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Economic Policy and Cotton in Uzbekistan

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Abstract

Uzbekistan is the seventh largest global cotton producer and third largest cotton supplier for world markets. Uzbekistan's Government policies largely shield cotton producers from world market price signals, and cotton area has changed little over the past decade despite strong international price fluctuations. Government pricing and exchange rate policies tax cotton producers and more than offset the value of input subsidies for cotton growers. The degree of taxation declined for several years after 2000, but increased again in the late 2000s. In the 2009, cotton output dropped as Uzbekistan responded to reduced water availability and increased global food prices with higher taxes on cotton growers. With continued taxation of cotton production, Uzbekistan likely will continue to lose ground to more dynamic cotton exporters like India and Brazil. As a result, USDA's longrun baseline projections for Central Asia show that the region's share of world cotton production will continue to fall over the next decade.

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Introduction

Uzbekistan is one of the world's largest cotton exporters.¹ Central Asia² accounts for 16 percent of world cotton trade, and Uzbekistan remains the leading producer and exporter among these former members of the Soviet Union. Uzbekistan accounted for 25 percent of world cotton trade in the 1970s and 1980s, more than any other exporter. At that time, its per hectare cotton yield was consistently among the highest in the world, exceeding U.S. yields by 74 percent during the first half of the 1970s (fig. 1).

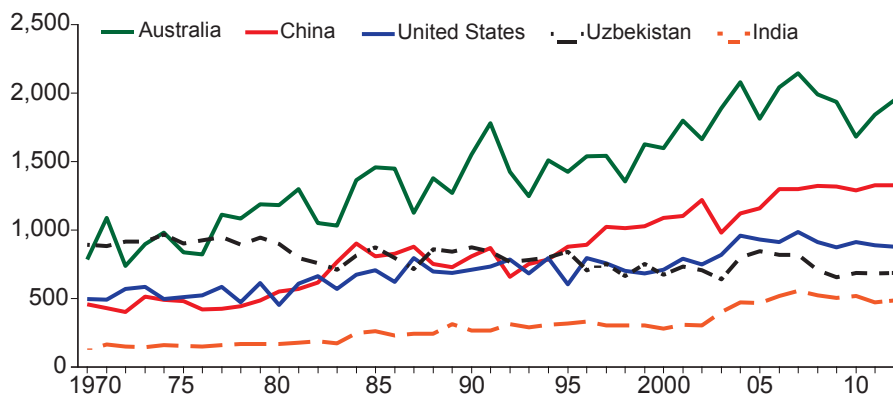
Since then, Uzbekistan's cotton yield has trended downward, and the Uzbek share of world trade has slipped below 10 percent (fig. 2). Elsewhere around the world, yields have increased, with annual gains among major exporting countries ranging between 1.6 percent (United States) and 4.3 percent (Brazil). Uzbekistan has successfully transitioned into an Asian supplier as its traditional markets in Russia and Ukraine have dwindled, but with output now about half of its 1985 level, it may not be meeting its full potential.

It is questionable whether Uzbekistan could sustain a return to its mid-1980s production levels or whether it would want to. Soviet planners oversaw an enormous increase in Central Asia's irrigated cotton area between 1945 and the 1980s. The consequent streamflow reductions and runoff contamination by fertilizers and other chemicals substantially reduced the area formerly covered by the Aral Sea, resulted in toxic residue along former coastal regions, and reduced crop yields in some provinces. In addition, widespread reports of child labor in Uzbekistan's cotton harvest add yet another dimension to the evaluation of the country's optimal cotton output levels (Environmental Justice Foundation, 2005).³ Recent weather problems and disputes with neighboring countries over irrigation supplies suggest that, even with a return to mechanization, Uzbekistan's current maximum production potential may be lower than it once was. Regardless of Uzbekistan's potential for sustainable production, a review of the country's economic and agricultural policies shows significant government intervention that currently hinders cotton production, reducing output.

Figure 1

Uzbekistan's cotton yields lag

Kilograms per hectare



Source: USDA, Foreign Agricultural Service, Production, Supply and Distribution Online data, 2012; USDA, Foreign Agricultural Service, 1977.

¹All data on agricultural output, consumption, and trade came from USDA's Foreign Agricultural Service Production, Supply and Distribution (PS&D) database for global agriculture, unless specifically noted otherwise. Units of measurement follow USDA conventions for international data, which include stating cotton data in fiber terms rather than as seedcotton, even in reference to countries where farmers market the latter.

²Central Asia refers to the former Soviet Republics of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan.

