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Chinese Cotton: Textiles, Imports, and Xinjiang

Fred Gale and Eric Davis





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Chinese Cotton: Textiles, Imports, and Xinjiang

Fred Gale and Eric Davis

Abstract

China limits imports of cotton by a quota and encourages textile manufacturers to purchase cotton from Xinjiang, a relatively remote region where 90 percent of China's cotton is grown. Nevertheless, 1,581 textile manufacturers applied for a share of the import quota between 2016 and 2022, thereby demonstrating their strong interest in importing cotton. The quota applicants reported that imports comprised about 20 percent of the cotton they used, but a few large companies accounted for a disproportionate amount. About 14 percent of applicants said imported cotton comprised over half of the cotton they used. Multivariate analysis found that applicants in coastal provinces—thousands of miles from Xinjiang—used more imported cotton than similarly sized applicants in other regions. In contrast, textile manufacturers in Xinjiang reported imports constituted less than 2 percent of the cotton they used—and 66 percent reported using no imported cotton. While China's imports of cotton are projected to gradually increase over the next decade, China's dominant position in the cotton market appears to be weakening, with U.S. cotton exports shifting to other Asian countries.

Keywords: China, cotton, imports, tariff-rate quota, TRQ, textile industry, Xinjiang

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Chinese Cotton: Textiles, Imports, and Xinjiang

Fred Gale and Eric Davis

What Is the Issue?

China is the world's largest textile manufacturer and the largest cotton consumer, but changes in China's economy are reshaping the geography of its cotton-textile sector. Nearly all of China's cotton is produced in the Xinjiang Uyghur Autonomous Region (XUAR), also known more simply as Xinjiang. Textile manufacturers—the main consumers of cotton—are concentrated in coastal and central regions where the share of China's cotton production fell from over 50 percent to 10 percent during 2011–21. These geographic changes are a factor influencing global trade in cotton and textiles. Additionally, the use of forced labor in Xinjiang attracted more attention to the industry, prompting the United States and other countries to ban products produced in the region. This study reviews the economic, geographic, and policy factors reshaping the industry and influencing the global trade of cotton and textile products. The study also examines data on Chinese companies applying for a share of China's cotton import quota to gain insight about the demand for imported cotton.



What Did the Study Find?

China became the world's largest producer, consumer, and importer of cotton soon after joining the World Trade Organization (WTO) in 2001. Despite adopting a tariff-rate quota (TRQ) system for cotton imports and issuing supplemental quotas in most years, the large number of cotton goods manufacturers that request shares of the quota suggests demand for imported cotton exceeds the quota.

While the TRQ was intended to protect China's cotton farmers, many farmers abandoned the labor-intensive crop as wages rose rapidly in many other industries and other crops produced higher returns. In response, officials encouraged cotton production in the relatively remote region of Xinjiang to prevent China from becoming reliant on imported cotton. Xinjiang growers receive a subsidy payment for cotton, and subsidies for machinery and seeds. A transportation subsidy induces textile manufacturers in eastern and central regions to purchase cotton from Xinjiang, which is about 2,200 to 2,900 miles from most of the country's textile manufacturers. Financial support and other incentives encourage manufacturers to shift operations to Xinjiang.

ERS is a primary source of economic research and analysis from the U.S. Department of Agriculture, providing timely information on economic and policy issues related to agriculture, food, the environment, and rural America.

Textile manufacturers in China are highly interested in importing cotton due to its lower price and quality. China imports about 20 percent of its cotton, and the United States is a chief exporter of cotton to China. While imported cotton is used in all provinces, manufacturers near the eastern seaboard show a greater propensity for imports. Nevertheless, in all regions, domestic cotton has the largest share of mill use.

Between 2016 and 2022, 1,581 companies applied for a share of the TRQ, and 265 companies applied in all 7 years. Most of these companies also applied for supplemental quotas issued with slightly higher tariffs. This large number of applicants suggests that imports could be even greater if quotas did not limit them. The operation of the quota application process is not public information, but data submitted by applicants suggests access to imported cotton is uneven. About 14 percent of applicants said imported cotton comprised over half of the cotton they used. Another 20 percent of companies requesting import quota did not use any imported cotton, suggesting that many applicants are unable to import. Textile manufacturers coped with limits on cotton imports by increasing their use of synthetic, chemical-based fibers or by importing cotton yarn. From 2000 to 2020, China's yarn imports doubled from under 1 million metric tons to around 2 million metric tons with Vietnam supplying about 45 percent of that total in 2020.

The number of textile manufacturers in Xinjiang applying for a share of the cotton import quota rose from 37 to 68 between 2016 and 2022. However, imports constituted less than 2 percent of the cotton Xinjiang applicants reported using—and 66 percent of them reported using no imported cotton—suggesting that applications from Xinjiang textile companies were often denied.

Analysis found that applicants in coastal provinces used more imported cotton than similarly sized applicants in other regions. Each location of a multi-plant company must apply separately for tariff-rate quotas. Textile manufacturers in Xinjiang that requested a share of the import quota included branches of some of China's largest textile companies, but the analysis found that Xinjiang applicants used less imported cotton than similar manufacturing plants located in other regions.

China's role as a cotton importer appears to have peaked, while other countries are increasing their share of imports. USDA baseline projections suggest that by 2030 Vietnam, Pakistan, Indonesia, Bangladesh, and Turkey will together account for 47 percent of the world's cotton imports while China will only account for 24 percent.

How Was the Study Conducted?

This study reviewed the regional patterns of China's cotton textile industry development and identified growing geographic separation between cotton production and textile manufacturing since the 1990s using data from Chinese sources. The study investigated spatial patterns of demand for imported cotton by analyzing lists of Chinese companies applying for a share of the import quota from 2016 to 2022. Multiple regression analysis was used to control for potentially confounding influences when investigating whether companies in coastal provinces were more likely to use imported cotton than similarly sized companies in other regions.

Chinese Cotton: Textiles, Imports, and Xinjiang

Introduction

China became the global center of textile production and cotton consumption during the first decade of the 21st century. Industry sources report that China accounts for about 50 percent of the world's textile production capacity, more than 30 percent of world textile and apparel exports, more than 30 percent of world cotton consumption, and 20 percent of world cotton imports (China Cotton Association, 2021; Yuan, 2021; USDA, FAS, 2021; China Textile Industry Council, 2021). China is one of the top two cotton-producing countries, yet it also imports cotton from the United States, India, Brazil, Australia, and many countries in Africa and Central Asia.

Strategic plans issued by China's cotton and textile industries call for more engagement in global markets, increased efforts to reshape global supply chains, and greater participation in international organizations (Farmers Daily, 2021; China Textile Industry Council, 2021). The long-term outlook for China's cotton market is clouded by uncertainties regarding its consumption, production, and trade. Like other once-dominant textile manufacturing countries in Europe and North America, China's textile sector is now facing rising costs and increasing competition from abroad. Plus, as cotton industry leaders acknowledge, China's domestic cotton supplies, which are stable if not declining, cannot meet the needs of the nation's textile industry (China Cotton Association, 2021a; Farmers Daily, 2021). China's Textile Industry Council (2021) further detailed the risks related to raw material supplies.

Cotton is of longstanding importance to Chinese officials as a raw material for manufacturing clothing and as a crop that generates income for farmers. A Chinese Ministry of Agriculture analysis (RCRE, 2017), reported that China had 15 million farms producing cotton and 45 million people engaged in growing the crop. To prevent imports from gaining a dominant share of the country's cotton market, Chinese officials included cotton—along with food grains and sugar—among the few commodities covered by a tariff-rate quota (TRQ) regime when the country joined the World Trade Organization (WTO) in 2001.¹ This cotton quota consistently filled annually, prompting officials in most years to supplement the TRQ with additional quotas to satisfy the strong demand. Still, indications show that potential demand is even greater.

When cotton production costs, along with wages in other industries began to rise, many farmers in China's eastern and central provinces abandoned cotton production. In response, Chinese officials began shifting cotton production to the Xinjiang Uyghur Autonomous Region (XUAR). This provincial-level region (also known as Xinjiang) in China's northwest contains a large population of Uyghur and other ethnic groups and borders several Central and South Asian countries. With fewer alternative crops, fewer pests, and fewer off-farm opportunities than eastern regions and with larger farms amenable to mechanization, officials viewed expansion of cotton in Xinjiang as a way to bolster national cotton output and bring economic development to the region.

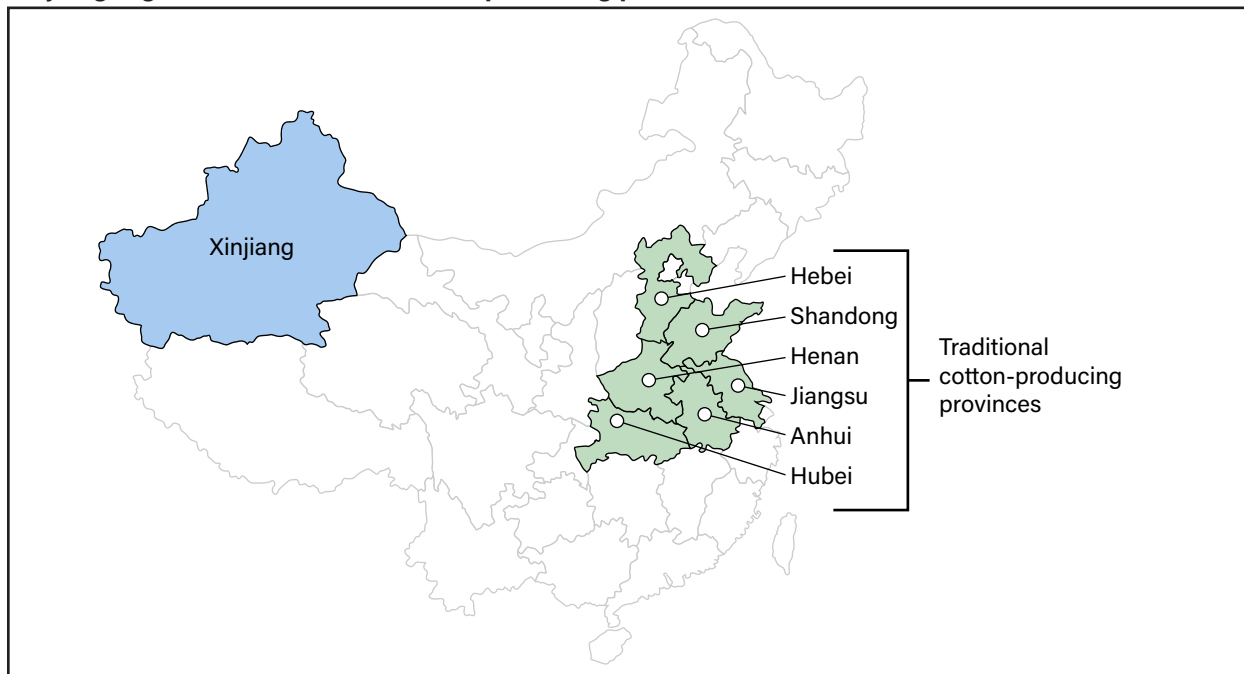
This regional shift to Xinjiang geographically separated most cotton production from textile manufacturing which remains concentrated in the traditional cotton-producing provinces in eastern and central regions of China (figure 1). Textile manufacturers demonstrate a strong appetite for imported cotton, but quotas limit the volume of imports they can obtain. On average, imports account for about 20 percent of cotton used.

¹ A tariff-rate quota (TRQ) is a mechanism introduced by World Trade Organization (WTO) reformers to open markets to imports of sensitive products that were often subject to stringent quotas or other nontariff barriers.

Their primary source of cotton is Xinjiang, located thousands of miles to the west. This reliance on Xinjiang cotton affects the cost and quality of the raw material available to textile manufacturers. Faced with their dependence on Xinjiang cotton and afforded various financial and administrative incentives by Chinese officials, some manufacturers shifted their operations to Xinjiang.

Figure 1

Xinjiang region and traditional cotton-producing provinces of China



Source: Created by USDA, Economic Research Service based on data analyzed in this report.

China's use of forced labor in Xinjiang attracted more attention to the textile industry. During 2020–21, the U.S. Customs and Border Protection (CBP) agency issued a series of Withhold Release Orders (WROs) banning U.S. imports of cotton and cotton products from entities in Xinjiang using forced labor. In January 2022, the Uyghur Forced Labor Prevention Act resulted in a broader ban on cotton produced in Xinjiang and products manufactured from such cotton.

This report reviews the economic factors and policies that led to the geographic separation of China's cotton production from its textile industry and then explores the impacts on China's use of imported and domestic cotton. By analyzing lists of Chinese companies that applied for a share of China's cotton import quota from 2015 to 2021, this study provides a snapshot of potential Chinese importers by geographic location, company type, and volume of imported cotton used. This study also provides insight into China's demand for imported cotton by answering these questions:

- How many companies apply for a share of the import quota?
- What is the regional distribution of quota applicants?
- Do companies in the newly developed cotton-textile region of Xinjiang apply for import quotas?
- How much imported and domestic cotton is used by different types of textile firms?

The study finds that most cotton goods manufacturers in China apply for a share of the import quota and that imported cotton accounts for about 20 percent of the cotton used by applicants. Imported cotton is used in many provinces, but the highest concentration is in the traditional textile-manufacturing regions near the eastern seaboard. In the main domestic production region of Xinjiang, a growing number of textile companies apply for a share of the cotton import quota, but they tend to use less imported cotton than other regions. In all regions, even in coastal regions far from Xinjiang, domestic Chinese cotton comprises the largest share of mill use.

China's Emergence as a Textile Manufacturing Hub

International trade flows in cotton shifted over the centuries, following regional shifts in textile manufacturing—the primary use of raw cotton. Textile manufacturers spurred the early industrialization of Europe, the United States, and other regions before rising costs and changing markets precipitated a move to new regions (Gumber et al., 2008; Lee and Fang, 2015). Each geographic shift in textile manufacturing shifted the flows of cotton exports accordingly.

The United States was a top supplier of cotton to Europe's textile industry in the early 1800s before launching its own textile industry later that century (Tompkins, 1904; Beckert, 2015). The decline of the Lancashire, England, textile industry during the late 19th and early 20th centuries was attributed variously to tariff reductions, cotton shortages, and the expansion of cotton-spinning capacity in competing countries (Dietrich, 1928; Brady, 1963).

The U.S. textile industry was concentrated in northeastern States in the 19th century and then shifted to southern States in the 20th century (Koistinen, 2002). After World War II, the United States was the world's largest producer and user of raw cotton. However, in the late 20th century, the U.S. textile industry started to decline due to higher labor costs and diminished competitiveness in the global market.

As the United States began to use less cotton, the textile industry in China and other Asian countries expanded. As a result, more U.S. cotton was exported. USDA, Production, Supply and Distribution (PS&D) data show annual domestic use of cotton fell from 10–11 million bales (1 bale = 480 pounds) each year during the 1990s to 2–3 million bales annually in recent years.² U.S. cotton exports rose from 5–7 million bales annually to 15–16 million bales annually over the same period. In the 21st century, the United States became the leading supplier of China's cotton imports.³

Before textiles emerged as one of China's earliest manufacturing industries in the early 20th century, China maintained a long history of producing handicraft-oriented textiles in cotton-growing areas (Myers, 1965). Growth in China's cotton production from 1949 to 1984 mirrored the rise of the country's textile industry (CAAS, 1987). Then, after China launched economic reforms in the 1980s, a burgeoning network of yarn-spinning and garment manufacturing township and village enterprises (TVEs) led to a resurgence in China's industrial output.

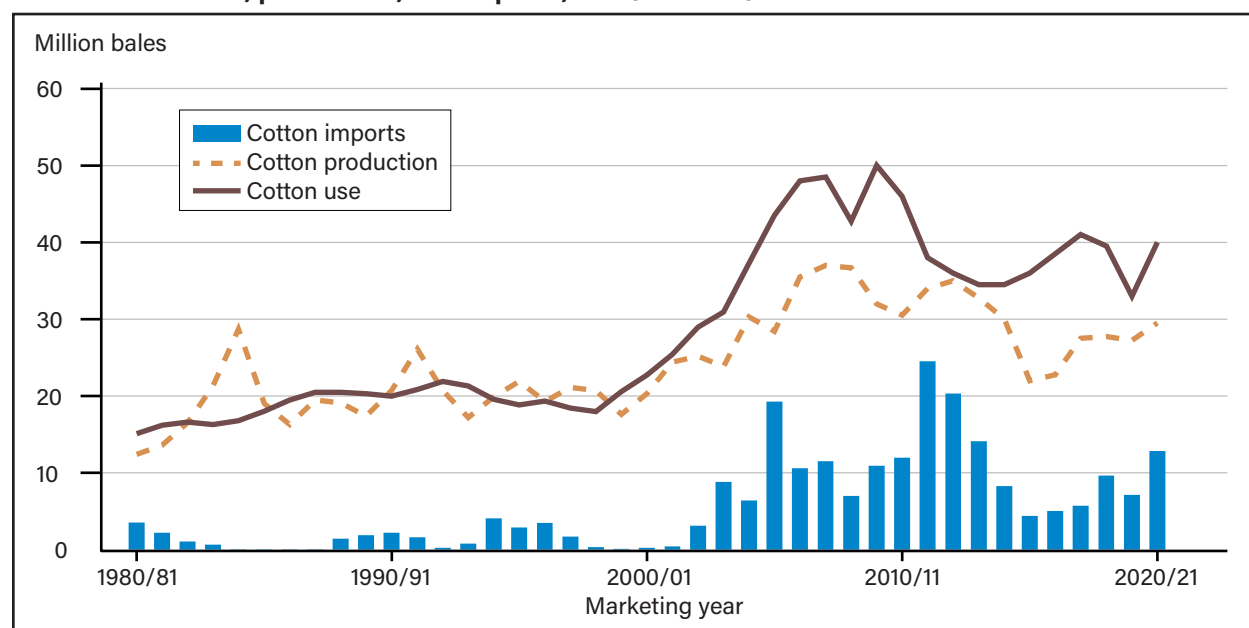
As output increased, boosting textile exports became a priority for Chinese leaders as they sought access to the global trading system (Shi, 2001). During the 1980s, China negotiated bilateral access for its textile and garment exports with the United States and initiated talks to join the General Agreement on Tariffs and Trade (GATT) to open overseas markets for its textile and garment exports. By 2001, China achieved membership in the World Trade Organization (WTO), GATT's successor. In 2005, the GATT/WTO's Multifiber Arrangement (MFA) was phased out, lifting a system of international textile quotas that constrained China's exports. This helped China become the leading textile manufacturer and exporter in the first decade of the 21st century, as well as the leading producer, consumer, and importer of cotton. China's cotton use soared from about 20 million bales (4.4 million metric tons) in the marketing year 1999/2000 to a peak of 50 million bales (10.9 million metric tons) in 2009/10. Cotton production rose from 20 million bales (4.4 million metric tons) to a peak of 36 million bales (8.1 million metric tons) in the same period (figure 2). China became a consistent net importer of cotton in the 2000s, peaking at 24.5 million bales (5.3 million metric tons) in 2011/12.

