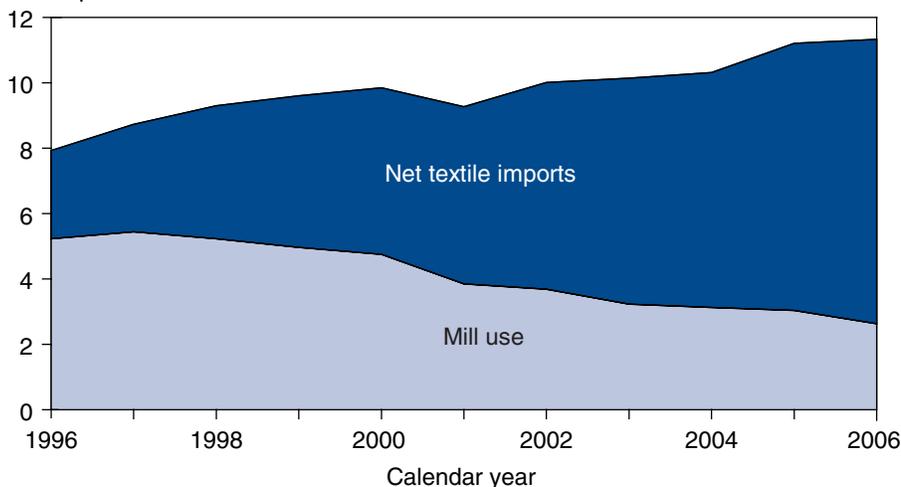
**Domestic Retail Demand Rises As Cotton Textile Imports Expand**

U.S. domestic retail demand for cotton (mill use plus net textile trade) in calendar year 2006 continued its upward trend, although at a slower pace than in 2005 (fig. 7). The final removal of all remaining MFA apparel quotas in January 2005 resulted in a significant expansion of imported textile and apparel products in 2005, reaching 10.5 billion pounds. In 2006, these imports rose for the 18th consecutive year to nearly 11 billion pounds. These rising imports provided increased competition for the domestic industry as U.S. cotton fiber mill use declined once again and textile exports were about unchanged for the fourth consecutive year.

Figure 7

**U.S. cotton mill use and cotton-equivalent of net textile imports**

Billion pounds



Source: Economic Research Service, USDA and Bureau of the Census, USDC.

As a proxy for retail sales, domestic cotton demand reached 11.2 billion pounds in 2005, 9 percent (894 million pounds) above the previous calendar year. Domestic retail cotton demand was fueled by lower-priced imported products and had risen for 4 consecutive years. Comparable gains have not been seen for nearly a decade, when the effects of the North American Free Trade Agreement (NAFTA) were most pronounced. In 1997, domestic cotton demand rose 10 percent and the gain amounted to 808 million pounds. Similarly in 1992, demand rose 14 percent from the year before, for an increase of 889 million pounds. However, these earlier years were fueled by gains in both imports and mill use, a much different environment than today. In 2006, domestic cotton demand continued higher, reaching a record 11.3 billion pounds.

With net imports of cotton textile and apparel products expanding considerably, U.S. cotton mill use accounted for only 23 percent of total domestic demand in 2006, compared with 62 percent in 1997. Meanwhile, the surge in imports pushed per capita cotton demand to nearly 38 pounds in 2006, similar to 2005. However, in 2006, only 9 pounds of this total was spun by the U.S. textile industry, the lowest share ever.

**Upland Cotton Acreage Variable, But Regional Shares Stable**

U.S. upland cotton planted area has averaged about 14 million acres over the past 15 years. However, significant variations can occur annually as a result of weather, prices, and the flexibility given to producers under government programs. Since 1996/97, upland cotton area has ranged between 13.1 and 15.5 million acres, but has been closer to the lower end of this range in recent years. In fact, during the first 4 years under the 2002 Farm Act, upland area ranged between 13.3 and 14.0 million acres as net return expectations for cotton and competing crops kept upland area about unchanged. However, about 15 million acres were planted in 2006/07,

following consecutive successful seasons and rising energy prices that limited some alternative crops.