³Since it gained independence, Uzbekistan has largely abandoned the formerly widespread use of mechanical harvesters (Pomfret, 2000), possibly as a result of the disruption of critical supply chains with the breakup of the Soviet Union. Financial distress on Uzbek cotton farms also may have reduced mechanization (Isengildina et al., 1998). The USDA attaché reports that wages for cotton picking are substantially higher in Kazakhstan and the Kyrgyz Republic than in Uzbekistan (USDA/FAS, 2005).

Uzbekistan's "State Order" System and Cotton

Since its independence from the Soviet Union in 1991, Uzbekistan has followed a strategy of gradual transition from planned to market economy. The government continues to exercise extensive control in agriculture, particularly in cotton and wheat production, which are referred to as "centralized" crops. The State maintains ownership of the land, and the right to use land for agriculture (other than household plots) is conditional on acceptance of the State's quotas for planting cotton and wheat. The State also provides subsidized inputs, including irrigation.

The "State order" system also includes quotas on the production of cotton and wheat, as well as on area planted. To ensure quotas are met, the State monitors efforts year-round (Veldwisch and Spoor, 2008): leaching⁴ is monitored in the winter; planting area, varieties, and dates are determined by the State in the spring; and fertilizer application during the growing season is directed by Ministry of Agriculture and Water Resources (MAWR) officials. During the cotton-growing season, State officials visit farms to determine yield potential and adjust planning targets and production quotas. Annual planting area is determined by a State plan and, at the local level, planning may extend to determining which fields are used for cotton, wheat, or noncentralized crops. While the State and collective farms organized during the Soviet period have been largely privatized since 2006, a large number of farms still rely on centralized Machine Tractor Parks (MTP) for machinery, and MTPs prioritize centralized crops.⁵

The textile industry exemplifies Uzbekistan's partial transition from planned to market economy. Uzbek cotton consumption has grown in recent years, representing greater foreign investment and an effort by the government to increase the share of fiber processed locally rather than exported. Many textile enterprises are joint ventures, with the government as the main shareholder (Rudenko, 2008). The Ministry of Textiles has been reorganized into the State Joint Stock Company (SJSC) UzbekEngilSanoat, which manages the government's shares in textile firms and is also engaged in promoting the export and domestic sales of local textile output. SJSC UzbekEngilSanoat also promotes investment in the textile industry (Naumov et al., 2010).

⁴Irrigation can result in soil salinization. Extra water, in addition to crop requirements, can be applied to irrigated fields to leach these salts away (Ayers and Westcot, 1994). In Uzbekistan, this commonly occurs during winter.

⁵MTPs were formerly a component of the State's authority over agricultural producers, but the relationship has evolved into what one study describes as a "patron-client" relationship distinct from formal authority (Shtaltovna et al., 2011).

Uzbek Cotton Pricing

The main policy instrument that transfers resources from cotton production is a procurement price set below world prices. Procurement below world prices is possible because producers are effectively required to sell their cotton exclusively through official channels. While much of Uzbekistan's cotton is exported, international trade is strictly controlled. This restriction limits global price transmission and allows resources to be transferred from producers, either directly by the government or indirectly through semi-governmental firms.

International cotton prices adjust relatively freely, so exporting countries seldom sustain significant gaps between their export prices and the world price. Uzbekistan regulates its export price, but does so in a relatively transparent manner. The Uzbek foreign trade companies (FTCs) authorized to export under the Ministry for Foreign Economic Relations, Investments, and Trade⁶ price cotton based on the A Index⁷ and Cotlook's quote for Uzbek cotton. Exceptions occur in some years, but they are difficult to sustain. For example, Uzbekistan's Government temporarily imposed a minimum export sales price of 60 cents per pound in December 2008, (*Cotton Outlook*, 2009). World prices averaged well below that level for several months during 2008/09, resulting in an unprecedented near-doubling of ending stocks, to 50 percent of use.

Policymakers in Uzbekistan have to take the world price of cotton as given when determining export prices, but the determinants of the State procurement price (SPP) are unclear. Djanibekov et al. (2010) suggested that the SPP is established annually based on the world price minus marketing costs. Guadagni et al. (2005) describe such a mechanism as well, but noted that costs were overstated. Sadler (2006) reported that prices were calculated based on production costs adjusted by recent inflation and asserted that, in earlier years, prices were fixed as a percentage of international prices, ranging from 70 percent in 1996 to 85 percent in 1997 and 100 percent in 2000. Rudenko et al. (2009) describe a process where the semi-governmental State joint stock company that monopolizes ginning in Uzbekistan, UzPakhtaSanoat, negotiates a price with the FTCs. For our purposes, this last observation is perhaps the most useful, highlighting the fact that price is determined by balancing competing interests within the Uzbek Government.