² Cotton data items are reported in 480-pound bales and metric tons. This report uses both units, depending on the data source.

³ The United States has exported cotton to China since the early 19th century (Chao, 1986).

Year-to-year fluctuations in China's cotton market reflect events such as the 2008–09 global financial crisis, China's cotton support price policy, swings in world cotton prices, trade tensions with the United States during 2018–19, China's decelerating economic growth during 2019, and the Coronavirus (COVID-19) pandemic beginning in 2020. After 2010, China's cotton consumption, imports, and production were all below their peak values. From 2009/10 to 2013/14, China's cotton use fell more than 30 percent from its peak level. An even more dramatic decline in imports lagged the drop in cotton use by several years. Imports plunged from their 2011/12 peak of 24.5 million bales (5.4 million metric tons) to 4.4 million bales (under 1 million metric tons) in 2015/16. Production also fell to a low of 22 million bales (4.8 million metric tons) in 2015/16 before rebounding to 27.5 million bales (6 million metric tons) in 2017/18. By 2020/21, each of these values had rebounded and were still among the highest in the world, although they were well below peak levels.

Figure 2
China's cotton use, production, and imports, 1980/81–2020/21



One bale = 480 pounds.

Note: A marketing year covers September–August.

Source: USDA, Economic Research Service analysis of data from USDA, Production, Supply and Distribution database.

The fluctuations in China's use of cotton correspond to its changing role in the global cotton market. At its peak during the first decade of the 21st century, China accounted for 40 percent of world cotton consumption, while in 2020/21 China accounted for 33 percent of world cotton use. As for China's share of global imports, it was over 50 percent at its peak in 2012/13, plunged to 15 percent in 2015/16, and then recovered to about 26 percent in 2020/21.

Chinese officials have long sought to stabilize the cotton market by buying and selling government reserves and by regulating the supply of imports. Consequently, cotton imports often do not reflect current supply and demand conditions. For instance, a cotton price support adopted in 2011 to insulate farmers from price swings led to a years-long disruption of the market. The support price exceeded the world price by a wide margin (MacDonald et al., 2015). During 2011–13 officials allowed textile manufacturers to buy cheaper imported cotton while the government bought large volumes of the domestic crop at the support price. Officials reported their cotton reserves grew to more than a year's consumption by 2013. Chinese officials then replaced the price support with a subsidy paid directly to growers, allowed the domestic cotton price to fall, began a campaign to sell excess cotton reserves to the domestic market, and cut the volume of cotton

imports (Clever, 2017; Liu et al., 2018). Sales of reserves continued until 2020 when Chinese officials said the excess stockpile was depleted. Cotton imports rebounded in 2020–21.

Chinese officials use an import quota system to adjust the supply of cotton. When China joined the WTO in 2001, officials adopted a tariff-rate quota (TRQ) system to control the volume of cotton imports.⁴ China set a 40-percent tariff on cotton imports from most countries but agreed to allow a limited quota of imports each year at a much lower 1-percent tariff. When established in 2001, the 0.894 million metric ton (4.1 million bales) quota comprised nearly 20 percent of total cotton used by Chinese manufacturers. The quota now equals roughly 10 percent of China’s annual cotton consumption. The rights to a share of the quota are allocated among prospective importers by an annual application process operated by Chinese officials, with 33 percent of the quota reserved for imports through a state-trading enterprise.

The TRQ volume is unchanged since it was fully implemented in 2004, but officials allow a varying amount of additional imports using a sliding scale quota system to supplement the TRQ. Nearly every year since 2006, officials granted an additional import quota based on their assessment of the textile industry’s demand for cotton. The additional quota is called sliding scale because the tariff on this quota is set each year in an interval between 5 percent and 40 percent using a formula based on domestic and world cotton prices. Officials set the sliding scale tariff and quota volume each year based on their assessment of market conditions.⁵ In many years, they issued additional quota that equaled or exceeded the TRQ. In years when officials wanted to limit supplies—such as in 2016 or 2017 when officials were disposing of cotton reserves—no sliding scale quota was issued. In 2018 and 2019, the National Development and Reform Commission of China (NDRC) announced a sliding scale quota of 0.8 million metric tons (3.675 million bales), bringing the sum of TRQ and sliding scale quotas for those years to 1.694 million metric tons (7.78 million bales) (Gilleski, 2018); but in 2020, the sliding scale quantity was cut to 0.4 million metric tons (1.84 million bales).

In years when sliding scale quota is issued, it is announced at varying times (in recent years, it was announced between April and September), followed by a brief period for applications. In some years, a portion of the sliding scale quota is designated for the “processing trade” (imported cotton that must be used in final products that are exported). For example, on April 30, 2021, China’s NDRC announced that 0.7 million metric tons (3.2 million bales) of sliding scale quota would be granted in 2021, which included 0.4 million metric tons (1.84 million bales) for the processing trade and 0.3 million metric tons (1.38 million bales) with no restrictions on use. Applications for a share of the quota were to be submitted to local branches of the NDRC between May 6–18 of that year.

The United States supplied just over a third of China’s cotton imports from 2015 to 2020 (figure 3). The U.S. share, however, showed great variation over this period. In 2016, the U.S. share accounted for 45 percent of total cotton imports. The share fell to 18 percent in 2019 when China imposed retaliatory tariffs on U.S. products, but the U.S. share rebounded to over 40 percent in 2020 and 2021. Part of this may be due to the United States-China Phase One trade agreement, signed on January 15, 2020, which committed China to boost imports of U.S. products. Chinese officials also granted exclusions from retaliatory tariffs for many importers beginning in March 2020. It is unclear whether imports were affected by special tariff treatment for cotton imported by China’s state-owned cotton reserve company or by manufacturers that used imported cotton as a raw material for exported textile products. From 2015 to 2020, China also imported cotton from Brazil, India, Australia, about 25 African countries, and 4 Central Asian countries. Imports from these coun-

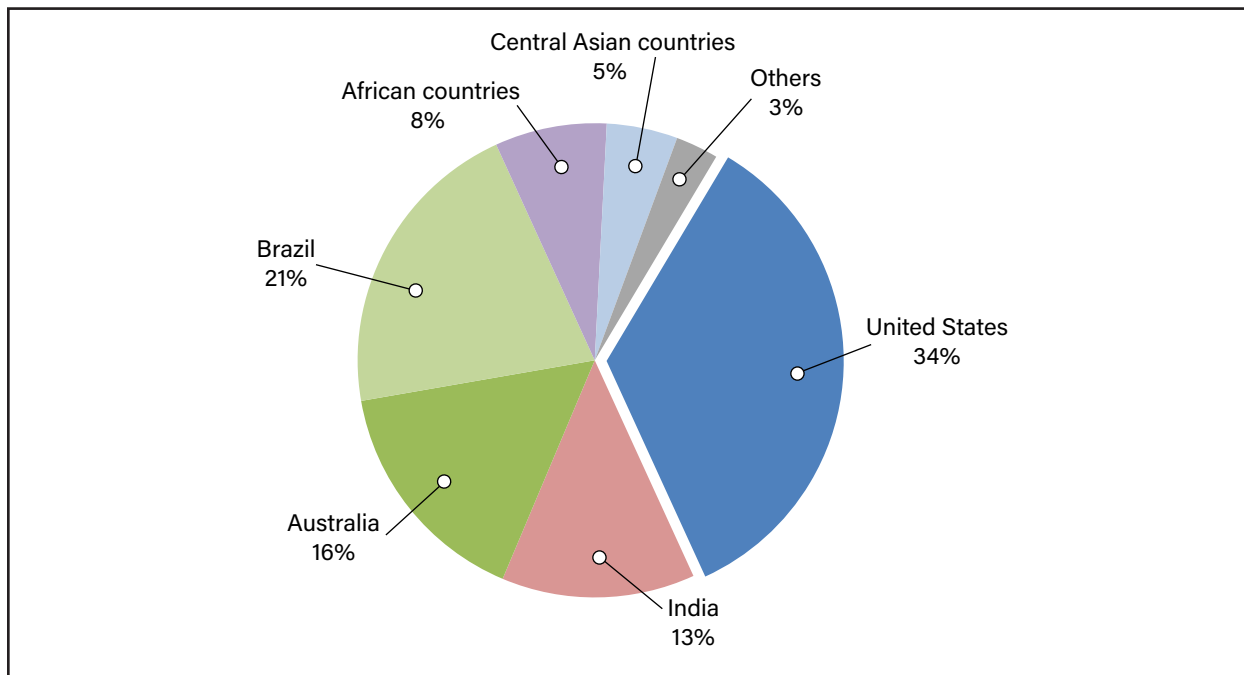
⁴ A tariff-rate quota converts nontariff barriers to a usually high tariff that provides an equivalent degree of protection, and then sets a quota allowing a relatively small volume that can be imported at a much lower tariff. China set its cotton tariff at 40 percent and allows up to 894,000 metric tons of cotton to be imported annually at a 1-percent tariff.

⁵ The sliding scale formula sets the tariff to vary inversely with the level of international cotton prices versus domestic Chinese prices. For example, the tariff is set near 40 percent when international prices are low, and near 5 percent when international prices are high.

tries also fluctuated from year to year. Imports from India, Brazil, and Burkina Faso accounted for most of the increase in 2021 imports.

Figure 3

Sources of China's cotton imports, marketing years 2015/16–2020/21

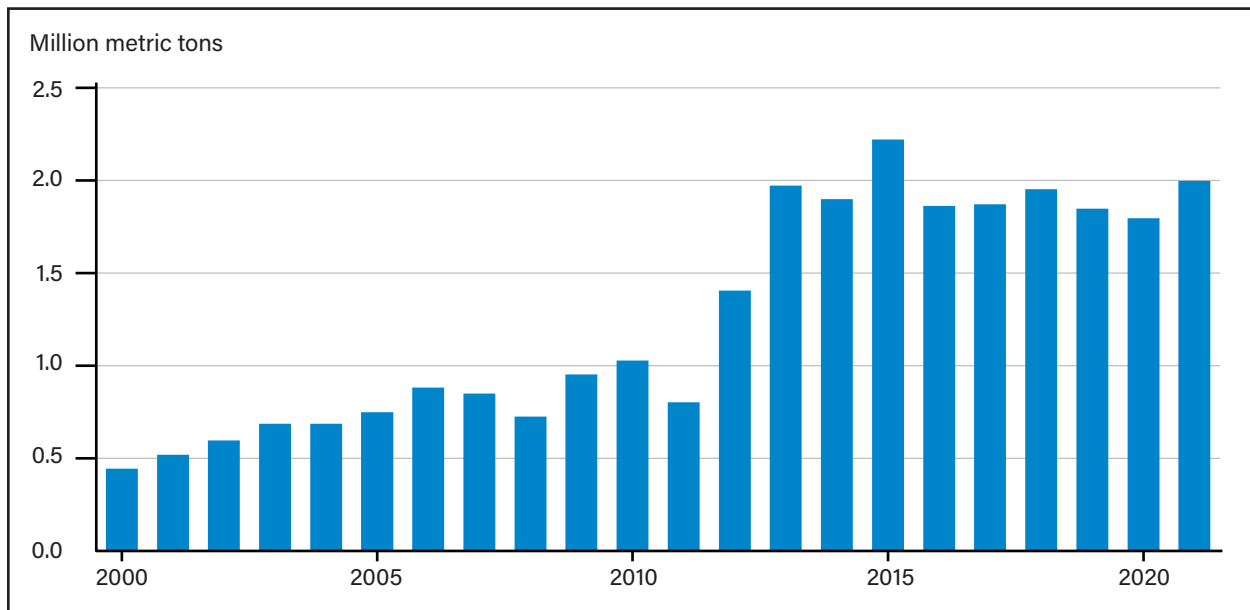


Note: Cumulative imports of cotton, marketing years 2015/16 to 2020/21.

Source: USDA, Economic Research Service analysis of China customs data accessed through Trade Data Monitor.

Chinese textile companies unable to access cheaper imported cotton can reduce raw material costs by importing cotton yarn spun in other countries. Textile manufacturers can import cotton yarn at a tariff of 5 percent—much lower than the 40-percent out-of-quota tariff on cotton—with no quota limit on yarn imports. China's yarn imports doubled from below 1 million metric tons during 2000–2009 to nearly 2 million metric tons during 2013–20 (figure 4), and during many recent years, China's yarn import volume was greater than or equal to the volume of its cotton imports. Yarn imports for 2021 were up 11 percent relative to 2020, coming in just less than 2 million metric tons. The leading yarn-supplying countries to China (figure 5) include countries that spin yarn mainly from imported cotton—such as Vietnam and other Southeast and East Asian countries—and others that spin yarn mainly from domestic cotton—such as India and Uzbekistan. Since 2010, China's purchases of yarn imports shifted from South Asia to Southeast and Central Asian sources. Yarn imports from Vietnam grew rapidly, while imports from India and Pakistan diminished. Vietnam supplied 45 percent of yarn imports during 2019 and 2020. Yarn imports from Central Asia (mainly Uzbekistan) and other Southeast Asian countries also grew, although the volume imported from these regions is less than the volume from Vietnam.

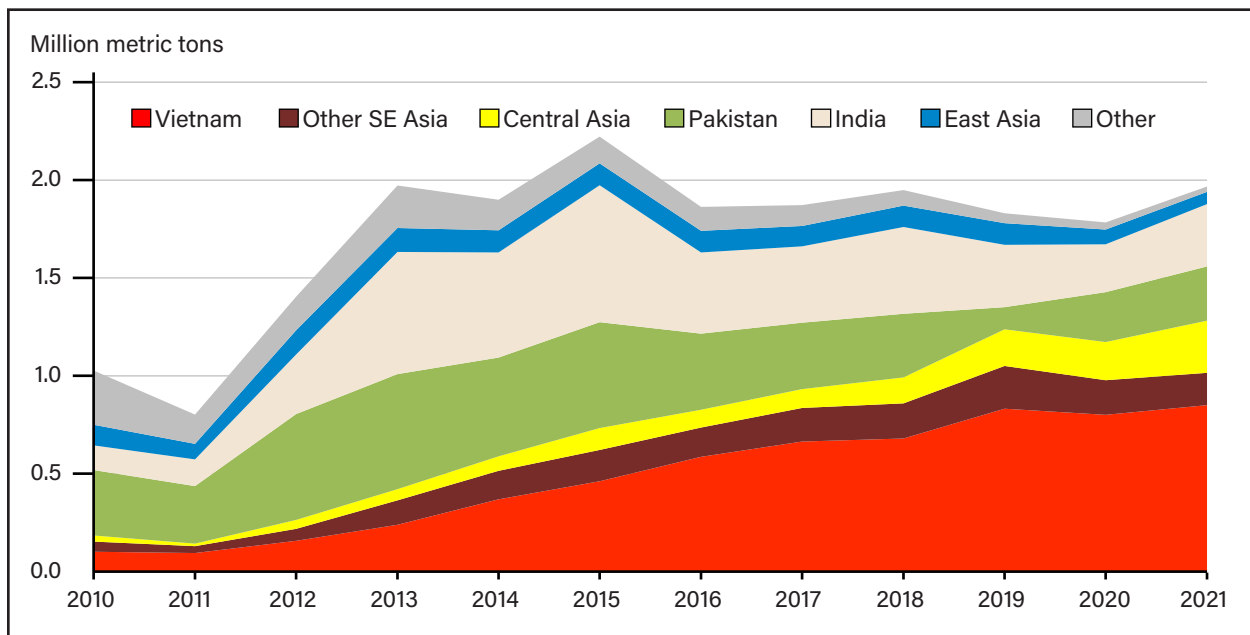
Figure 4
China's imports of yarn, 2000-21



Notes: Years represented as calendar years. Data are for harmonized system category HS 5205, cotton yarn containing 85 percent or more cotton, the most common type of yarn imported by China.

Source: USDA, Economic Research Service analysis of China customs data accessed by Trade Data Monitor.

Figure 5
Sources of China's yarn imports, 2010-21



Notes: Years represented as calendar years. SE = Southeast. Other SE Asia includes Cambodia, Malaysia, Myanmar, and Thailand. Central Asia includes Uzbekistan, Tajikistan, Kazakhstan, and Turkmenistan. East Asia is comprised of Japan, South Korea, and Taiwan.

Source: USDA, Economic Research Service analysis of China customs data accessed through Trade Data Monitor.

China's cotton industry is facing increasing competition from synthetic polyester and other chemical-based fibers. The China Cotton Association (2021a) listed competition from synthetic fiber as one of the major challenges for the industry. The association reported that consumption of chemical-based fiber tripled in 40 years, reducing the share of cotton used in textile production from 48 percent to 27 percent. Data from the China Cotton Textile Association (2021) confirmed that cotton's share of fiber output fell from 50 percent to 33 percent between 2010 and 2020.

Cotton's loss of market share to synthetics partly reflects strong consumer demand for products made with synthetics, but it also likely reflects the high cost and varying quality of cotton available to Chinese manufacturers. The China Cotton Association (2021a) attributed the growth in synthetic fiber use to the lower cost of synthetics, their consistent quality, the diverse types of fibers available, and strong consumer demand. According to the China Textile Industry Council (2021), China now produces 70 percent of the world's chemical-based fibers. The council's recommendation for the 2021–25 5-year plan included research and development on bio-based synthetics and fibers derived from coal-based chemicals to mitigate risks from the disruption of petroleum imports that serve as the key raw material in synthetic products.

China's Geographic Separation of Textile and Cotton Production

Traditionally, China's textile manufacturing and cotton production were both concentrated in provinces along China's coast and in river valleys with easy access to local cotton supplies, urban markets, and ports. China's Academy of Agricultural Sciences (CAAS, 1987) identified the main cotton-growing regions as counties in central and eastern provinces along China's Yellow, Huai, and Yangzi River valleys.

During the 1990s, one of the most prominent changes in China's cotton-textile industry began to unfold as cotton production began to increase in Xinjiang. The regional shift in cotton from the traditional regions accelerated during the 2000s as rapid economic growth in coastal regions raised wages. As rural laborers spent more days working off-farm, many stopped planting cotton, a crop with relatively high labor requirements.