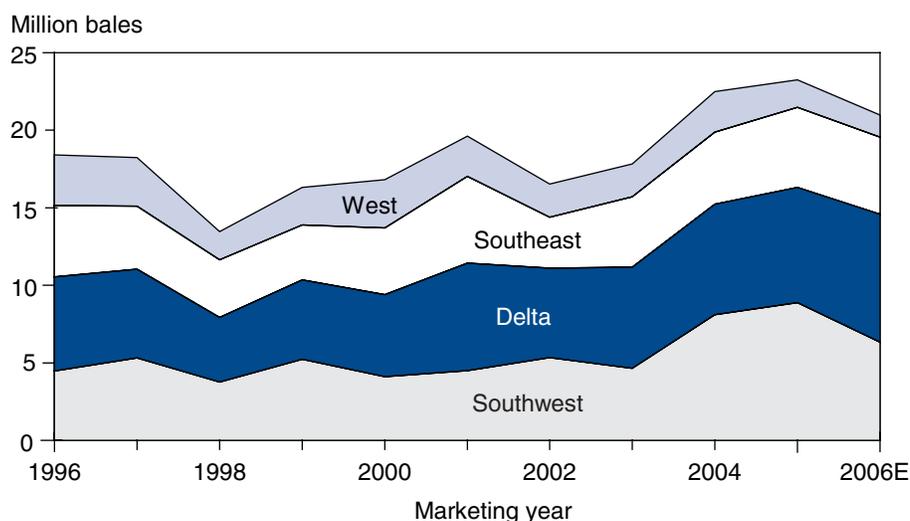
Regionally, cotton acreage shares have been relatively stable since the mid-1990s, when area had already returned to the eastern half (Southeast and Delta regions) of the U.S. Cotton Belt (fig. 8). Several factors contributed to the reversal of cotton's move westward (Southwest and West) for decades. First, the success of the boll weevil eradication program that began in the Southeast in the late 1970s and continued throughout much of the 1980s meant that cotton was once again viable there. Also, many Delta farmers adopted short-season production systems that improved yields and net income by reducing the crop's susceptibility to weather and insect damage. In addition, long periods of drought in the 1980s and early 1990s in the western United States severely limited water supplies available for cotton and other crops.

Over the past decade, the Southeast and Delta have accounted for 23 and 27 percent, respectively, of the U.S. upland cotton area, a significant gain from the 1980s when these regions combined for less than one-third of the total area. The Southwest accounts for about 44 percent of upland cotton area while the West contributes the remaining share. The Southeast has increased cotton planted acreage at the expense of corn and soybeans, while upland area in the West has shifted to more permanent tree crops.

### Recent Yield Gains Push Production Higher

Although upland cotton area has remained fairly stable over the past several seasons, recent technological advances—like biotechnology, variety improvements, and the success of the boll weevil eradication program—have increased cotton productivity across the United States. In 2005, upland cotton planted to biotech (pest resistant and/or herbicide tolerant) varieties

Figure 8  
**U.S. upland cotton production by region**



Note: 2006 is estimated.

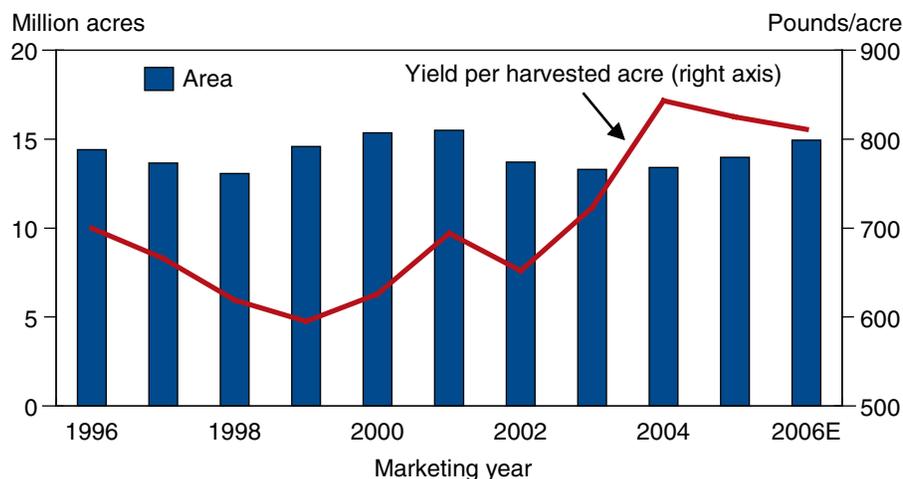
Source: *Crop Production*, National Agricultural Statistics Service, USDA.

accounted for nearly 80 percent of total acreage, compared with about 50 percent just 6 years ago. More intensive management systems and increased area under irrigation have also raised U.S. cotton productivity.