Volatile world prices hinder policymakers' ability to precisely target the relationship between the SPP and the world price; they have to choose between recent price movements and longer-term averages when forecasting the world price. One study (Sadler, 2006) noted that, at least prior to 2005, producers entered into a sales contract with their local gin, and that, theoretically, the price would be adjusted if the market price changed. In practice, the price was set so low that even a decline in the market price left it above the contract price. Thus, the system acted as a price smoothing mechanism, reducing SPP volatility compared with the world price (fig. 3). Rudenko et al. (2009) noted that unforeseen price changes between the time the prices are initially negotiated and the time cotton is finally exported are absorbed by the FTCs, effectively smoothing farm prices. Pomfret (2009) also characterized the State

⁶Three FTCs account for virtually all of Uzbekistan's cotton exports: Joint-Stock Company Uzinterimpex, State Joint Stock Foreign Trade Company Uzmarkazimpex, and Uzprommashimpeks. About 75-80 percent of Uzbekistan's cotton production is exported. Cotton for domestic mill use is purchased through the Uzbekistan Commodity Exchange, which also accounts for a portion of cotton exports.

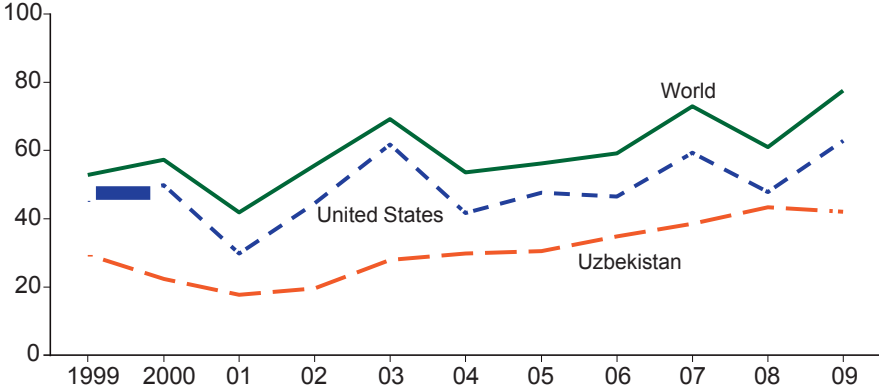
⁷The A Index is regarded as cotton's world price. Published by Cotlook Ltd, the index is an average of the five lowest quotes for Middling 1 3/32' upland cotton from among 19 types traded internationally. Prices represent offering quotes, for delivery at Far East ports.

procurement system as insulating farmers from world price movements. This characteristic is not necessarily intentional, but is definitely a consequence of policy in Uzbekistan.

Figure 3

World, United States, and Uzbekistan cotton prices

Cents per pound



Sources: State procurement prices (SPP) from USDA's attaché in Tashkent and the International Cotton Advisory Committee (ICAC). U.S. cotton price from USDA, National Agricultural Statistics Service, 2011. World cotton price from Cotlook Ltd. Exchange rates from the United Nations Development Programme (2006) and TCX Investment Management Company B.V.

Exchange Rate Policy

More than 75 percent of Uzbekistan's cotton is exported, so foreign exchange rate policy is an important determinant of the NRA. Uzbekistan's Government controls capital flows and its exchange rate, and cotton and gold are "centralized" exports. Centralization means that all foreign exchange earnings from these commodities must be surrendered to the government for conversion into local currency (the Soum) at the official exchange rate.⁸ At times, this policy mix has resulted in a significant implicit tax on the cotton sector as a result of the official exchange rate's overvaluation. An International Monetary Fund (IMF) study of this policy during its peak years (Rosenberg and De Zeeuw, 2001) found that exchange rate overvaluation transferred the equivalent of between 3.4 percent (1997) and 6.7 percent (1999) of gross domestic product (GDP) from the cotton sector to the government.

The goals of exchange rate policy can include expansion of trade, controlling inflation, and assistance in achieving longrun development goals. An undervalued exchange rate can promote exports, but an overvalued exchange rate reduces incentives to produce tradable goods. It can even be specifically employed as an export tax.⁹ However, an overvalued exchange rate reduces import prices in domestic currency terms, reducing local inflationary pressure. Foreign exchange shortages are likely to result, which can hinder imports but also provide a policy opportunity as sectors can be targeted for assistance through preferential access to the limited supply of foreign exchange.