A Ministry of Agriculture report, *Xinjiang and National Cotton Industry Security* (Guan, 2008), revealed that China's Communist Party leaders devoted significant attention to a strategy to expand cotton production in Xinjiang.⁶ Officials dispatched researchers and technicians to Xinjiang to reclaim land for farm use, build water management and irrigation projects, subsidize new cotton varieties, use plastic film to retain moisture in the soil, and launch a subsidy to facilitate transportation of cotton from Xinjiang to other regions. Guan (2008) reported that higher yields and lower production costs in the region were expected to improve Xinjiang's competitiveness in the cotton industry. The expansion of production in Xinjiang was seen as a strategy to prevent domestic output from shrinking to the point that China's textile industry would become too reliant on imports of raw material. Other objectives Guan cited included boosting income growth for ethnic minorities and maintaining social stability and defense capabilities in the border region.

The Xinjiang Production and Construction Corps (XPCC), a military-operated network of large-scale farms and industrial sites, aided the region's transition as the network played a leading role in mechanizing Xinjiang's cotton production. China's Ministry of Agriculture (2017a) reported that 80 percent of XPCC's cotton was mechanically harvested in 2016, compared with 25 percent in the rest of Xinjiang, while nearly all cotton outside Xinjiang was picked by hand that year.⁷ Farm mechanization was stymied in eastern and central regions by fragmented farmland plots.⁸ Official news sources estimated the mechanization rate in Xinjiang rose to 80 percent in 2021 (Xinhua, 2021).

Data from a national agricultural production cost survey conducted annually by China's NDRC illustrate the changing economics of cotton production in China that underlie these changes. From 1990 to 2011, the value of cotton output exceeded or equaled estimated costs per hectare each year, suggesting that cotton was a profitable crop in China during that period (figure 6). However, from 2005 to 2013, production costs increased greatly, fueled mainly by a surge in labor costs from \$729 to \$3,317 per hectare. This rise in labor costs reflected the rising wages that family laborers could earn working additional days off-farm instead of

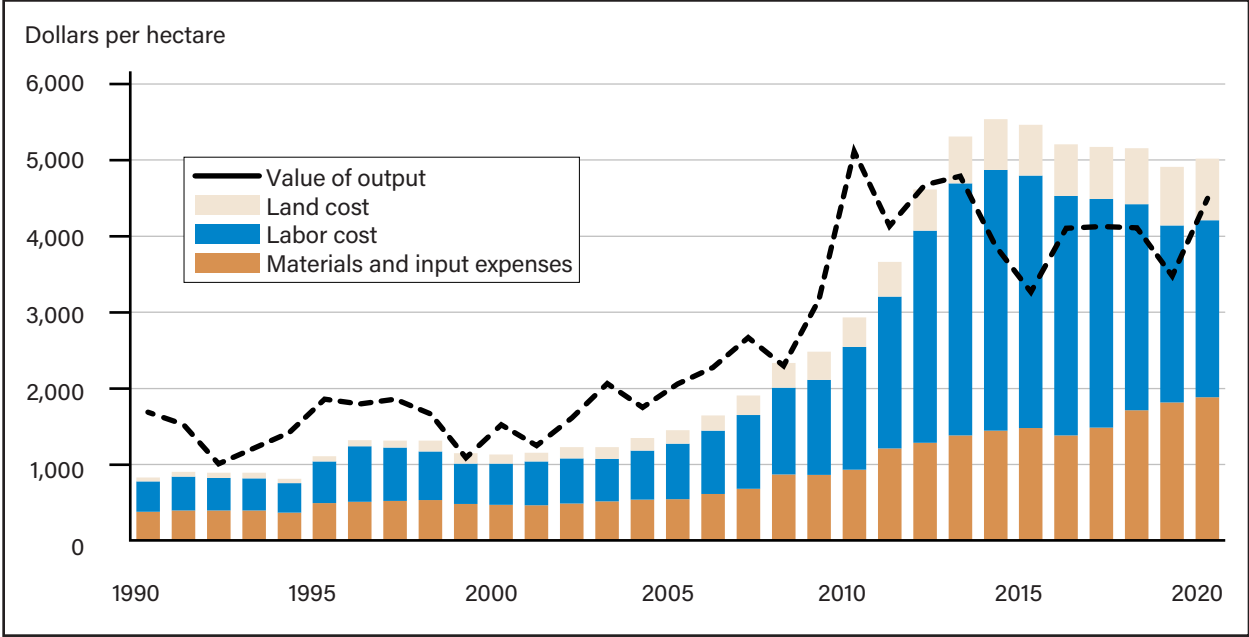
⁶ Guan (2008) was in the fifth group of agricultural researchers dispatched from Beijing to Xinjiang to study expansion of cotton production. His report listed more than a dozen top agricultural officials in various central government departments and communist party offices that commissioned and approved the report on Xinjiang's cotton industry.

⁷ According to China's Ministry of Agriculture (2017a), the cultivation and seeding of cotton fields was 85 percent mechanized, while only 23 percent of harvesting was mechanized.

⁸ A draft 5-year plan by the China Cotton Association (2021) called for reviving cotton production in central and eastern regions. Other news reports called for stronger cotton subsidies in eastern and central provinces (Clever, 2017), but government officials did not give any prominent endorsement to these initiatives.

tending a cotton crop. These higher costs meant that from 2013 to 2020, the estimated cost of producing cotton exceeded the value of each year’s output, implying that cotton was unprofitable.⁹

Figure 6
China cotton production costs, 1990–2020



Note: Original data in Chinese yuan per mu converted to dollars per hectare using an official exchange rate and ratio of 15 mu per hectare.

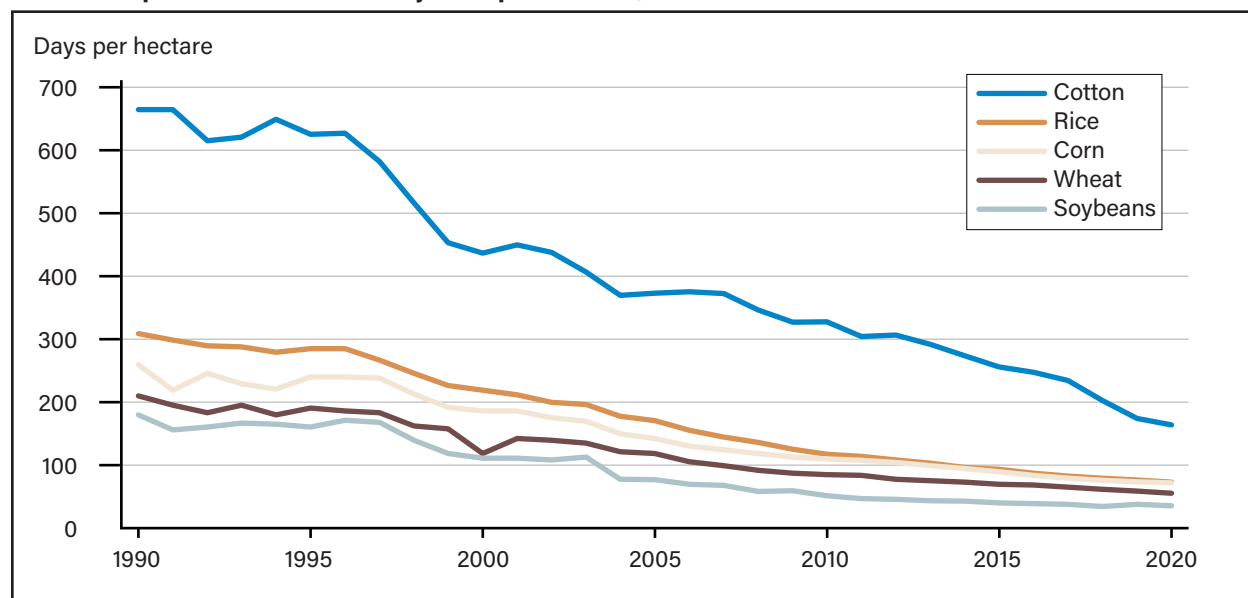
Source: USDA, Economic Research Service calculations using data from the National Development and Reform Commission of China.

The rising opportunity cost of labor, reflected by growth in off-farm wage rates, incentivized the use of machinery and other methods to reduce labor’s share in cotton production. Data show that since the early 1990s the labor requirement for cotton production in China fell dramatically, but even so, cotton labor use per hectare remains the highest among field crops (figure 7). According to NDRC data, cotton production used an average of 164 days of labor per hectare in 2020, compared with 73 days for rice, 71 days for corn, 56 days for wheat, and 36 days for soybeans. With labor consistently the largest component of production cost, rising wages meant the labor intensity of cotton was a deterrent to planting the crop.

⁹ Costs of labor and land reflect mostly imputed costs of unpaid family labor and land contracted from village collectives calculated by National Development and Reform Commission of China analysts using prevailing wages and land rents. The data report positive cash returns for cotton, but returns are low compared with returns from other crops and foregone off-farm earnings.

Figure 7

Labor use per unit of land for major crops in China, 1990–2020



1 hectare = 2.46 acres.

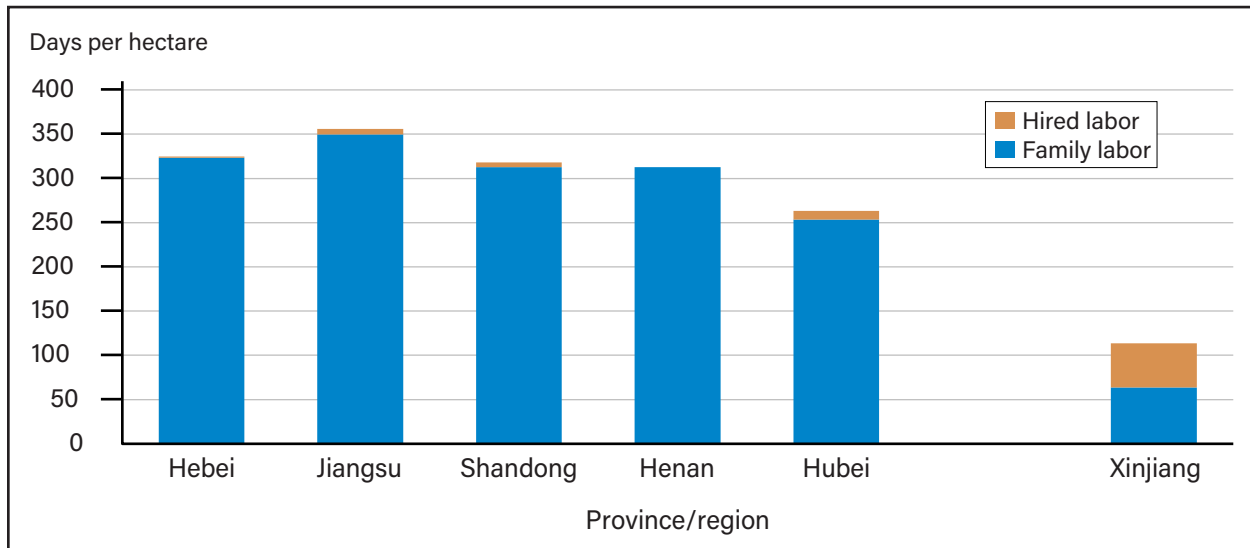
Source: USDA, Economic Research Service calculations using data from the National Development and Reform Commission of China.

The concentration of cotton production in Xinjiang is partly due to lower labor requirements in the region. The NDRC agricultural production cost survey for 2020 showed that 113 days of labor were used for each hectare of cotton produced in Xinjiang—about 32 percent of the 356 days used in Jiangsu Province and 43 percent of the 263 days used in Hubei Province (figure 8). Additionally, cotton farms in the traditional eastern and central regions used family labor almost exclusively, while Xinjiang farms used a much higher proportion of hired laborers.

Greater mechanization in the Xinjiang region is reflected in much higher expenses for hiring machinery services as compared with five provinces in other parts of China shown in figure 9. Much higher irrigation expenses for Xinjiang cotton producers showed they also are more reliant on irrigation than producers in other parts of China.

Figure 8

Average labor input in cotton production, by Chinese province/region, 2020

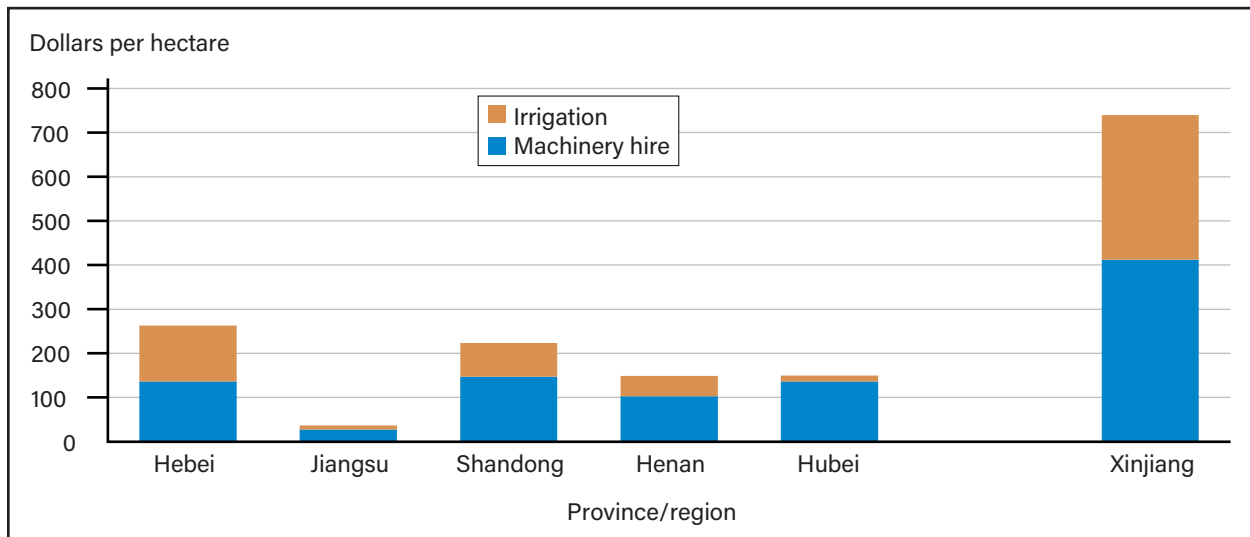


1 hectare = 2.46 acres.

Source: USDA, Economic Research Service calculations using data from National Development and Reform Commission of China.

Figure 9

Selected cotton production expenses, by Chinese province/region, 2020



1 hectare = 2.46 acres.

Note: Original data in Chinese yuan per mu converted to dollars per hectare using an official exchange rate and ratio of 15 mu per hectare.

Source: USDA, Economic Research Service calculations using data from the National Development and Reform Commission of China.

As profitability of cotton production diminished, rising government support for cotton producers was skewed toward Xinjiang. The Chinese target price subsidy for cotton producers, in place since 2014, makes payments to growers in Xinjiang based on the difference between the market price and a government-determined target price. The target price was set at 19,800 yuan per metric ton in 2014, 19,100 yuan in 2015, and 18,600 yuan in 2016 and subsequent years. China's market price for cotton fell below 15,000 yuan per metric ton in the first year of the target price subsidy in 2014/15 and never reached the target again until 2021/22. Cotton producers outside of Xinjiang received much smaller subsidies and payments were often delayed (Clever, 2017). A bulletin on cotton output issued by the China National Bureau of Statistics (2021) attributed the resilience of cotton production in Xinjiang to the target price subsidy policy.¹⁰

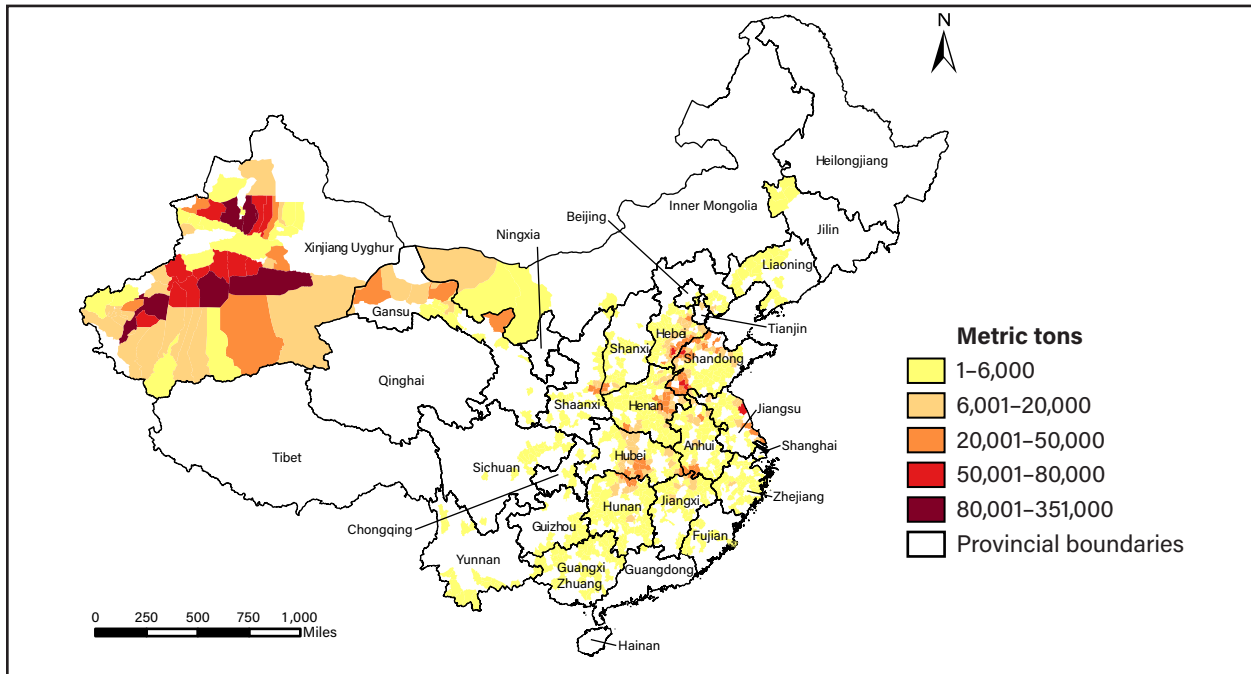
Other subsidies are given for purchase of machinery, improved seed varieties, and construction of “high standard” fields with irrigation, roads, and electricity infrastructure. According to China's Ministry of Agriculture (2017a), subsidies for purchasing a cotton harvesting machine rose from 200,000 to 600,000 yuan (about \$38,000 to \$95,000) during 2012–17, with subsidies over those years totaling 300 million yuan (about \$48 million). The XPCC—which reportedly accounted for 41 percent of Xinjiang's cotton output in 2020—can access credit support, subsidies for farm machinery, and technical assistance seldom available to cotton farmers in eastern and central provinces (Mei, 2020).

Chinese government policy support for grain production in eastern and central provinces also indirectly fostered Xinjiang dominance in cotton production. Traditional cotton-growing areas in the Yellow and Yangzi River regions are also key grain-producing regions. Since 2004, officials focused on maintaining food security by inducing farmers in eastern and central provinces to plant grains through subsidies and other support policies (Gale, 2013; Gale et al., 2015). By encouraging these farmers to plant grain, the subsidies also likely encouraged more farmers in these regions to abandon cotton production.