Weather is a chief determinant of upland cotton yields. Excellent growing conditions in 2004 and 2005, along with improved varieties, produced a record yield in 2004 (fig. 9) and a record crop in 2005. The yield of 843 pounds per harvested acre in 2004 was well above the preceding 3-year average of 689 pounds. In 2005, additional area, a second consecutive season of favorable growing conditions, and a very low abandonment rate (3 percent) pushed upland production to more than 23 million bales.<sup>3</sup> Back-to-back record crops provided an available U.S. cotton supply not seen since the mid-1960s.

<sup>3</sup>The abandonment rate is the percentage of planted area that is not harvested. During the 1996-2005 seasons, abandonment averaged 10 percent but ranged between 3 and 20 percent.

Figure 9  
**U.S. upland cotton area and yield**



Note: 2006 is estimated.  
 Source: *Crop Production*, National Agricultural Statistics Service, USDA.

## U.S. Cotton Farm and Financial Characteristics

U.S. cotton farms and their operators are similar in many respects to those of other crops, but are very different in some key areas. According to data from the 2003 Agricultural Resource Management Survey (ARMS), farms growing cotton tend to be larger than those growing other crops (table 1), with above-average gross farm incomes, government payments, farm expenses, net incomes, farm asset values, and debt-to-asset ratios.

Large farm operations are more likely to be organized into partnerships, and cotton farms are no exception. Partnerships allow operators to pool their resources to achieve economies of scale and to combine their talents in managing the farm operation. Cotton farm operators are also more likely to list farming as their occupation and to have completed high school and college compared with other farm operators.

### Cotton Farms Are Higher Risk, Higher Reward

Cotton farms in 2003 generated an average net cash income of \$127,354 per farm, far more than the average of \$11,568 for noncotton farms in the cotton production regions (table 1). The higher average income generated on cotton farms is mainly due to their larger farm operations. Cotton farms averaged 1,199 acres per farm, compared with 376 acres for noncotton farms. Cotton farms' average ratio of cash expenses to gross cash income was 71 percent, compared with 91 percent for noncotton farms. This means that cotton farms could generate \$100 of gross income with less expenditures. Larger farms can achieve economies of scale by spreading management, labor, and machinery costs over more units of output, thus gaining an advantage over smaller farms.

Cotton farm operations averaged higher debt-to-asset ratios than noncotton farms in cotton production regions. Higher values for this statistic indicate more risk of financial difficulties in periods of low prices and income. However, on average, cotton farms were financially solvent based on their average debt-to-asset ratios and net cash incomes. In 2003, 76 percent of cotton farms more than covered their cash expenses from farming with their gross cash incomes (fig. 10). Farms can remain in production in the short term if they can cover their cash costs from their gross cash income and from other cash sources such as off-farm work. Without government payments included in gross cash income, only 61 percent of cotton farms were able to cover cash expenses in 2003.<sup>4</sup> Thus, government payments allowed an additional 15 percent of cotton farms to obtain positive net cash incomes.

Total government payments averaged \$60,315 per cotton farm in 2003, compared with \$3,121 per noncotton farm in cotton producing States. Direct, countercyclical, and loan deficiency payments comprise most of the payments. In 2003, government payments contributed 14 percent of gross cash income on cotton farms, compared with 5 percent for noncotton farms.<sup>5</sup>

<sup>4</sup>Government payments consist of payments for direct, countercyclical (CCP), loan deficiency (LDP), marketing loan gains (MLG), net value of commodity certificates, peanut quota buyouts, milk income loss contracts (MIL), agricultural disaster (including disaster assistance and market loss), Conservation Reserve Program (CRP), Wetland Reserve Program (WRP), Environmental Quality Incentives Program (EQIP), and other Federal, State, or local government agricultural program payments.