Uzbekistan's overvaluation first became significant late in 1996 and has fluctuated widely since then. Financial sector reforms starting in 2000 and two large devaluations of the official exchange rate in May 2000 and November 2001 helped bring the official and parallel market exchange rates into alignment by 2003 (table 1). This culminated with Uzbekistan's acceptance of the currency convertibility obligations of Article VIII of the IMF's Articles of Agreement in October 2003.¹⁰ During 2008, however, the official exchange rate again began to diverge from the parallel market rate.¹¹ Since then, overvaluation ranged from 15 percent in 2008/09 to 48 percent in 2011/12.

When considering the interaction between the level of the SPP and the degree of exchange rate overvaluation, note that cotton policy is probably not the primary determinant of the official exchange rate's level or of its ratio to the parallel rate. Instead, policymakers presumably set the SPP with knowledge of the government's goals with respect to the real exchange rate. While policymakers' targeting of the real exchange rate may not be perfect, the rate has followed relatively clear trends, so the export parity of the nominal SPP can also be targeted to a large extent.

⁸Noncentralized exports have a 50 percent surrender requirement.

⁹Brazil's multiple exchange rate system during the 1930s is one example (Barros, 2009). At that time, coffee accounted for 70 percent of Brazil's exports, and coffee export earnings were subject to repatriation at an exchange rate higher than that applied to many other commodity transactions.

¹⁰However, Pomfret (2009) and others found that access to foreign exchange in bank accounts is problematic, and even access to cash in the form of domestic currency has been difficult (Gemayel and Grigorian, 2005). In addition to the foreign exchange price, the government has administrative policies that can alter the value of foreign exchange holdings, examination of which is beyond the scope of this study.

¹¹The unofficial foreign exchange market in Uzbekistan is referred to here as the "parallel" market. Lindauer (1989) assigned the term "black" markets to illegal parallel markets. Press reports from Uzbekistan suggest that parallel markets are currently illegal, but may have been legal previously.

Table 1

Uzbek cotton procurement prices and exchange rates

Marketing year	Procurement (SPP)	Exchange rate (official)	Exchange rate (parallel)	Parallel exchange rate market premium
	<i>Soums per ton</i>	<i>— Soums per U.S. dollar —</i>		<i>Percent</i>
1999/2000	34,800	168	684	308
2000/01	52,000	331	903	173
2001/02	80,000	635	1,355	113
2002/03	126,000	918	1,153	26
2003/04	195,000	992	999	1
2004/05	225,000	1,069	1,067	0
2005/06	255,000	1,185	1,175	-1
2006/07	306,000	1,244	1,268	2
2007/08	352,000	1,293	1,344	4
2008/09	430,000	1,403	1,610	15
2009/10	454,850	1,537	2,101	37
2010/11	587,980	1,661	2,360	42
2011/12	496,020	1,850	2,730	48

SPP=State procurement price.

Sources: Procurement prices from USDA's attaché in Tashkent and the International Cotton Advisory Committee (ICAC). Exchange rates from the United Nations Development Programme (2006) and TCX Investment Management Company B.V.

Calculating the Export Parity of Domestic Prices

Accurate information about Uzbekistan's economy is limited, and official statistics are often unreliable.¹² Determining how economic policy affects cotton production is also difficult to calculate due to the pervasiveness of government intervention. The full policy impact on producers is a function of numerous local administrative decisions and likely intentionally lacks transparency. Uzbekistan, however, is not completely closed off from the rest of the world. Procurement prices and exchange rates are available and can be used to examine the relationship between Uzbekistan's SPP and world prices and to estimate whether procurement price policies result in an implicit tax (or subsidy) on cotton production.

This approach is based on a comparison of the ratio of the SPP to world prices against the comparable ratio—prices received relative to world prices—for U.S. farmers. Uzbek farmers, like those in most low-income countries, market their output as unginned seedcotton, so the SPP is a seedcotton price. In contrast, U.S. farmers gin their own cotton, market the fiber and seeds separately, and receive income from both products. U.S. and Uzbek prices must, therefore, be adjusted to make them more directly comparable. U.S. prices are adjusted by deducting the cost of ginning from the farm price for fiber and then adding in the value of the cottonseed sold separately. The Uzbek SPP for seedcotton is adjusted to a fiber-equivalent basis through division by the proportion of fiber typically derived from Uzbek seedcotton.¹³ U.S. and Uzbek cotton are of similar quality, so differences in export parity may indicate whether pricing creates a tax or subsidy for Uzbek farmers.