Data from 2009—near the peak of China's cotton output—show that Xinjiang contained all 10 counties producing more than 80,000 metric tons of cotton (figure 10). While many of China's major cotton-producing counties (with output of 20,000 metric tons to 80,000 metric tons annually) were still in the traditional production regions of Anhui, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, and Shandong Provinces, many counties in industrialized regions like southern Jiangsu, eastern Shandong, Zhejiang, Guangdong, and Fujian Provinces were no longer producing much cotton. In addition, Shanghai, which was once a significant cotton-producing area, had no significant cotton output.

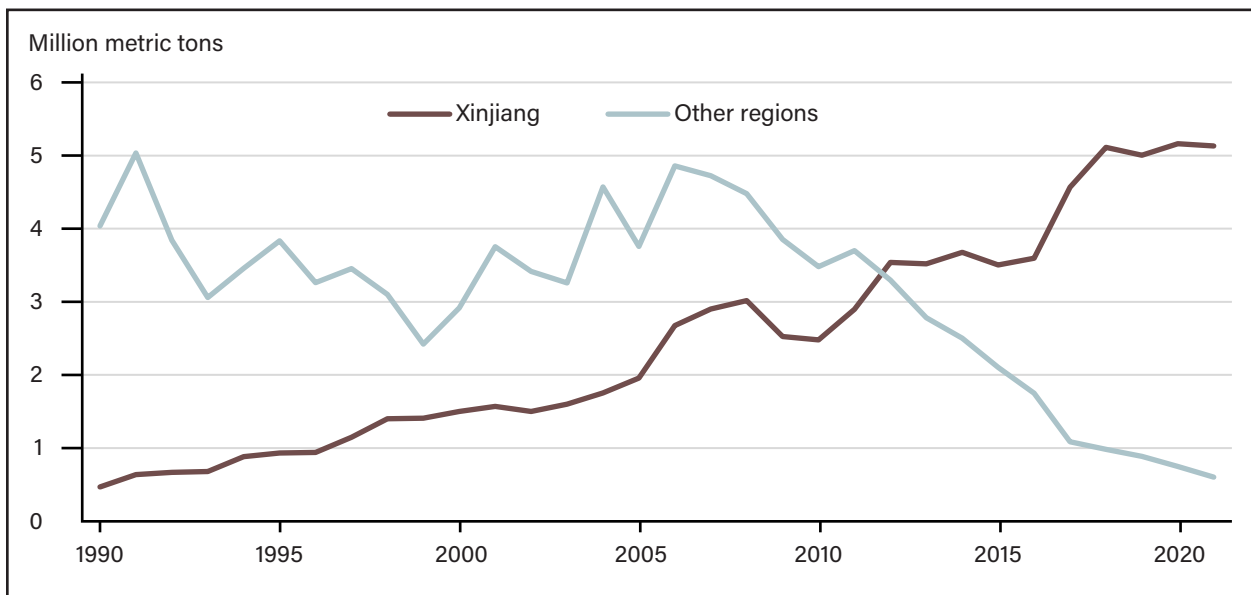
¹⁰ Bulletins issued by the China National Bureau of Statistics in previous years also attributed sustained cotton output in Xinjiang to the target price subsidy.

Figure 10
China's cotton-producing counties, 2009



Source: USDA, Economic Research Service analysis of data from the China National Bureau of Statistics, County Socioeconomic Statistics.

Figure 11
Regional trends in China's cotton output, 1990-2021



Source: USDA, Economic Research Service analysis of data from the China National Bureau of Statistics.

The changing geography of cotton production is evident in statistics illustrating contrasting trends in regional cotton output (figure 11). Xinjiang’s output nearly doubled to reach 5 million metric tons by 2018, remaining near that level ever since. A 5-year plan for the Xinjiang region (Xinjiang Daily, 2021) and the China Cotton Association’s (2021a) recommendations for the 5-year plan both called for keeping annual cotton production in Xinjiang stable at 5 million metric tons. Production in the traditional regions of eastern and central China declined from 4.9 million metric tons in 2006 to just 602,000 metric tons in 2021. China’s National Bureau of Statistics (2021) said that during 2021 the area planted in cotton declined 18 percent in the Yangzi River region and 25 percent in the Yellow River region.

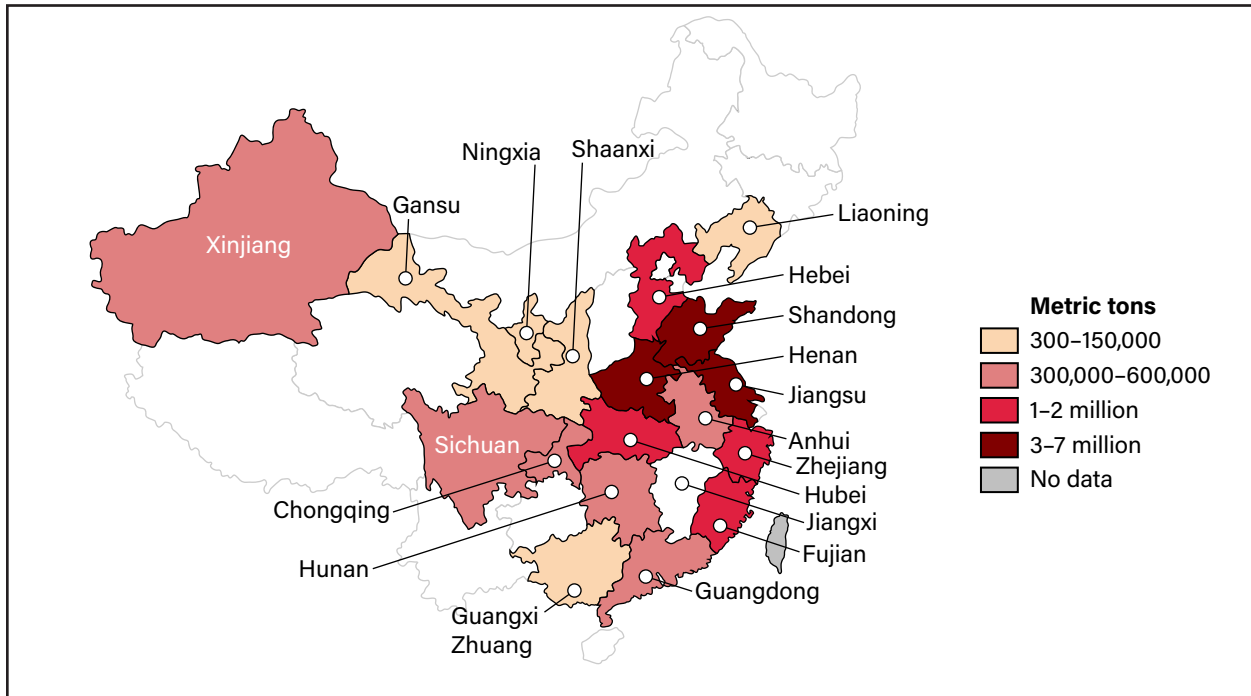
Most reports from the Chinese government and news media say Xinjiang’s cotton has superior attributes, such as fiber length and color, but industry sources raise concerns about China’s overall cotton quality. China’s Ministry of Agriculture and Rural Affairs’ (MARA, 2021) projection of future supply and demand highlighted quality problems in their assessment stating, “Cotton quality will gradually come close to meeting the requirements of the textile industries.” MARA also noted that high-grade cotton will account for most imports during 2021–30.

The director of China’s cotton association voiced concern that supplies of high-quality cotton were insufficient despite the ample volume of cotton produced in the country (Economy Daily, 2021). A program launched in 2019 to standardize seed varieties in Xinjiang’s largest production region aimed to address the issue of cotton failing to meet the standard of textile manufacturers (Aksu Daily, 2020). An update on this program cited persistent problems, such as batches of cotton containing varying fiber lengths, cotton lint often contaminated with foreign matter, and inspection documents sometimes being falsified (Aksu Daily, 2021a). The China Cotton Association (2021b) reported that Xinjiang’s government launched a cotton quality program in 2021.

Traditionally, China’s major textile manufacturing regions overlapped with its cotton-producing regions (see the box titled “Geography and Textile Industry Location”). Even as cotton production shifted to Xinjiang, China’s textile manufacturers remained largely concentrated in eastern and central regions where companies can access technology, capital investment, and final markets in Chinese cities and ports. Yarn production is now highly capital intensive, and the growing use of synthetic fiber diminishes the use of cotton raw materials. In 2009, the top three yarn-manufacturing provinces—Shandong, Jiangsu, and Henan—were in traditional cotton-growing regions (figure 12). Those three provinces accounted for 60 percent of China’s yarn output in 2009. The eastern provinces of Hebei, Anhui, Hubei, Zhejiang, Fujian, and Guangdong comprised another 30 percent of yarn output. In 2009 Xinjiang accounted for less than 2 percent of yarn output.

Figure 12

China's yarn output, by province/region, 2009



Source: USDA, Economic Research analysis of data from the China National Bureau of Statistics.

Geography and Textile Industry Location

Myers (1965) described the historical development of China's textile industry in Jiangsu and other provinces where the textile industry is still concentrated today. The geographic concentration of the industry is consistent with economic principles of industry location.

Consistent with Von Thünen's (1826) model of the location of industrial and agricultural activities, cotton production—yielding relatively low economic value per unit of land—typically occurs far from urban centers and in places with suitable climate and soil, an abundance of water, and other favorable environmental factors. China's textile industry began with yarn spinning by farmers who double-cropped cotton and food crops. As demand expanded, cotton supplies in Jiangsu were supplemented by cotton from northern provinces.

China's textile manufacturing was traditionally located in proximity to cotton farms, rural labor, and urban centers in southern coastal regions, consistent with Weber's (1913) identification of the optimal point to produce goods for a final market in a location triangle based on costs of raw materials and finished goods. The concentration of the industry in coastal regions reflected the long history of foreign trade and investment and proximity to foreign settlements in Shanghai and its hinterland during the 19th century (Myers, 1965; Chao, 1986; Shi, 2001).

China's networks of small-scale, township-based garment and textile firms have been viewed as an example of English economist Alfred Marshall's industrial cluster concept (Wang, 2011), a geographic clustering of similar firms that facilitates the exchange of industry-specific knowledge, the pooling of shared labor, and the minimization of raw material transport costs (Ellison et al., 2020; Rosenthal and Strange, 2020). The industry's recent productivity and innovation are attributed to the geographic concentration of the textile industry in these regions (Lin et al., 2011; Bellandi and Lombardi, 2012).

In the 21st century, the rapid urbanization and rising opportunity costs of land and labor disrupted established geographic patterns. Cotton production declined as labor became scarce in eastern China. Manufacturing, high-tech industries, services, tourism, and other industries supplanted the textile and garment industry in coastal provinces.

Chinese planners now aim to develop textile and garment manufacturing in Xinjiang, where large companies are encouraged to set up branches. The region's 5-year plans for 2016–20 and 2021–25 call for setting up garment manufacturing clusters close to cotton supplies but far from coastal industry clusters and ports. The 2021–25 plan aims to shift cotton/textile/garment trade to China's western border with Central and South Asia.

The Chinese Ministry of Agriculture identified the regional imbalance between textile manufacturing and cotton production as one of “many problems and contradictions” in China's cotton industry (RCRE, 2017). China's economic planners sought to address this imbalance by moving more textile manufacturing to Xinjiang. A 2014 Xinjiang government plan called for boosting investment in the region's textile and garment manufacturing to create 1 million jobs in the sector by 2023. The plan estimated that Xinjiang held about 4 percent of yarn-spinning capacity in 2012 and offered a 20-billion-yuan (over \$3 billion) industry support fund, discounted electricity rates, and employee training programs to expand the industry (Xinhua, 2014). A Xinjiang official explained the plan was partly designed to bring textile manufacturing to the source of raw materials (Xinhua, 2017). Other objectives were to achieve social stability in the region and to make Xinjiang an integral part of China's “One Belt, One Road” strategy of increasing trade and investment with Central

Asia, South Asia, and the Middle East (State Council, 2018).¹¹ The 2016–20 5-year plan for Xinjiang called for expanding the textile and apparel industries and industrial parks in several regions of Xinjiang. The plan highlighted apparel manufacturing as a labor-intensive sector that could create jobs for rural people and promised support for companies that shift production to Xinjiang. In mid-2017, state media reported that over 1,900 textile and apparel companies were operating in Xinjiang—including well-known companies based in eastern provinces—and claimed that industry employment had reached 415,000 (Xinjiang Daily, 2017). Clever (2017) also reported a surge in Xinjiang textile investment.

According to the China National Bureau of Statistics *2018 China Economic Census Yearbook*, Xinjiang had 1,079 textile enterprises and 1,694 garment manufacturers, a combined total of 2,773. A ranking of China’s provinces by textile industry indicators using data from the economic census shows that textile manufacturing was still concentrated in eastern provinces (table 1).¹² Jiangsu and Zhejiang were the top ranked textile provinces, accounting for a combined 52 percent of textile enterprises, 42 percent of the value of industry assets, 38 percent of annual gross business income, and 37 percent of textile industry employment. Shandong was the third ranked province in number of enterprises, value of assets, and employment. The southern coastal provinces of Guangdong and Fujian were also among the top ranked textile provinces in China for each indicator, and other traditional cotton-producing provinces—Hebei, Henan, and Hubei—were among the leading textile provinces, with shares of 3 percent to 6 percent each. Despite claims by state media of rapid growth, in 2018 Xinjiang still had a relatively minor share of textile production. Xinjiang held 4 percent of textile industry assets but only 2 percent of employment and 1 percent of textile enterprises and business income.

Table 1
Rankings of China’s provinces/regions in textile industry indicators, 2018

Number of enterprises		Value of industry assets		Annual gross business income		Textile employment	
Province	Share	Province	Share	Province	Share	Province	Share
Jiangsu	29	Zhejiang	22	Jiangsu	21	Jiangsu	19
Zhejiang	23	Jiangsu	20	Zhejiang	17	Zhejiang	18
Shandong	9	Shandong	10	Fujian	12	Shandong	12
Guangdong	9	Fujian	8	Guangdong	8	Guangdong	8
Hebei	8	Guangdong	7	Hubei	8	Fujian	8
Fujian	3	Henan	6	Shandong	8	Hubei	7
Henan	3	Hubei	5	Henan	5	Henan	6
Xinjiang	1	Xinjiang	4	Xinjiang	1	Xinjiang	2

Notes: Data are for “above-scale” enterprises, which account for 69 percent of textile industry employment. Share = provincial share of national total as a percent.

Source: USDA, Economic Research Service analysis of the China National Bureau of Statistics, China 4th Economic Census.

Recent industry documents indicate that Xinjiang’s share of textile production capacity grew rapidly during 2012–20, but its share of the national industry remains modest. The China Cotton Association (2021a) reported that in 2020 Xinjiang reached yarn-spinning capacity of 20 million spindles—up from 7 million spindles in 2012—and 33 percent of the cotton produced in Xinjiang was used by manufacturers in the region. Xinjiang’s spindle capacity was 18 percent of China’s 110-million capacity reported for 2020 (Textile Apparel Weekly, 2021).

¹¹ The plan’s Chinese title was, 大力发展纺织服装产业促进百万人就业规划纲要 (2014–2020年) (*Plan To Greatly Develop the Textile and Garment Industry and Promote Employment of 1 Million (2014–2020)*).¹²

¹² The trend by province or region cannot be discerned from official data because China’s National Bureau of Statistics no longer reports provincial or regional yarn output.

Xinjiang's 2021–25 5-year plan echoed earlier initiatives for developing textile and garment manufacturing and included a section on “labor-intensive industry development” strategy (Xinjiang Daily, 2021). However, the 5-year plan recommendations by the China Textile Industry Alliance (2021) did not mention Xinjiang as a major textile manufacturing region and instead emphasized risks related to synthetic fiber supplies, geopolitical and trade friction, data security, and surges of foreign capital flows.

The 2021–25 Xinjiang plan also features initiatives to engage the region in foreign trade and investment. The plan calls for establishing an international textile trading center in the region. A People's Daily (2020) discussion of plans for promoting agricultural trade with Central Asia highlighted investments in Tajikistan's cotton and textile sectors and a plan to construct Central Asia's largest textile manufacturing center. One of those investments was a China-Tajikistan Agricultural Cooperation Park, comprising 8,800 hectares of land for cotton production in Tajikistan and overseen by a cotton company associated with the XPCC (Guojihua Fazhan, 2015). Such projects are consistent with the governmental strategy of diversifying China's sources of agricultural imports while ensuring a central role for companies affiliated with state farms such as the XPCC (Ye, 2016). A strategic plan by China's Ministry of Agriculture (2017) stated that the foreign agricultural zones were intended to help Chinese companies establish sites abroad for sourcing raw inputs and to help them learn how to operate in global markets, build infrastructure, and establish industry clusters in foreign countries.

Domestic and Imported Cotton: Transportation and Price

Cotton imported to China competes with cotton produced in China based on quality, characteristics, and delivered cost at the location where it is spun into yarn. Shipping costs influence the final cost since both imported and domestic cotton are shipped long distances. Imported U.S. cotton is shipped to Chinese ports such as Qingdao from U.S. ports such as Long Beach, California, (6,570 miles) or Savannah, Georgia (11,700 miles via the Panama Canal). Most domestic Chinese cotton must also be shipped a considerable distance from Xinjiang to reach the textile manufacturers in central and eastern China. For example, the distance from Xinjiang to Guangdong is about 2,900 miles; to Jiangsu, 2,600 miles; to Shandong, 2,400 miles; and to Henan, 2,200 miles. Cotton is transported from Xinjiang by both truck and rail. The average transportation cost by truck is about 4 cents per metric ton per mile.¹³

Chinese officials subsidize the cost of transporting cotton from Xinjiang to textile manufacturers in other provinces at a fixed rate of 500 yuan per metric ton (see the box titled “Cotton Transportation Subsidy”). Thus, the subsidy amounts to about 3–4 percent of the delivered price of domestic cotton in recent years (13,000 to 15,000 yuan per metric ton).

Cotton Transportation Subsidy

China subsidized the transportation of cotton from Xinjiang to other provinces since the early 2000s. A 2016 article notes the “subsidy for transportation of cotton exiting Xinjiang” was 500 yuan per metric ton, with a total of 1.825 billion yuan paid to 1,282 companies (China Industry News Network, 2016). The subsidy was offered to “help Xinjiang address its problems of long distance and excessive cotton cost and to reduce cotton cost for buyers.” The subsidy was raised from 400 yuan to 500 yuan per metric ton in 2012 (RCRE, 2017). Articles published after 2016 did not report detailed information on this subsidy. No transportation subsidy exists for cotton produced in other provinces nor for imported cotton.