<sup>5</sup>While the ARMS data provide a detailed snapshot of government payments to cotton operations in 2003, payments can vary significantly with price, as discussed later in the section, "Government Payments: Important to Cotton Sector Revenues."

Table 1

**Characteristics of U.S. cotton farms and their operators, by specialization and versus noncotton farms, 2003**

Item	Cotton farms			Noncotton farms (C) 1
	Specialized (A)	Nonspecialized (B)	All	
Percent of farms	63	37	100	97
Percent of cotton production	71	29	100	0
Cotton as percent of value of production	75 BC	19 AC	41	0 AB
Total operated acres per farm	1,029 BC	1,491 AC	1,199	376 AB
Owned and operated	318 C	475 C	375	217 AB
Rented	703 C	1,013 C	817	143 AB
Cropland acres	880 C	1,136 C	974	114 AB
Harvested cotton acres	521 BC	301 AC	440	0 AB
Number of commodities per farm	2.3 BC	4.1 AC	2.9	1.5 AB
Percent of farms producing:				
Corn	15 BC	47 AC	27	4 AB
Sorghum	16 C	*20 C	18	3 AB
Soybean	18 BC	30 AC	23	5 AB
Cattle	13 BC	*34 AC	21	54 AB
Wheat	17 BC	45 AC	27	6 AB
Peanut	12 BC	27 AC	18	0 AB
Operator occupation (percent):				
Farming	82 BC	91 AC	85	30 AB
Nonfarm	14 BC	*4 AC	11	48 AB
Retired	*3 C	**2 C	*3	22 AB
Operator age (mean)	54	54	54	57
Less than 50 years (percent)	35	36	35	29
65 or more (percent)	*25	*28	26	30
Operator education (percent):				
High school	93 C	92 C	93	88 AB
Completed college	28	22	26	21
Farm organization (percent):				
Sole or family proprietor	78 C	61 C	72	92 AB
Partnership	14 C	*30 C	20	4 AB
Family corporation	*6 C	*7 C	7	3 AB
Gross cash income per farm (dollars)	346,655 BC	594,895 AC	437,858	61,122 AB
Crop cash receipts	237,747 BC	374,600 AC	288,026	28,682 AB
Livestock cash receipts	*2,079 C	**54,918	**21,492	22,814 A
Government payments	57,663 C	64,880 C	60,315	3,121 AB
Federal crop insurance	8,227 C	11,290 C	9,352	637 AB
Cash production expenses	241,297 BC	429,668 AC	310,504	55,554 AB
Net cash income	105,358 C	165,227 C	127,354	11,568 AB
Farms with government payments (percent)	92 C	95 C	93	28 AB
Farms with Federal crop insurance (percent)	30 C	32 C	31	4 AB
Household income per farm family (dollars)	122,054 C	178,029 C	142,463	71,447 AB
Farm income	77,668 BC	134,379 AC	98,345	5,129 AB
Off-farm income	44,386 C	43,650 C	44,118	66,318 AB
Earned income from business or job	33,798 C	*32,330 C	33,263	50,481 AB
Percent with off-farm business or job	58 C	57	57	71 A
Average value per farm (dollars):				
Farm assets	801,503 BC	1,378,905 AC	1,013,639	602,933 AB
Farm debt	*113,063 C	*164,006 C	131,779	50,000 AB

Source: 2003 USDA Agricultural Resource Management Survey. Coefficient of Variation = (Standard Error/Estimate)\*100.

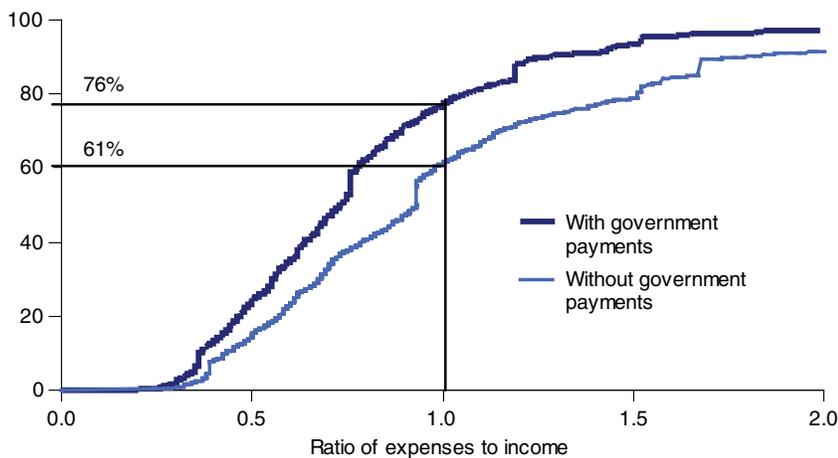
\* indicates that CV is greater than 25 and less than or equal to 50. \*\* indicates that CV is above 50.