News reports indicate that documents are issued each year to implement the Xinjiang cotton transportation subsidy program. An example is the Xinjiang Finance Department’s 关于做好2018年度出疆棉花运费补贴申报工作的通知 (“Notice on Carrying Out 2018 Work on Application for Ex-Xinjiang Cotton Transportation Subsidy.”) Most documents were unavailable because many Xinjiang government websites were not accessible when this research was conducted.

The China National Cotton Exchange and the China Cotton Association implement the transport subsidy by accepting and verifying applications. A website for submitting subsidy applications is maintained by China’s National Cotton Association.

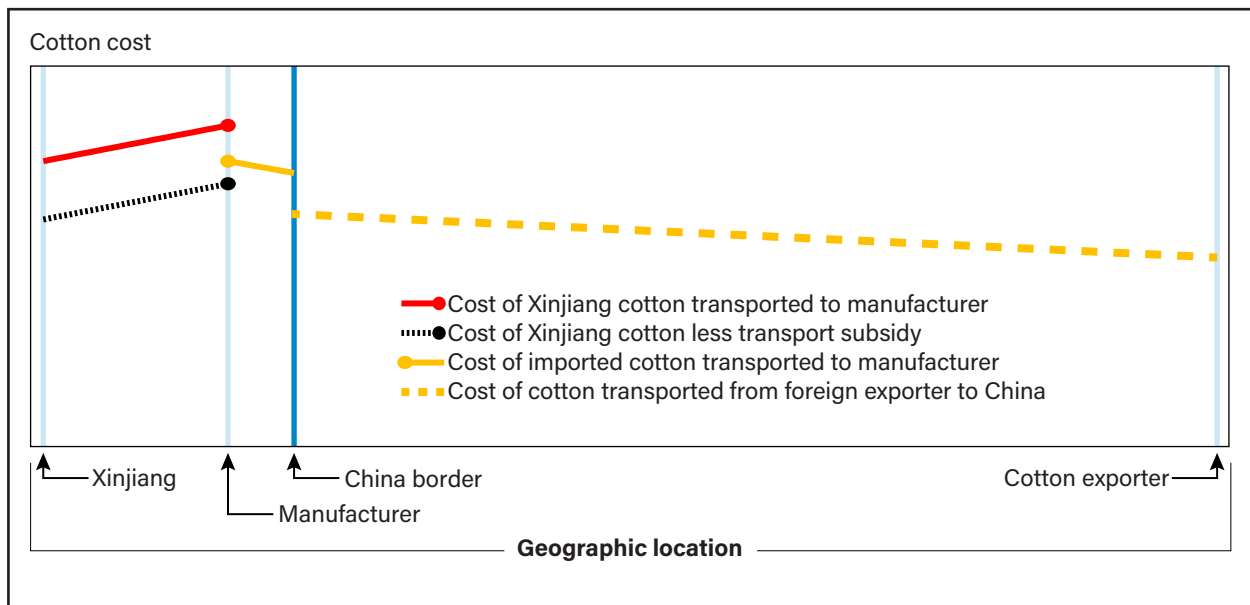
A social media site posted a document issued by 全国棉花交易 (China National Cotton Exchange) called 关于公示2019年度出疆棉花运费补贴审核结果的通知(2021年第2号) (“Notice on Announcing Verification Results of 2019 Ex-Xinjiang Cotton Transportation Expense Subsidy.”) 全棉市子(2021 No.2), which was published in January 2021.

¹³ The cost per metric ton per mile is based on the approximate distance from the main cotton-producing county in Xinjiang (Yuli County) to the centroid of each province following the fastest highway route. Transportation costs come from the China Cotton Information Network, using a 6.5 renminbi to \$1 exchange rate.

Figure 13 presents a general depiction of the cost of cotton transportation and the purpose of the subsidy. The cost of Xinjiang cotton is represented by a red line showing a rising cost for longer transportation distances. The subsidized transportation cost is represented by a black dot 500 yuan (about \$77) lower than the red dot at the manufacturer's location. The dashed yellow line illustrates the cost of importing cotton as far as China's border. The cost of foreign cotton at the border exceeds the foreign country's initial export price due to ocean transport costs. The solid yellow line that begins above the dashed yellow line shows that the cost to Chinese importers increases at the border due to tariffs, taxes, and unloading fees. Transportation from the border to the hypothetical Chinese textile manufacturer's location in eastern China adds more transportation costs. In the diagram, the total theoretical cost of importing cotton to the manufacturer's location (yellow dot) is slightly higher than the total subsidized cost of Xinjiang cotton (black dot). In practice, however, the relative costs of cotton from Xinjiang and foreign sources vary, depending on price fluctuations at the point of origin, transportation costs, tariffs, and taxes.

Cotton prices fluctuate monthly, but the price of domestic cotton reported by China's Ministry of Agriculture and Rural Affairs (MARA) was equal to or higher than the value of imported cotton at the border during most months since 2014 (figure 14). China's quota on imports limits the supply of cotton, thus keeping domestic prices higher than international prices. Chinese officials vary the volume of "sliding scale" quota based on their assessment of market demand (MacDonald et al., 2015). The average price of cotton in China exceeded the price at the border—before assessing tariffs, other taxes, and transportation costs—by 20 percent to 30 percent during most months from 2014–21. The price differential narrowed in 2014–16 when Chinese officials ended a cotton price support and began releasing government reserves into the market. No sliding scale quota was granted in 2016–17, but quotas were granted in 2018–19 after the Chinese price rose above the international price. The sliding scale quota was cut in half for 2019 as the price differential narrowed during a period of weak demand. A modest amount of additional quota was issued in 2020–21, but the price differential widened to 50 percent in the second half of 2020 and 2021 as Chinese prices rose rapidly.

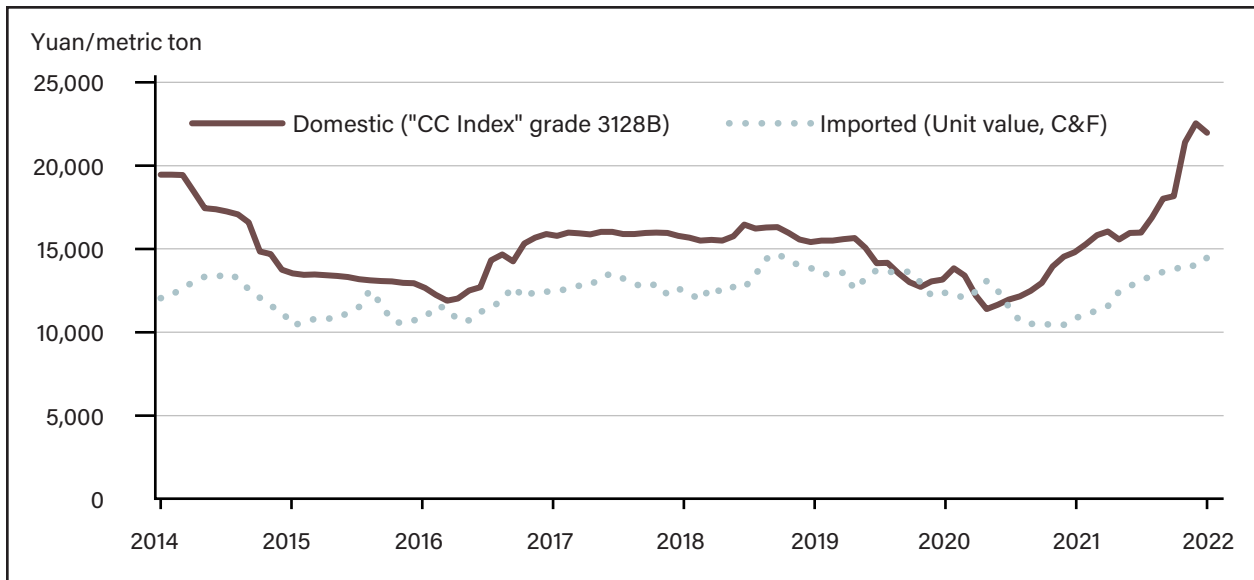
Figure 13
Illustration of the cost of Xinjiang and imported cotton to a textile producer in eastern China



Note: The Chinese textile producer is a hypothetical entity in eastern China.

Source: USDA, Economic Research Service data.

Figure 14
China cotton prices, monthly, 2014-21



Notes: Domestic cotton refers to the China Cotton (CC) Index for cotton grade 3128B. C&F = cost and freight. Imported cotton is the landed value of cotton converted to Chinese yuan at the corresponding monthly exchange rate.

Source: Domestic and imported prices are reported in China's Ministry of Agriculture and Rural Affairs' monthly commodity situation and outlook reports.

Analysis of Applicants for Cotton Import Quotas

To acquire the right to import cotton under the tariff-rate quota (TRQ), prospective importers must submit applications requesting a portion of the TRQ in September of the year before the year in which they hope to import cotton. Officials then decide whether to award a portion of the quota to an applicant and what percentage of the total each applicant should receive. News reports reveal that Chinese local officials compete to gain greater shares of the cotton quota for firms in their jurisdictions (see the box titled “Municipal officials compete for import quotas”). Thirty-three percent of the cotton TRQ is designated for import by a state-trading enterprise (STE). Little is known about how the STE share of the quota is allocated or used, but it may be used to replenish state reserves and accomplish other policy objectives.¹⁴

Municipal Officials Compete for Import Quotas

Municipal development and reform commission offices accept firms’ applications for TRQ allocations and pass them on to the commissions that determine the quota allocations. USDA, ERS reviewed announcements of cotton TRQ allocations issued by eight municipal and county commissions in six provinces from 2010 to 2021 to understand the issuance of TRQs. The quota amount awarded to applicants under the purview of these commissions ranged from 700 to 91,000 metric tons, and the number of firms receiving a portion of the total quota ranged from 1 to 22 per locality.

Announcements issued by these commissions say they assist firms in the application process, conduct inspections to verify data, and analyze data to assess cotton demand. They also check for regulatory violations, illegal sales of imported cotton to other companies, and financial irregularities that would disqualify applicants.

Announcements also indicate that local commission offices compete to advocate for larger allocations to local firms. Most announcements include language such as: “The Huarong County (Hunan Province) office takes an active role and makes every effort to help enterprises improve their application materials, taking the initiative to make numerous reports to provincial and municipal offices.”

Many announcements highlight the monetary value of quotas by reporting estimated cost savings for local textile firms, citing differences between local and international cotton prices. In 2021, the Lanxi (Zhejiang Province) commission said local textile companies were eager to obtain quota allocations to fulfill rising orders and reduce high cotton costs. In 2016, the Dezhou (Shandong Province) municipal office noted the use of quotas improves product quality by blending imported long staple cotton from the United States and Australia with local cotton.

The lists of applicants for the 2018–21 sliding scale quota included most of the same companies that apply for a share of the TRQ. A match of the applicants for the 2021 TRQ and 2021 sliding scale quota found that 513 of the 690 TRQ applicants (89 percent) appeared on both lists. The sliding scale applicant list included 63 companies that did not appear on the TRQ applicant list. Of the largest 71 cotton users on the TRQ applicant list, only 6 did not appear on the sliding scale applicant list that year. In view of the overlap between the two lists—and the omission of cotton imports from all sliding scale lists—this analysis excluded the sliding scale applicant lists. This study examined the lists of companies that applied for the TRQ each year since 2016.

¹⁴ For example, the Ministry of Agriculture and Rural Affairs’ (2017) strategy for overseas agricultural demonstration zones recommended “guiding” Chinese state-trading companies to use their tariff-rate quota shares to import commodities produced in the zones.

The TRQ applicant lists, posted on the public website of the National Development and Reform Commission of China (NDRC), include the name and location of each applicant. Applicants also were required to report information about their products, capacity, and raw material use. Information on raw material use, however, varied from year to year; the lists do not indicate the requested quota amount or the amount granted to applicants. Several lists reported the amount of cotton used and the amount imported in past years. The application forms requested information on the firm's past TRQ and sliding scale quota allocations and the actual imports from the previous year, but most of the published lists excluded this information. This analysis focused on examining trends and the regional distribution of TRQ applicants as indicators of demand for imported cotton. Authors also analyzed yarn production and the volume of cotton reported by TRQ applicants in 2020 and 2021, 2 years for which consistent data on imported cotton use was reported.

NDRC instructs applicants to provide data for the first three quarters of the year in which the application was submitted. For example, the yarn and cotton data for the first three quarters of 2019 were to be entered in the 2020 TRQ application.¹⁵ The data, therefore, reflect only three quarters of yarn production and cotton use during the year prior to the TRQ year. Authors estimated annual totals from the TRQ application data using a ratio that assumed fourth-quarter output equaled the average for the first three quarters (see the box titled "Annualizing Yarn and Cotton Data").

Annualizing Yarn and Cotton Data

TRQ applicants reported data on yarn production and cotton use for the first three quarters of the application year. Authors multiplied these values by a factor of four-thirds to estimate annual totals, assuming that fourth quarter production equaled the average of the first three quarters. The four-thirds ratio is verified in two ways. First, by calculating the ratio of January–September yarn output to annual yarn output using aggregate monthly industrial output of yarn reported by China's National Bureau of Statistics for 2018–20, the average ratio was 3.98/3. Second, by comparing cotton use reported by 513 companies on the list of TRQ applicants (January–September values) with cotton use reported by the same companies on the 2021 sliding scale quota applicant list, which reports their annual use, the ratio for individual companies varied but the average was four-thirds. The same annualization factor was used for each year.

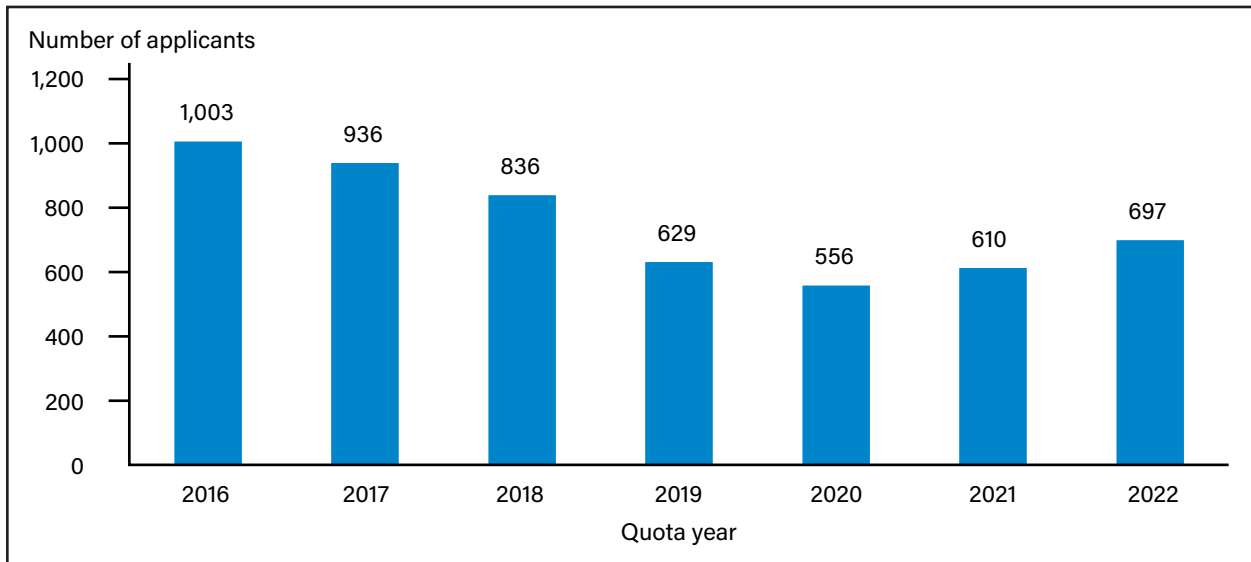
The number of cotton import quota applicants (figure 15) declined from 1,404 in 2016 to 562 in 2020. Applications rebounded moderately to 620 for the 2021 quota and 697 for the 2022 quota. The modest increase in applicants could reflect recovery of the textile industry in 2020 and 2021 when applications were submitted. Note that these applications were submitted in September of the year prior to the quota year, so prospective importers may have submitted applications based on their expectations for market conditions 3 or more months in the future.

The decline in the number of applicants contrasts with the growth in cotton imports shown by customs statistics (figure 16). The 2016 import volume, 0.9 million metric tons, equaled the TRQ—when no sliding scale TRQ was announced. China's cotton imports rose to over 2 million metric tons in 2020. The expansion of imports from 2017 reflects the restoration of the sliding scale TRQ in those years. These values imply the tariff-rate quota (TRQ) filled each year. Data for the 2021 calendar year shows a slight decline, but the 2021 import total still exceeded the sum of the TRQ (0.9 million metric tons) and the sliding scale quota (0.7 million metric tons).

¹⁵ Applications for the "sliding scale" quota (submitted 7–10 months after the tariff-rate quota (TRQ) applications requested cotton use for the entire previous year.

Figure 15

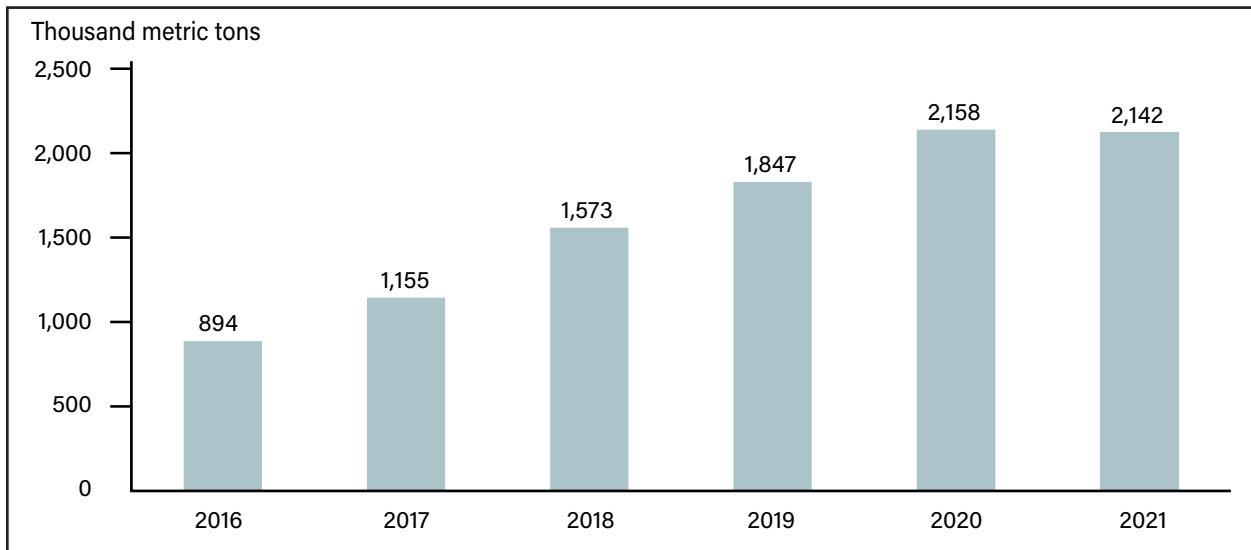
Number of applicants for cotton tariff-rate quotas, 2016-22



Source: USDA, Economic Research Service analysis of the National Development and Reform Commission of China lists of applicants for tariff-rate quotas.

Figure 16

China's cotton imports, 2016-21



Source: China customs data accessed through Trade Data Monitor.

Considerable churning of the TRQ applicants occurred from year to year (table 2), but while a minority, many companies applied every year. Merging the TRQ applicant lists from 2016 to 2022, a total of 1,581 different companies appeared on the applicant lists. Only 265 of those companies appeared on the applicant lists in all 7 years. The majority appeared in 3 or fewer years, with the largest number of applicants (406) appearing only once. There were 100 companies that appeared as applicants for the first time on the 2022 TRQ applicant list and 60 that appeared for the first time on the 2021 list.

Table 2

Tariff-rate quota applicants by number of years they submitted applications, 2016–22

Number of years companies applied	Number of companies applied
7	265
6	89
5	76
4	158
3	289
2	298
1	406
Cumulative number of applicants	1,581

Note: Table shows count of companies on merged applicant lists for 6 years.

Source: USDA, Economic Research Service analysis of the National Development and Reform Commission of China tariff-rate quota applicant lists.

Nearly all TRQ applicants reported their output was cotton yarn, with blended or synthetic yarn reported by only a few applicants. Garment and cloth manufacturing firms rarely appeared on the cotton TRQ applicant lists. A few applicants were trading companies that reported no output data. When examining the yarn production reported by TRQ applicants for 2018–21, the annual average was 8.2 million metric tons (table 3). The 2021 data indicate a surge in yarn production to 9.6 million metric tons that year after 2 years of relatively low output (7.3 million metric tons in 2019 and 7.7 million metric tons in 2020). A much larger 28.4-million metric ton average national yarn output was reported for 2019–20 by China’s National Bureau of Statistics compared with the volumes reported by TRQ applicants. The use of synthetic fiber and other natural fibers besides cotton by textile manufacturers that did not apply for cotton TRQs could account for some of this difference.

Table 3

Yarn production and cotton use reported by tariff-rate quota (TRQ) applicants, 2019–22

Item	Unit	2019 (2018 data)	2020 (2019 data)	2021 (2020 data)	2022 (2021 data)
TRQ applicants	Number	629	556	610	697
Yarn produced	Million metric tons	8.2	7.3	7.7	9.6
Cotton yarn	Million metric tons	6.9	6.1	6.2	8.0
Pure cotton yarn	Million metric tons	4.8	4.4	4.8	6.0
Cotton use	Million metric tons	7.8	6.7	7.3	9.0
Imported cotton	Million metric tons	NA	1.4	1.4	NA
Imported share of cotton use	Percent	NA	21	20	NA

NA = data not available.

Note: The sum of values for the first 3 quarters of the year prior to the tariff-rate quota (TRQ) year reported by applicants is annualized based on monthly national yarn output reported by National Bureau of Statistics of China (see box titled “Annualizing cotton and yarn data”).

Source: USDA, Economic Research Service analysis of National Development and Reform Commission of China (NDRC) lists of tariff-rate quota applicants.

Among applicants, cotton yarn constituted most of their reported yarn production. Pure cotton yarn, in turn, constituted most of the cotton yarn output. The volume of cotton use reported by TRQ applicants suggests that the applicants represent most of the industry's cotton users. The total cotton use reported by TRQ applicants averaged 7.7 million metric tons per year during 2018–21. This total is about 94 percent of the 8.2 million metric tons (37.5 million bales) average estimated by USDA, PS&D during the August–July market years that correspond to the 2018–20 calendar years. Consistent with the larger yarn output reported for 2021, the 9 million metric tons of cotton use reported by TRQ applicants in that year was substantially larger than in the previous 3 years.

The 1.4-million metric ton annualized use of imported cotton reported for 2019 and 2020 exceeds the 0.9-million metric ton TRQ, but it is still 25 percent less than the 1.9-million metric ton average annual cotton imports reported by customs data during 2018–20. Note that the use of cotton during a particular year may not correspond to the volume imported during that year since portions of China's cotton imports are stored in national reserves and released in later years. In addition, the lists likely understate the volume of cotton imported since the state cotton trading company, which accounts for a substantial share of total imports, does not appear on the applicant lists.¹⁶ In addition, discrepancies might be tied to sliding-scale imports by the 63 companies that appear on 1 or more of the 2018–21 sliding scale quota applicant lists but do not appear on the TRQ applicant list.

TRQ applicants included a few large companies and many small ones. For example, on the 2022 TRQ, the volume of cotton that applicants reported using during the first 9 months of 2021 ranged from zero tons to 240,000 metric tons. Among the 697 applicants for the 2022 TRQ, 18 companies reported using 50,000 metric tons or more of cotton, while 274 applicants reported using less than 5,000 metric tons. The median cotton use was only 6,100 metric tons.

The 20 largest scale applicants (ranked by reported cotton use) include a mix of companies in the traditional textile manufacturing regions, as well as a growing number of large producers based in Xinjiang. The top 20 accounted for 24 percent of total cotton use reported by applicants on the 2020 TRQ, 23 percent of the total on the 2021 TRQ, and 21 percent on the 2022 TRQ. Note that each location of a multi-plant firm was required to apply separately. That means some branches of large companies appear in the top 20 while other branches of the same company were outside the top 20 or did not apply at all. The largest company on the applicant list for each quota year, 2019–22, was Weiqiao Textile Company Limited, based in Shandong Province. Weiqiao Textile was not only the largest in terms of cotton use, but its yarn output and imported cotton volume were also twice as large as the second ranked applicant each year. Among the other large-scale applicants, some used large volumes of imported cotton while others used none.

The ratio of imported cotton use to total cotton use was calculated to estimate the importance of imported cotton to applicants (table 3) by analyzing cotton-use data for 2019–20 drawn from applications for the 2020 and 2021 TRQs. Imported cotton use was not included in the published lists for other years. Imported cotton constituted 21 percent of the applicants' total cotton use for 2019 and 20 percent for 2020. Imported cotton use varied widely among TRQ applicants. Authors pooled the data for TRQ applicants in 2020 and 2021 and tabulated a frequency distribution of the ratio of imported-to-total cotton use for the 2 years (figure 17).¹⁷

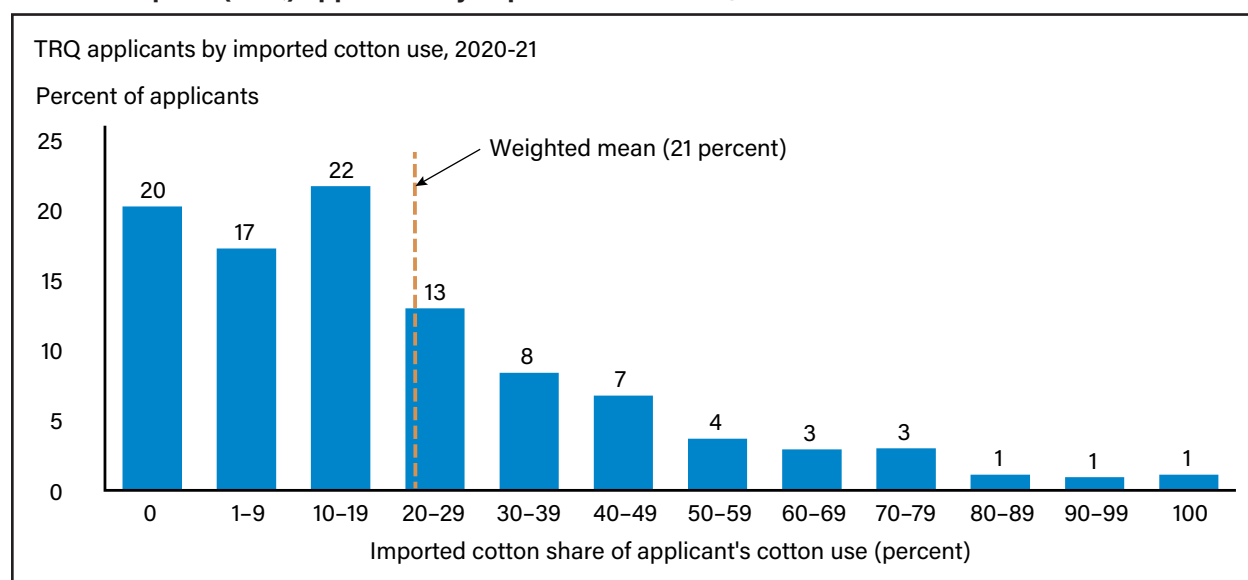
¹⁶ For wheat and corn, the Chinese state trading company for grain appeared on tariff-rate quota (TRQ) applicant lists for the first time in 2020 after a World Trade Organization (WTO) case challenging grain TRQ administration revealed that China had not made the state-traded share of TRQ available to other potential importers (Gale, 2021). The cotton TRQ was not included in the WTO case.

¹⁷ The frequency distribution was similar for the 2 years, with slightly more dispersion in the 2021 tariff-rate quota data.

The prevalence of imported cotton use varied widely. Among the applicants, 59 percent reported using less than 20 percent imported cotton. That included 20 percent of applicants that reported zero use of imported cotton. Presumably, these companies applied for a quota even though they did not receive or apply for a quota in the previous year and suggests that many applications are denied. A minority of applicants reported using large proportions of imported cotton. On the other hand, 15 percent of applicants reported 30–49 percent imported cotton use, 7 percent reported using 50–69 percent, and another 7 percent of applicants reported over 70 percent of their cotton was imported. Only 13 percent of applicants reported their imported cotton use was 20–29 percent of their total cotton use—the category containing the weighted mean of 21 percent.

Weiqiao Textile and 10 other companies owned plants in multiple locations in China, so imported cotton use at an individual plant was unlikely to reflect the full use of imported cotton by multi-plant companies. In the data, 49 applicants were identified at different locations that were part of 1 of 11 different companies.¹⁸ The average imported cotton use for the 2020 and 2021 TRQ years was calculated for each of the companies (table 4). The number of locations per applicant company varied from two to nine. All reported use of imported cotton at more than one plant.

Figure 17
Tariff-rate quota (TRQ) applicants by imported cotton use, 2019–20



Notes: Horizontal axis is ratio of imported cotton to total cotton used by applicant. Reported cotton use is for the first three quarters of 2019 and 2020, drawn from pooled lists of applicants for the 2020 and 2021 TRQs. Applicants with zero cotton use were excluded.

Source: USDA, Economic Research Service analysis of National Development and Reform Commission of China lists of tariff-rate quota applicants.

¹⁸ Ten of these companies were among the top 12 in a ranking of cotton-textile firms by business income (China TexNet News, 2011).

Table 4

Average annual use of imported cotton by companies with applicants at multiple locations, 2019–20

Companies	Applicants	Cotton use		
		All cotton	Imported cotton	Imported share
	Number	1,000 metric tons		Percent
Weiqiao Textile	3	364	118	32
Huafang Group	5	227	47	21
Tianqiao (Texhong)	9	219	12	5
Litai Textile	4	148	5	3
Ruyi Group	4	129	16	12
Bros Eastern Textile	5	72	16	22
Sanhe Textile Group	2	79	22	28
Hengfeng	8	108	6*	6
Lianfa Textile	2	31	6	21
Huafu Yarn	2	38	7	19
Longyuan Textile	3	39	9	23

*One Hengfeng location did not report import data.

Notes: The table shows the annualized weighted average of imported cotton use reported for the first three quarters of 2019 and 2020. Table shows data from 40 applicants for 2020 and 2021 tariff-rate quotas that were part of multi-plant companies. Imported cotton use was not reported on applicant lists for other years.

Source: USDA, Economic Research Service analysis of National Development and Reform Commission of China lists of tariff-rate quota applicants.

Weiqiao Textile was by far the largest user of cotton and the largest user of imported cotton.¹⁹ The company's largest plant used an average of 97,000 metric tons of imported cotton, which accounted for most of the company's 118,000 metric tons total. Weiqiao's use of imported cotton was more than double the next largest imported cotton average of 47,000 metric tons used by Huafang Group, which had five applicants (two in coastal provinces, two in central provinces, and one in Xinjiang). Imported cotton comprised 32 percent of Weiqiao's cotton use, also the largest among multi-plant companies. The Sanhe, Longyuan, and Bros Eastern companies had imported cotton-use ratios above the average of 21 percent for all applicants; other multi-plant companies had at- or below-average ratios of imported cotton. Weiqiao's three locations, three of Huafang's locations, two of Sanhe's locations, two of Longyuan's locations, one of Tianqiao's locations, and one of Ruyi's locations were among the corporate applicants that appeared on all seven applicant lists from 2016 to 2022 (table 2).

The TRQ applications of most provinces declined from 2016 to 2021 (table 5). The declining trend was especially prominent among the top four provinces—Shandong, Jiangsu, Henan, and Hubei. Their share of applications fell from 67 to 57 percent between 2016 and 2021. Xinjiang and Fujian were exceptions to the declining trend. Fujian applications rose from 2016 to 2022. In the same period, Xinjiang applications averaged around 40 from 2016 to 2021 and then increased greatly to 68 in 2022. For the 2021 TRQ applicant list, 6 of the top 20 applicants—measured by reported cotton use—were located in Xinjiang. An examination of the geographical representation of companies on the TRQ list for 2021 (figure 18) showed that Shandong Province had by far the most TRQ applicants. Jiangsu and Henan Provinces followed closely. Hubei and Xinjiang had the fourth and fifth largest number of applications.

¹⁹ Weiqiao was ranked first among cotton-textile firms by China TexNet News (2021). The company website reports operations in four cities in Shandong Province; Weiqiao applicants represent three of them.

Table 5

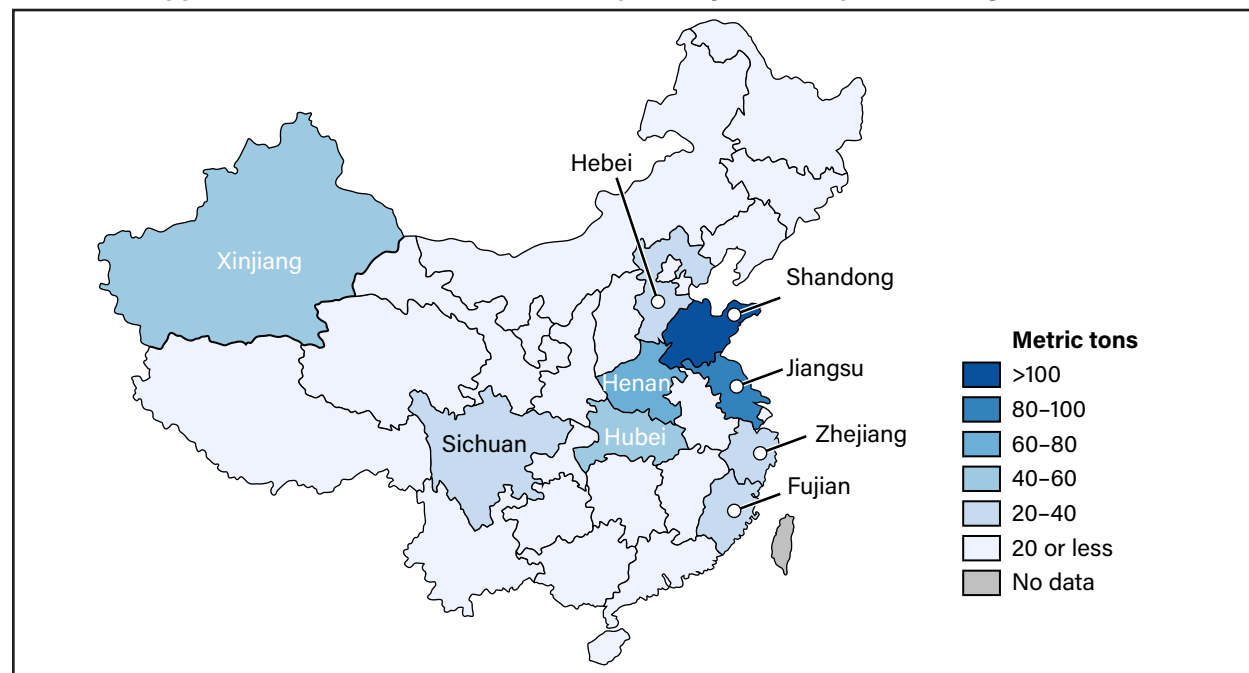
Number of tariff-rate quota applicants, by Chinese province/region, 2016–22

Region	Quota year						
	2016	2017	2018	2019	2020	2021	2022
	Number of applicants						
Shandong	297	263	187	149	149	153	165
Jiangsu	168	153	139	96	79	81	84
Henan	123	112	111	73	60	65	74
Hubei	84	80	85	54	50	55	60
Xinjiang	37	44	49	42	31	47	68
Fujian	25	24	26	31	32	38	43
Hebei	50	43	37	26	26	29	32
Sichuan	33	22	27	28	24	25	25
Zhejiang	41	38	33	22	21	24	22
Anhui	26	20	24	20	17	20	21
Hunan	0	27	28	21	18	19	22
Shaanxi	31	29	19	15	11	15	20
Jiangxi	24	28	23	16	13	14	15
Guangdong	18	12	13	11	10	11	13
Others	46	45	41	37	21	24	33

Notes: Table shows applications for the corresponding year's tariff-rate quota. Applications were submitted during the previous year.