A, B, and C mean significant differences with indicated column based on t-statistics at a 90 percent confidence level or higher.

<sup>1</sup>Include data on noncotton farms in cotton producing States of AL, AZ, AR, CA, FL, GA, KS, LA, MS, MO, NM, NC, OK, SC, TN, TX, and VA.

Figure 10

**Distribution of cotton farms by ratio of cash expenses to gross cash income for the farm operation, 2003**



Data source: USDA 2003 Agricultural Resource Management Survey and ERS calculations.

**Cotton Farm Characteristics Differ by Region**

Cotton farm characteristics did differ among regions in 2003, but the differences were not always statistically significant and may be due to chance (table 2). For example, net cash income on cotton farms ranged from \$82,437 in the Southwest to \$223,780 in the West, but statistically speaking, these cotton farms did not generate significantly different average net cash incomes from farming.<sup>6</sup> In addition, the average household income of cotton operators did not differ in a statistically significant way. However, many other items were significantly different, and are noted in table 2.

Southeast cotton farms accounted for 31 percent of all cotton farms and produced 25 percent of the value of production.<sup>7</sup> Southeast farms were the smallest in terms of cotton acreage as well as total operated acreage. They ranked third in cotton yields as Southeast producers were the least likely among all regions to irrigate their cotton. However, Southeast cotton farms were more diversified, averaging 3.5 commodities per farm in 2003 versus 2.9 or less commodities for the other farms. Southeast cotton farms were more likely to raise wheat, peanuts, or tobacco, and had the greatest likelihood of a family member employed off-farm.

Delta cotton farms represented 24 percent of all cotton farms and 35 percent of the cotton value of production.<sup>8</sup> Average cotton acreage and total farm acreage were not significantly different from those in the Southwest and West. However, Delta cotton farmers owned less farm acreage than Southwest and West cotton farmers. Yields in the Delta were second highest. About half of the Delta cotton farms also raised soybeans and a quarter grew corn.

The Southwest contained 38 percent of U.S. cotton farms and produced 25 percent of the cotton value.<sup>9</sup> Average cotton yields were lowest among all the regions due to the hot, dry climate and low percentage of irrigated acreage. The Southwest's climate limits the choice of crops that can be grown profitably, so cotton farms there are more likely to grow wheat and sorghum as low-cost alternatives.

<sup>6</sup>Since the sample sizes were small and there is a wide range of values for income (including negative values), the variances around these sample means are relatively large and overlapping. Therefore, we cannot rule out that the population means are not different.

<sup>7</sup>The Southeast region consists of farms in Virginia, North Carolina, South Carolina, Georgia, Alabama, and Florida.

<sup>8</sup>The Delta region consists of farms in Tennessee, Mississippi, Arkansas, Louisiana, and Missouri.

<sup>9</sup>The Southwest region consists of farms in Kansas, Oklahoma, and Texas.