Source: USDA, Economic Service analysis of National Development and Reform Commission of China lists of tariff-rate quota applicants

Figure 18

Number of applicants for 2021 cotton tariff-rate quota, by Chinese province/region

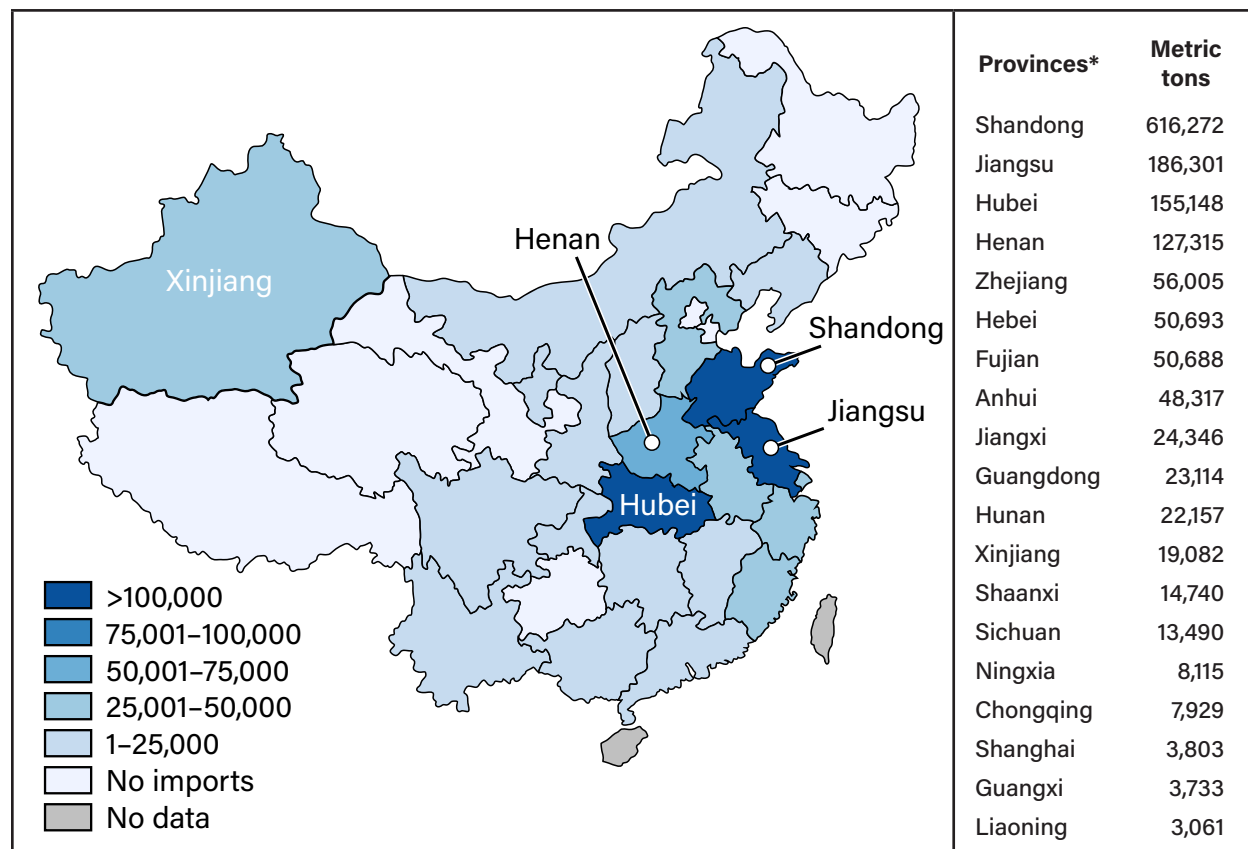
Source: USDA, Economic Research Service calculations using National Development and Reform Commission of China lists of tariff-rate quota applicants.

Among applicants for the 2021 TRQ, the volume of imported cotton use was concentrated in the provinces where the most TRQ applications were submitted (figure 19). The top four provinces—Shandong, Jiangsu, Hubei, and Henan—reported using over 800,000 metric tons—75 percent of the total imported cotton use reported by applicants. Shandong Province companies were, by far, the top users of imported cotton, reporting more than 600,000 metric tons of imported cotton use—about half of the total. Five of the top six users of imported cotton in 2021 were in Shandong.

In contrast, Xinjiang applicants reported using a combined total of 19,082 metric tons of imported cotton—only 1.3 percent of the total reported by all applicants. Six Xinjiang applicants were among the largest companies—using 25,000 to 68,000 metric tons of cotton—but they used no imported cotton. More broadly, in the 2020 TRQ, 20 of the 31 Xinjiang applicants reported zero imported cotton use, and 31 of the 47 Xinjiang applicants for the 2021 TRQ reported no use of imported cotton. Only a few Xinjiang applicants reported 1,000 or more metric tons of imported cotton use: in 2020 there were four TRQ applicants and in 2021 there was one TRQ applicant.

Figure 19

Use of imported cotton reported by tariff-rate quota applicants, by Chinese province/region



*Provinces/regions with less than 3,000 metric tons are omitted from the list.

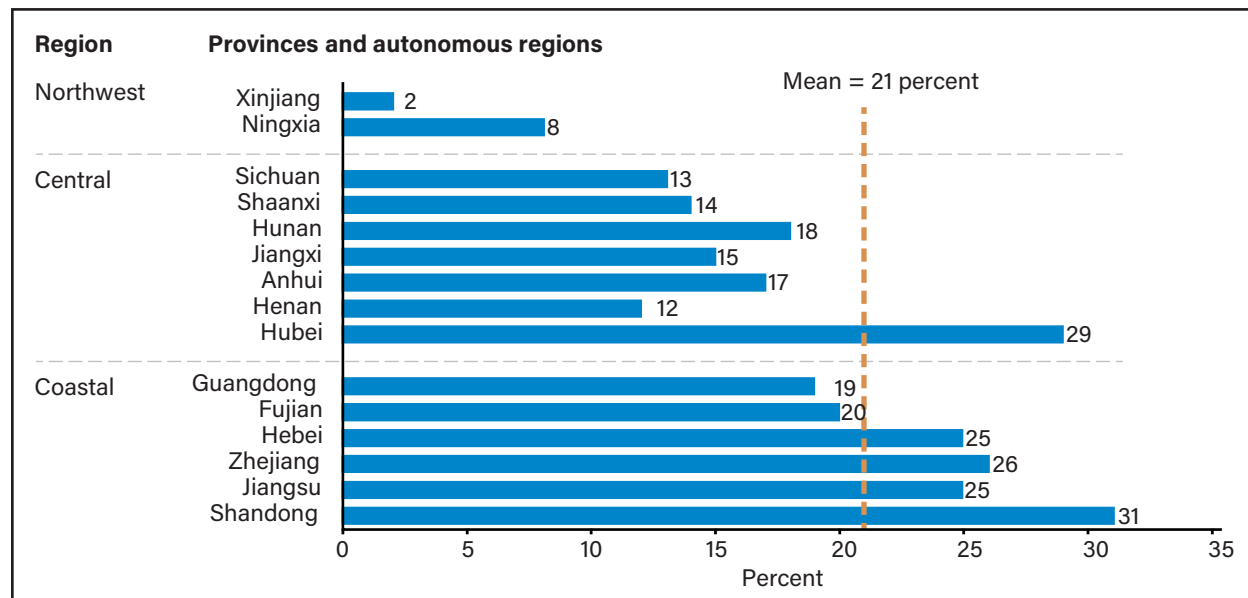
Note: The average of cotton used in the first three quarters of 2019 and 2020 reported by companies applying for 2020 and 2021 tariff-rate quotas, annualized by multiplying by four-thirds.

Source: USDA, Economic Research Service analysis of National Development and Reform Commission of China lists of tariff-rate quota applicants.

Authors also investigated whether companies in coastal regions were more likely to use imported cotton due to their access to ports and imported cotton and their greater distance from the main domestic source of cotton in Xinjiang. Authors expected companies in Xinjiang and those in central regions farther from ports to be less likely to use imported cotton. Figure 20 displays the average ratio of imported cotton use to total cotton use for coastal provinces, central provinces, and Xinjiang. Data on cotton use for 2019 and 2020—corresponding to applications for the 2020 and 2021 TRQs—were pooled to calculate an average for each province and autonomous region. Several provinces with less than 75,000 metric tons of annual cotton use were excluded. The overall mean of 21 percent is displayed for reference.

Figure 20

Proportion of imported cotton used by tariff-rate quota applicants, 2019–20/21 by province/region of China



Notes: The chart shows the average ratio of imported-to-total cotton use reported by tariff-rate quota applicants. Data for 2019 and 2020, drawn from applications for 2020 and 2021 tariff-rate quotas.

Source: USDA, Economic Research Service analysis of National Development and Reform Commission of China lists of tariff-rate quota applicants.

The regional patterns of imported cotton use are broadly consistent with the hypothesis of a higher propensity to use imported cotton in coastal regions. The imported cotton-use shares of four of the six coastal provinces were above the 21-percent overall mean. Shandong’s 31-percent imported cotton-use share was 10 percentage points above the mean. Three other coastal provinces maintained imported cotton use shares around 25 percent, also exceeding the mean but lower than for Shandong. The cotton-use shares of Guangdong and Fujian Provinces were slightly below the mean. Among the central provinces, the imported cotton-use ratios of six of the seven provinces were below the 21-percent mean—ranging from 12 percent for Henan to 18 percent for Hunan. Hubei was the only province with an import share above the mean (29 percent). Hubei’s imported share of cotton use stands out as an exception to the lower ratios among central provinces and is larger than all but one coastal province (Shandong). It is unclear why Shandong and Hubei feature prominently among their peers, but there may be a policy or some other factor that authors cannot observe.

As expected, TRQ applicants in Xinjiang reported the lowest ratio of imported cotton use, at just 2 percent (the ratio was 2 percent in both 2019 and 2020). Ningxia had the second lowest ratio of 8 percent.

Authors also observed that companies with multiple locations tended to concentrate their use of imported cotton at plants in coastal provinces. Of the multi-plant companies shown in table 5, seven companies used imported cotton primarily in their coastal plants. The largest user of imported cotton—Weiqiao Textile Company Limited—located all three of its plants in Shandong Province. The second largest multi-plant applicant—Huafang—used imported cotton at locations in two coastal provinces and two central provinces, but the coastal locations accounted for most of the company’s imported cotton use. Only Ruyi Group used imported cotton roughly equally in its two Shandong (coastal) plants and in its Ningxia and Xinjiang plants. Five other multi-plant companies reported the use of imported cotton in coastal provinces, in central/western provinces, and in Xinjiang. Overall, branches of multi-plant companies that were located in Xinjiang reported relatively little imported cotton use: three had zero, including Huafang’s Xinjiang location.

Multivariate Analysis

Authors used regression analysis to identify the role of geographic location in a company's use of imported cotton while holding constant the size of operations and other characteristics. The regression model was in the form detailed here as Equation 1.

$$M = a + \beta_0 Q + \beta_i X_i + \varepsilon \quad (1)$$

M represents the company's reported use of imported cotton in metric tons, and Q is the company's total cotton use, also measured in metric tons. β_0 details the relationship between the scale of an enterprise and the volume of imported cotton. The expectation was that the sign on this coefficient would be positive. X_i details a series of other salient covariates. For example, in some formulations, a dummy variable for applicants that were part of the multilocation firms identified in table 5 was included to measure whether cotton use by applicants belonging to such firms differed from that of single-location firms. In other specifications, authors included a set of dummy variables representing coastal, central, and Xinjiang regions to determine whether proximity to coastal ports increased propensity to use imported cotton. A variable representing provincial cotton output, in metric tons (from China's National Bureau of Statistics), was also tested to investigate directly whether a larger local supply of cotton reduced the propensity to use imported cotton. ε captures the variation that is unaccounted for in the model.

Authors pooled TRQ applicant data from the 2020 and 2021 quota lists (therefore, cotton use is for 2019 and 2020, respectively) that had consistent data on cotton use. There were 562 observations for 2020 and 619 observations for 2021: a total of 1,181. Of those, 1,016 applicants reported data for both years. After examining ordinary least squares estimates and because a few companies are far larger than others, authors implemented a robust regression approach to address problems with outliers and leverage—observations that exert an inordinately large impact on the estimate. This involved first calculating “Cook's distance”—an index commonly used to assess whether individual observations affect regression parameter estimates—then dropping any observations with distances greater than 1. This action resulted in removing three observations: the 2020 and 2021 observations for Weiqiao Textile in Shandong—the company with largest use of imported and total cotton—and the 2021 observation for the Taikangxian Yinxin Cotton Industry Company in Henan Province, which showed relatively modest values of cotton use. The remaining 1,178 observations were given a weighting based on the value for Cook's distance, then authors re-estimated regressions. Results are in table 6.

Table 6

Key factors affecting volume of imported cotton in 2020 and 2021

Variable	Volume of imports (metric tons)		
	Model 1	Model 2	Model 3
Firm size (total cotton use in metric tons)	0.056***	0.045***	0.052***
Multilocation company	-196.7*	-169.5	-182.4*
Xinjiang versus coastal area	-1,158.9***		
Central area versus coastal area	-168.1***		
Coastal area versus noncoastal area		343.8***	
Provincial cotton production (metric tons)			-0.201***
Year dummy (2020)	-86.7*	-104.2*	-89.7*
Constant	652.1***	388.1***	599.2***
R-squared	0.306	0.212	0.278
Observations	1,178	1,178	1,178

P = probability value. *** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.1$.

Note: Information from pooled data for quota years 2020 and 2021.

Source: USDA, Economic Research Service analysis of National Development and Reform Commission of China lists of tariff-rate quota applicants.

Results were largely in line with expectations. The volume of imported cotton increases with the scale of the company (total cotton use). However, parameters suggest that imported cotton use increases less than proportionately with scale—with imported cotton use rising 5 metric tons for every 100-metric-ton increase in scale. This is less than the weighted average of 0.21 for the ratio of imported-to-total cotton use. The multiple-location dummy variable contained a negative coefficient, but the coefficients were not significantly different from 0.0 at the 0.05 level of significance. This is consistent with the analysis of multilocation companies described earlier in this report.

Consistent with their proximity to ports and urban centers in eastern China, the use of imported cotton is highest for companies in coastal regions. Imported cotton use is lower for companies in China's cotton production hub of Xinjiang. In Model 1, the coefficient for the central region is negative, indicating that central-region companies use less imported cotton than coastal companies of similar size. The coefficient on the Xinjiang region dummy is negative and of a larger magnitude, confirming that companies in Xinjiang use the least amount of imported cotton when analysis controls for firm size and status as a multilocation company.

Model 2 includes a coastal dummy as the only regional indicator. Its positive value indicates that coastal companies use more imported cotton than similarly sized companies in other regions, but this model does not capture the difference between central and Xinjiang regions shown in Model 1.

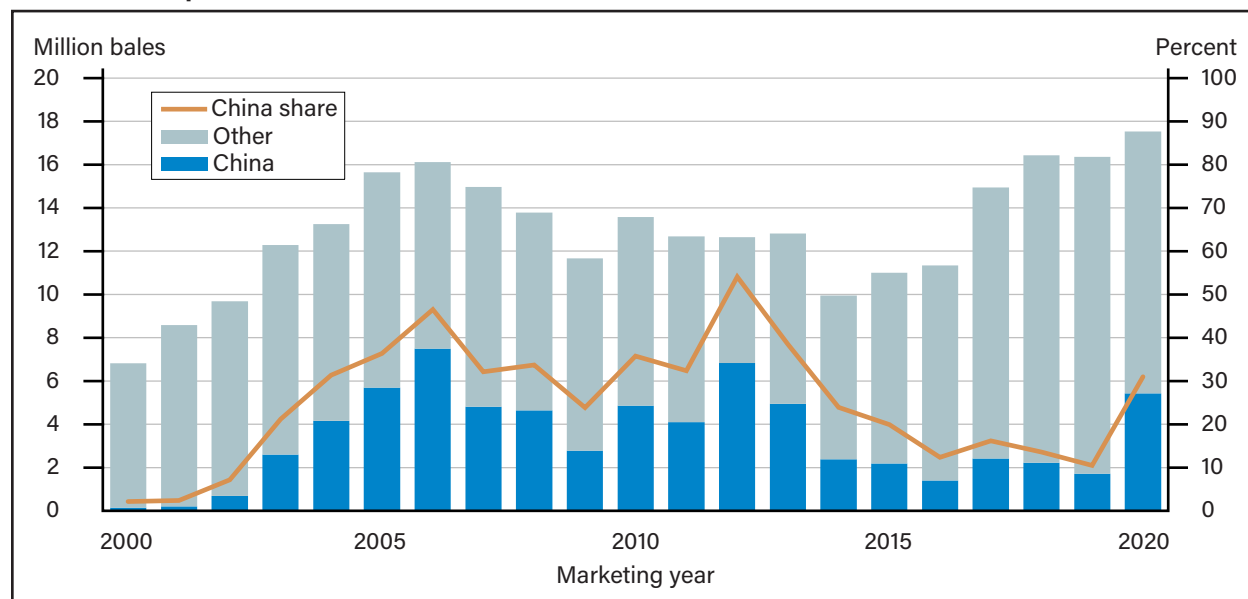
Model 3 excludes the regional dummies but includes a variable representing provincial cotton production. This variable has a negative value, indicating that companies in provinces with a greater cotton supply use less imported cotton than those in provinces with less cotton production. This variable indicates that use of imported cotton is lower in regions where local cotton supplies are more abundant. However, this variable is highly correlated with the regional variables since over 85 percent of cotton was produced in Xinjiang during the years studied here. The models therefore cannot discern separately the effects of distance from the coast and local cotton supplies on use of imported cotton.

Peak Cotton in China and Its Implications

While China's textile manufacturers appear to be eager to import cotton, China's role as a market for U.S. cotton has nevertheless diminished. The share of U.S. cotton exports destined for China peaked in 2012 at 50 percent (figure 21), and in 2016 the Chinese share of U.S. cotton exports fell to 12.4 percent when China issued no sliding scale import quota. The 2016 share fell further to 10.5 percent in 2019 when China imposed retaliatory tariffs on U.S. goods. At the same time, U.S. cotton exports to other destinations surged to record levels—over 16 million bales during 2018–19. In 2020, U.S. cotton exports rebounded to China, which coincided with the Phase One trade agreement. In fact, the United States set a new record for exports that year. Nevertheless, 69 percent of U.S. cotton exports went to other destinations such as Vietnam, Pakistan, Bangladesh, Indonesia, Mexico, Thailand, and South Korea.

Figure 21

U.S. cotton exports to China and other destinations, 2000/01–2020/21



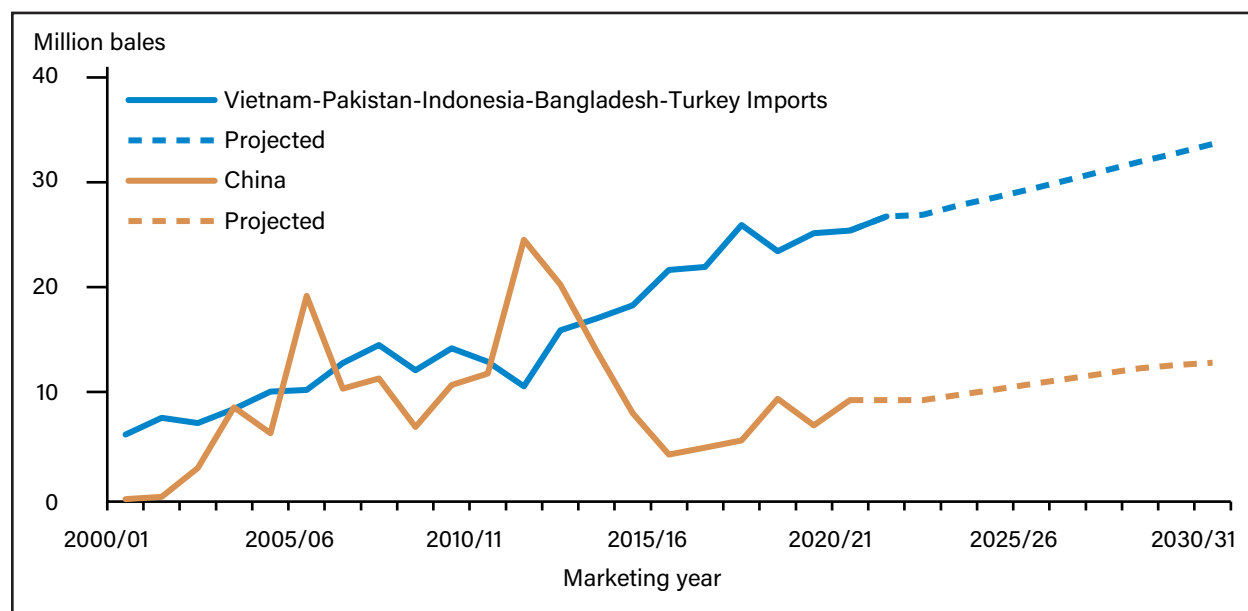
1 bale = 480 pounds.

Source: USDA, Economic Research Service calculations using data from the USDA, Foreign Agricultural Service Global Agricultural Trade System.

In the global cotton market, a group of other textile-manufacturing countries—Vietnam, Pakistan, Bangladesh, Indonesia, and Turkey—surpassed China as cotton importers. As China's overall cotton imports dropped from their peak of 24.5 million bales in 2011 to under 5 million bales in 2015, the combined imports by these five countries doubled to 21.7 million bales in 2015 and 25.4 million bales in 2020/21 (figure 22). While China remains the largest importing country, the combined imports of these competitors now exceed China's volume of imports. Moreover, imports into these countries are far less volatile. The U.S. Department of Agriculture (USDA) baseline projections show that cotton imports by Vietnam, Bangladesh, Indonesia, Turkey, and Pakistan will rise by 9.2 million bales during 2020–30, while China's imports will rise by only 3.5 million bales (Dohlman et al., 2021).²⁰ These projections indicate that Vietnam, Bangladesh, Indonesia, Turkey, and Pakistan will together account for 47 percent of world cotton imports in 2030 while China will only account for 24 percent. Chinese companies have invested in some of the textile manufacturing capacity in these countries.

²⁰ USDA baseline projections are issued each year. Projections for China and other major countries are available in the USDA, International Baseline database on the USDA, Economic Research Service website.

Figure 22
Imports of cotton by selected countries, 2000/01–2030/31



1 bale = 480 pounds.

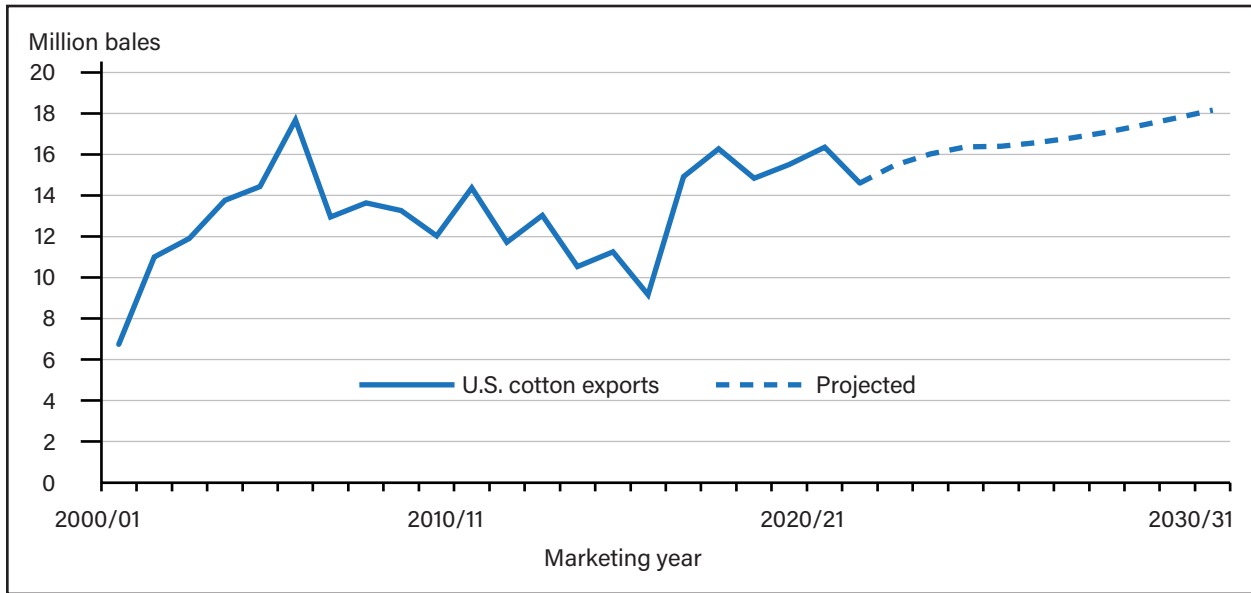
Notes: Data for marketing years. Data for 2021/22–2030/31 are projected.

Source: USDA, Economic Research Service calculations using data from USDA, Foreign Agricultural Service’s Production, Supply, and Distribution Database, and USDA, ERS International Baseline Database.

China’s Ministry of Agriculture and Rural Affairs (MARA) anticipates a decline in the country’s cotton imports. Projections of supply and demand for Chinese commodities issued by China’s MARA (2021) projected that China’s cotton imports would fall from 2.1 million metric tons to 1.8 million metric tons—a decline of about 1.6 million bales—during 2020–30. In the same time period, MARA projected that China’s use of cotton would peak in 2023 at 8.2 million metric tons before falling to 7.4 million metric tons in 2030—a decline of about 3.2 million bales.

U.S. cotton exports are expected to increase as they shift to other markets. USDA projects that U.S. cotton exports will rise about 3.1 million bales during the marketing years 2020/21–2030/31 (figure 23). The projected export volume of 18.1 million bales in 2030/31 would eclipse the previous record volume in 2005/06. Based on the analysis in this report, U.S. cotton sales are likely to continue shifting away from China to other Asian countries with growing—and perhaps less volatile—demand for cotton.

Figure 23
U.S. cotton exports, 2000/01–2030/31



1 bale = 480 pounds.

Notes: Data for marketing years. Data for 2021/22–2030/31 are projected.

Source: USDA, Economic Research Service calculations using data from USDA, Foreign Agricultural Service's Production, Supply, and Distribution Database, and USDA, ERS International Baseline Database.

Conclusion

The westward shift of China's cotton to the Xinjiang region separated the output of raw material from the regional textile-cotton clusters in the river valleys of eastern and central China that contributed to the industry's past growth. China's textile manufacturers now remain concentrated in coastal and central regions, but they must procure their supplies of cotton either from Xinjiang—2,200 to 2,900 miles away from most textile manufacturers—or by importing cotton. While cotton production in Xinjiang holds an advantage over other domestic locales since large-scale, mechanized cotton production is possible, Xinjiang's distance from final markets in eastern China and overseas is a drawback. Some textile manufacturers established plants in Xinjiang, but China's textile manufacturers are still predominantly located in eastern and central regions.

The growth of China's cotton-textile industry is constrained by quotas on cotton imports. Officials supplement the original quota established in 2001 with additional quota in most years, but the large number of applicants suggests that demand for imported cotton exceeds the quota. Quota limits are meant to bolster domestic cotton output by protecting domestic cotton producers from import competition, but China's cotton output appears to have reached a ceiling. China's cotton production, consumption, and imports peaked between 2005 and 2013. The 2021–25 plan recommendations issued by China's Cotton Association (2021) and the plan for Xinjiang envision national cotton output remaining steady at 5.5 million metric tons to 6.5 million metric tons and cotton consumption remaining steady at 8 million metric tons. The lack of growth in the textile industry may not only be due to limits on imports but also to the changing economics of China's cotton-textile-clothing industry chain. Use of cotton has been constrained by factors such as rising production costs in many parts of China and the growing use of synthetic fibers. The trend also reflects strategic plans espoused by Chinese planners, including “high-quality opening” and “One Belt One Road” strategies, which are responses to the changing economics of the industry.

U.S. cotton exports are expected to grow, despite the changes and limitations in the Chinese market. The growth, however, may be driven less by China and more by other Asian countries with increasing demand for cotton. Nevertheless, barring unforeseen policy changes, China should—for the foreseeable future—remain a major market for U.S. cotton exports.

References

- Aksu Daily. 2020. 新疆阿克苏地区棉花产业发展的改革突围之路 (“The Road To Reform of Cotton Industry Development in Xinjiang’s Aksu District”).
- Beckert, S. 2015. “Empire of Cotton: A Global History,” *Vintage*.
- Bellandi, M. and S. Lombardi. 2012. “Specialized Markets and Chinese Industrial Clusters: The Experience of Zhejiang Province,” *China Economic Review* 23(3):626–638.
- Brady, E.A. 1963. “A Reconsideration of the Lancashire ‘Cotton Famine,’” *Agricultural History*, 37(3):156–162.
- Chao, K. 1986. “The Chinese-American Cotton-Textile Trade, 1830–1930,” *America’s China Trade in Historical Perspective* (authors: E.R. May and J.K. Fairbank), Cambridge: The Committee on American-East Asian Relations.
- China Cotton Association. 2021a. 关于征求对‘中国棉花产业十四五规划’意见的函 (Request for Opinions for 14th Five-year Plan for China’s Cotton Industry), unpublished document.
- China Cotton Association. 2021b. 苏旭红：2021年度新疆棉花产业情况 (Su Xuhong: 2021 Xinjiang Cotton Industry Situation), news report.
- China Cotton Information Net. 2020. 中国棉业改革发展20年 (20 Years of Reform and Development in China’s Cotton Industry), Beijing: China Agricultural Press.
- China Industry News Network. 2016. 出疆棉花运费补贴政策继续在疆实施 (Subsidy for Transportation of Cotton Out of Xinjiang Will Continue).
- China Ministry of Agriculture. 2008. 全国优势农产品区域布局规划 (2008–2015年) (National “Advantaged Agricultural Product Regional Layout Plan (2008–2015)),” unpublished document.
- China Ministry of Agriculture. 2017a. 我国棉花生产综合机械化率突破70 Percent (National Cotton Production Comprehensive Mechanization Rate Breaks Through 70 Percent), Press Office report.
- China Ministry of Agriculture. 2017b. 农业部关于印发《农业对外合作“两区”建设方案》的通知 (Ministry of Agriculture Issues ‘Two Zones’ for Agricultural Cooperation Construction Program), Nong Wai Fa No. 3.
- China National Bureau of Statistics. 2021. 2021年全国棉花产量小幅下降 (“Small Decline in National Cotton Production in 2021,”) online bulletin.
- China National Bureau of Statistics. Various years. *China Statistical Yearbook*, Beijing: China Statistical Press.
- China National Bureau of Statistics. 2018–2020. *China Economic Census Yearbook*, Beijing: China Statistical Press.
- China National Development and Reform Commission. 1990–2021. *Compilation of Materials on Agricultural Product Cost and Profits*, Beijing: China Statistics Press.

- China State Council. 2018. 国务院办公厅转发商务部等部门关于扩大进口促进对外贸易平衡发展意见的通知 (“State Council Management Office Forwards to Ministry of Commerce a Circular on Ideas To Expand Imports To Promote Balanced Trade.”) Guo Ban FaNo. 53.
- China Textile Industry Research Institute. 2020. 安全发展视角下的纺织行业--“十四五”纺织经济研究 (“Textile Industry Under the Security Perspective—14th Five-year Plan.”)
- China Textile Industry Council. 2021. 《纺织行业“十四五”发展纲要》正式发布 (“Textile Industry 14th Five-year Plan Development Outline Officially Released,”) online article.
- China Texnet News. 2021. 2020年全国棉纺织行业营业收入排名 (“Ranking of National Cotton Textile Industry by Business Income in 2020).”
- Clever, J. 2017. “Imports of U.S. Cotton Rebound as Total Cotton Imports Recover,” USDA, Foreign Agricultural Service GAIN report CH17062.
- Dietrich, E.B. 1928. “The Plight of the Lancashire Cotton Industry,” *The American Economic Review* 18(3):469–476.
- Dohlman, E., J. Hansen, and D. Boussios. 2021. USDA, *Agricultural Projections to 2030*. Long-Term Projections Report OCE-2021-1, U.S. Department of Agriculture, Interagency Agricultural Projections Committee.
- Economy Daily. 2021a. “一主两辅”提高棉花品质 (“One Main, Two Auxiliary Raises Cotton Quality.”).
- Economy Daily. 2021b. 中国棉花供需基本平衡 (“China’s Cotton Supply and Demand are Basically in Balance.”).
- Ellison, G., E.L. Glaeser, and W.R. Kerr. 2010. “What Causes Industry Agglomeration?” *American Economic Review* 100:1195–1213.
- Farmers Daily. 2021. 中国棉花协会呼吁打造可持续的世界棉业 “China Cotton Association Calls for Creating a Sustainable World Cotton Industry.”).
- FAS. 2021. *Cotton and Products Annual*, U.S. Department of Agriculture GAIN CH2021-0039.
- Gale, F. 2013. *Growth and Evolution in China’s Agricultural Support Policies*, ERR-153, U.S. Department of Agriculture, Economic Research Service.
- Gale, F., J. Hansen, and M. Jewison. 2015. *China’s Growing Demand for Agricultural Imports*, EIB-136, U.S. Department of Agriculture, Economic Research Service.
- Gilleski, S. 2018. *China Announces Additional Cotton Import Quotas*, U.S. Department of Agriculture, FAS GAIN report 18033.
- Guan, R. 2008. “Xinjiang and National Cotton Industry Security” Beijing: China Agricultural Press.
- Gumber, R.K., M.S. Gill, G.J. Dharminder Pathak, and R.S. Sarlach. 2008. “History and Status of Cotton, Cotton Research in Punjab” 1–2.
- Guojihua Fazhan. 2015. 公司在塔吉克斯坦再获13.2万亩棉花种植基地 (“Company Acquired 132,000 mu in Tajikistan as a Cotton Farming Base.”).

- Hsu, H.H. and F. Gale. 2001. *Regional Shifts in China's Cotton Production and Use*, Cotton and Wool Situation and Outlook Yearbook, U.S. Department of Agriculture, Economic Research Service.
- Koistinen, D. 2002. "The Causes of Deindustrialization: The Migration of the Cotton Textile Industry from New England to the South," *Enterprise & Society* (3)3:482–520.
- Lee, J.A. and D.D. Fang. 2015. "Cotton As a World Crop: Origin, History, and Current Status," *Cotton*, 57:1–23.
- Lin, H., H. Li, and C. Yang. 2011. "Agglomeration and Productivity: Firm-level Evidence from China's Textile Industry," *China Economic Review* 22(3):313–329.
- Liu, Y., J.R.C. Robinson, and W.D. Shurley. 2018. "China's Potential Cotton Tariffs and U.S. Cotton Exports: Lessons from History," *Choices* 33(2):1–6.
- MacDonald, S., F. Gale, and J. Hansen. 2015. *Cotton Policy in China*, Cotton and Wool Outlook CWS-15C-01.
- Mei, X. 2020. 中国棉花产业面临多重挑战 ("China's Cotton Industry Faces Many Important Challenges,") 第一财经 (Yicai).
- Ministry of Agriculture and Rural Affairs, China. 2021. *China Agricultural Outlook Report 2021–2030*, Beijing: China Agricultural Press.
- Myers, R. 1965. "Cotton Textile Handicraft and the Development of the Cotton Textile Industry in Modern China," *The Economic History Review New Series*, 18(3):614–632.
- Peoples Daily. 2020. 中国与中亚农业合作稳步推进 ("Steady Progress in China-Central Asia Agricultural Cooperation.").棉花产业共给测结构性改革: 现状, 问题与对策 ("Cotton Industry Supply Side Structural Reform Situation, Problems, and Countermeasures,") in 农业共给测结构性改革: 难点与对策 (*Agricultural Supply Side Structural Reform: Difficulties and Countermeasures*), Beijing: China Agricultural Press.
- Rosenthal, S.S. and W.C. Strange. 2020. "How Close Is Close? The Spatial Reach of Agglomeration Economies," *Journal of Economic Perspectives* 34(3):27–49.
- Shi, Y. (editor). 2001. World Trade Organization 与中国纺织工业 (*WTO and China's Textile Industry*), Beijing: China Textile Press.
- Textile and Apparel Industry Weekly. 2021. 中国棉纺织大会绘就行业“十四五”高质量发展新蓝图 ("China Cotton Textile Industry Meeting New Blueprint for High Quality Development 14th Five Year Plan.").
- Tompkins, D.A. 1904. *The Cotton industry. Publications of the American Economic Association*, 5(1):144–153.
- Xinhua. 2014. 新疆设立200亿元专项资金支持纺织服装产业发展 ("Xinjiang Sets Up a 20 Billion Yuan Special Fund to Support Textile and Apparel Industry Development.").
- Xinjiang Daily. 2017. 纺织服装产业强力带动新疆就业 ("Textile and Apparel Industry Strongly Promote Employment Growth in Xinjiang.").

- Xinjiang Daily. 2021. 新疆维吾尔自治区国民经济和社会发展第十四个五年规划和2035年远景目标纲要 (“Xinjiang Uyghur Autonomous Region Outline of 14th Five-Year Plan for National Economic and Social Development and 2035 Long-term Objectives.”).
- Von Thünen, J.H. 1826. “Der Isolierte Staat,” *Beziehung auf Landwirtschaft und Nationalökonomie*.
- Wang, J. 2013. *Institutional Change and the Development of Industrial Clusters in China*. Series on Economic Development and Growth, World Scientific (8).
- Weber, A. 1913. *Ueber den Standort der Industrien*, Wentworth Press (3).
- Wendel, J.F. and R.C. Cronn. 2003. “Polyploidy and the Evolutionary History of Cotton.” *Botany Publication and Papers*.
- Xinhua News Service. 2021. 新疆棉花再获丰收 机采率将破80% (“Xinjiang Rate of Mechanical Harvest Increases Again to Over 80 Percent.”). News report.
- Ye, Xingqing. June 2016. 中国全球农产品供应体系多元化 离不开 “一带一路” (Diversification of China’s Global Agricultural Supply System Is Inseparable from ‘Belt-Road’). China Economic Times.
- Yuan, Ruiling. 2021. “China Cotton Outlook,” China Ministry of Agriculture and Rural Affairs, presentation to China Agricultural Outlook Conference, Beijing.