Table 2

**Characteristics of U.S. cotton farms and their operators, by region, 2003<sup>1</sup>**

Item	Southeast (A)	Delta (B)	Southwest (C)	West (D)
Percent of farms	31	24	38	7
Percent of cotton production	25	35	25	16
Cotton as percent of value of production	41 BD	60 ACD	43 B	*24 AB
Total operated acres per farm	852 CD	*1,203	1,459 A	1,270 A
Owned and operated	328 D	209 CD	463 B	650 AB
Rented	506 C	*993	995 AD	616 C
Cropland acres	664 CD	*1,136	1,093 A	1,117 A
Harvested cotton acres	346 CD	*538	448 A	468 A
Number of commodities per farm	3.5 BCD	2.4 A	2.9 A	2.9 A
Percent of farms producing:				
Corn	36 D	*26 D	*25 D	**4 ABC
Sorghum	**1 BC	*10 ACD	39 ABD	—
Soybeans	32 CD	*50 CD	*2 ABD	0 ABC
Cattle	*26 BD	*4 AC	*30 BD	**2 AC
Wheat	19 BCD	*10 ACD	43 AB	37 AB
Hay	*6 BD	**0 ACD	*6 BD	53 ABC
Peanuts	49 BCD	—	*6 ABD	—
Tobacco	20 BCD	0 A	0 A	0 A
Operator occupation (percent):				
Farming	82 B	92 AC	84 B	84
Nonfarm	*16 BD	*5 AC	*12 BD	—
Retired	**2	**2	**4	**3
Operator age (mean)	51 C	53	57 A	53
Less than 50 years (percent)	46 C	*35	25 A	39
65 or more (percent)	18	**32	32	*16
Operator education (percent):				
High school	87 BD	97 AD	93 D	100 ABC
Completed college	18 CD	**25	27 AD	46 AC
Farm organization (percent):				
Sole/family proprietor	80 D	76 D	69 D	*41 ABC
Partnership	13 D	*19 D	**20 D	47 ABC
Family corporation	*6	*3 C	*9 B	*8
Gross cash income per farm (dollars)	365,965 D	*517,517 D	309,534 D	1,139,032 ABC
Crop cash receipts	245,014 CD	*417,789 CD	141,287 ABD	805,013 ABC
Livestock cash receipts	**4,647	**2,969	**49,836	**3,984
Government payments	56,715 D	*64,794	53,469 D	96,016 AC
Direct	23,151 CD	*37,131	28,796 AD	49,198 AC
CCP and LDP	22,399 CD	*23,109 D	13,643 AD	43,044 ABC
CRP, WRP, and EQIP	1,025	*1,593	*1,392	**1,100
Other	*10,140 BD	2,961 AC	9,638 BD	**2,674 AC
Federal crop insurance	10,990 BD	*1,688 AC	13,913 BD	*3,677 AC
Cash production expenses	236,958 D	*350,144 D	227,097 D	915,251 ABC
Net cash income	129,007	*167,373	*82,437	**223,780
Farms with Government payments (percent)	94	91	95	92
Farms with Federal crop insurance (percent)	38 BD	*10 AC	42 BD	*9 AC

—Continued

—Table 2 Continued

Household income per farm family (dollars)	132,367	*149,119	125,813	*265,081
Farm income	88,542	*116,388	75,153	**216,363
Off-farm income	43,825	32,731 CD	50,660 B	48,718 B
Earned income from business or job	35,870 B	*20,995 A	39,898	26,633
Percent with off-farm business or job	69 CD	*51	53 A	51 A
Average value per farm (dollars):				
Farm assets	1,071,418 CD	*693,864 D	773,216 AD	3,038,685 ABC
Farm debt	108,392 D	*83,516 D	100,061 D	*545,749 ABC

Source: USDA 2003 Agricultural Resource Management Survey. Coefficient of Variation (CV) = (Standard Error/Estimate) x 100. \* indicates that CV is greater than 25 and less than or equal to 50. \*\* indicates that CV is above 50.

— = Data insufficient for disclosure. A, B, C, and D mean significant differences with indicated column based on t-statistics at a 90 percent confidence level or higher. Southeast includes VA, NC, SC, GA, AL, and FL. Delta includes TN, MO, AR, MS, and LA. Southwest includes KA, OK, and TX. West includes NM, AZ, and CA.

Cotton farms in the West differ markedly from cotton farms in the other regions.<sup>10</sup> The West accounted for only 7 percent of cotton farms in 2003, but produced 16 percent of U.S. cotton as a result of high yields. Cotton yields in California averaged nearly 2.75 bales per acre, versus 1 bale in Texas. Cotton farms in the West harvested 468 acres of cotton per farm, about the same as Delta and Southwest farms. The dry climate in the West limited the types of crops grown there. About half of the cotton farms also raised hay, while just over a third grew wheat.

Cotton farms in the West averaged more gross cash income and higher cash expenses, but their average net cash income did not differ significantly from cotton farms in other regions. The high percentage of irrigated cotton acreage in the West likely contributed to their higher gross incomes and expenses. Western cotton farms received the most government payments per farm, \$96,016, but had the lowest ratio of government payments to gross cash income at 8 percent, compared with 13-17 percent in other regions.

Western cotton farmers also owned the most acreage per farm, had the highest ratio of owned-to-operated acreage, and had the highest value of farm assets and equity. Pooling of resources may have resulted in more owned land in Western cotton operations since they are more likely to be organized as partnerships—47 percent compared with 20 percent or less for farms in the other regions.

### Specialized Cotton Operations Dominate, But Nonspecialized Farms Important Too

Farm operations more reliant on cotton are likely to see greater impact from changes in cotton supply and demand, resulting from either altered farm policy or from market or production conditions that influence the cotton markets. For analytical purposes, cotton farms were divided into specialized and nonspecialized operations based on the composition of their value of production. Specialized cotton farms were those where half or more of the value of production was derived from cotton; nonspecialized cotton farms derived less than half their value of production from cotton.

In 2003, 63 percent of U.S. cotton farms specialized in cotton (table 1). These farms produced 71 percent of the value of U.S. cotton production on

<sup>10</sup>The West region consists of farms in New Mexico, Arizona, and California.

half of their 1,029 acres per farm. Nonspecialized cotton farms accounted for 37 percent of all cotton farms and produced 29 percent of the cotton value of production. Nonspecialized cotton farms operated more total acreage, an average of 1,491 acres per farm, but had only 20 percent of their acres committed to cotton production. Consequently, nonspecialized cotton farms were diversified operations that were more likely to raise corn, soybeans, wheat, peanuts, and cattle than specialized cotton farms. With farm income derived from multiple agricultural commodities, nonspecialized cotton farms were less vulnerable to shocks to any particular commodity market; specialized cotton farm operations were more vulnerable to swings in income from changing cotton prices or yields.

Specialized cotton farms generated, on average, lower gross cash incomes, cash expenses, and net incomes per farm than nonspecialized cotton farms. In 2003, net cash income from specialized cotton farms averaged \$105,358, compared with \$165,227 on nonspecialized farms. Specialized cotton farms are less efficient in generating \$100 in gross cash income. On average, it cost them \$70 to generate \$100 in income in 2003, compared with \$62 for nonspecialized cotton farms. In addition, government payments accounted for 17 percent of gross cash income for specialized cotton farms, versus 11 percent for nonspecialized cotton farms.

In 2003, household income averaged \$122,054 per family for specialized cotton farm operators, compared with \$178,019 for nonspecialized cotton operators. Although average farm income was higher for nonspecialized cotton farms, average off-farm income was nearly the same as for specialized cotton farms. Often, off-farm income is more stable than farm income; about 57 percent of the farm families on specialized and nonspecialized cotton farms had someone in the family working a nonfarm job or business in 2003.

## **Cotton Farm Household Income Varies Significantly**

The household income for cotton producers averaged \$142,463 in 2003 (table 1). In comparison, the household income for noncotton farms in cotton-producing States averaged \$71,447, just over half that of cotton producers.<sup>11</sup> Household income for all farm operators averaged \$68,597, while the U.S. household income averaged \$59,067 in 2003. For most farm households, income from off-farm sources exceeds income from the farm operation.<sup>12</sup> However, cotton producers derive the majority of their family income from the farm. Often, large farm operations leave their operators with little time for nonfarm occupations, while higher farm incomes may lessen the need for these operators or their family members to earn off-farm income. Eleven percent of cotton producers listed nonfarm jobs or businesses as their main occupation, compared with 48 percent of noncotton farm operators (table 1).

Incomes received by cotton farm families vary widely. When grouped into household income quintiles (table 3), cotton producers' families in the lowest quintile had, on average, negative household incomes. In this category, many farm operations lost money and off-farm income often was not enough to cover the loss. Frequently, cotton producers in this quintile were

<sup>11</sup>Cotton farms are compared to farms not harvesting cotton in the States where cotton is usually produced. These States are Alabama, Arizona, Arkansas, California, Florida, Georgia, Kansas, Louisiana, Mississippi, Missouri, New Mexico, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia.

<sup>12</sup>Off-farm income includes income from off-farm businesses or jobs, Social Security payments, pensions, interest and dividends, gifts, royalties, rental properties, trusts, and other sources.