Pomfret (2009) estimated Uzbek ginning costs for 2002, and Rudenko et al. (2009) estimated the same costs for 2004. Both studies reported ginning costs at around 10 cents per pound, comparable with U.S. costs for 2002 (USDA/ERS, 2012a). Estimated U.S. ginning costs for 1999-2010 are available from ERS's cost and returns estimates; NASS's farm price for cottonseed multiplied by the ratio of U.S. cottonseed to cotton fiber production provides an estimate of the additional value available to U.S. farmers from their farm output (USDA/NASS, 2012; USDA/FAS, 2012).¹⁴ We assumed that transportation costs to export markets were similar, and the distances to Tianjin (China) from both Bandar Abbas (Iran) and Long Beach, CA, suggest this assumption is plausible. Being landlocked—and entirely bounded by neighbors that are themselves landlocked—Uzbekistan faces export impediments that do not affect U.S. exports, but evidence suggests that ocean freight charges are lower for Uzbekistan, which is possibly offsetting.¹⁵

U.S. policy currently has little effect on the price U.S. cotton farmers receive relative to the world.¹⁶ Therefore, the export parity of U.S. farm prices to world prices should be representative of transportation costs and marketing margins freely determined by market forces. Data from USDA's Farm Service Agency (FSA) support this conjecture. U.S. farm legislation mandates that FSA survey cotton exporters annually to measure average marketing costs of U.S. cotton to foreign markets. During 2004-09, these costs ranged between 19 and 24 percent of the Cotlook A Index (USDA/FSA, 2012). During the same period, the export parity of U.S. farm prices averaged 74 percent,

¹²According to IHS Global Insight (2011), "all economic data emanating from the country [are] highly suspect." The IMF regularly notes weaknesses and inconsistencies in Uzbek data that hinder evaluation of economic performance (IMF, 2007).

¹³Piggott and Wohlgenant (2002) described the relationship between the prices of processed goods jointly produced from an input and the input's price. If the proportions of the joint products are α and $1-\alpha$; the price of seedcotton is A ; the price of cotton seed is B ; the cost of ginning is C , and the price of cotton fiber is P , then: $P = [A - (1-\alpha)B + C]/\alpha$. In Uzbekistan, average ginning outturn is 32 percent (α). Here we follow the widely accepted simplification of dividing the seedcotton price by the ginning outturn. This allows direct comparison with the adjusted U.S. price described in the text.

¹⁴Uzbek farmers are reportedly permitted to purchase byproducts from their ginned cotton at a discount, and Velshwisch (2008) indicated that this occurs at least in Khorezm, but other authors suggest that the practice is not widespread. The discount would likely only add a few cents per pound to the procurement price, changing the calculations minimally. Rudenko (2008) noted that Uzbekistan's crushing industry pays relatively little for the cottonseed it procures and is highly profitable.

¹⁵Verma (2008) found that transportation from Bandar Abbas to China may be as much as 3 cents per pound less expensive than from the West Coast of the United States, or 4-5 percent of the world price. USDA's attaché indicated that Uzbekistan's supports an excellent transportation infrastructure but, for our purposes, we simplify calculations by assuming that higher domestic costs offset Uzbekistan's external transportation advantage. The need to transfer to a different gauge rail system at the Commonwealth of Independent States (CIS)-Iranian border is an example of a higher cost between farm and port.

¹⁶User Marketing Certificates (more widely known as the "Step 2" program) were determined by a World Trade Organization (WTO) dispute panel to act partly as an export subsidy. The program was terminated after the 2005/06 marketing year. The Food and

Footnote 16 continued on page 10.

indicating an A Index premium of about 25 percent, consistent with FSA cost estimates (fig. 4). The reliability and speed of delivery of U.S. cotton should allow U.S. cotton to command a premium on world markets, but this premium is largely embodied in the farm prices of U.S. producers.

While adjusted U.S. farm prices for cotton averaged about 25 percent below the world price during 1999/00-2010/11 (table 2), the Uzbek SPP averaged about 50 percent below the world price when valued at official exchange rates and averaged about 60 percent below at parallel market rates, suggesting that the official procurement price substantially underestimates the value of Uzbek cotton on world markets. Within this 12-year period, distinctly different sub-periods can be discerned, with implicit taxes reaching their lowest levels between 2005/06 and 2008/09.

Between 2005/06 and 2008/09, the SPP averaged only 44 percent below the world price (at market exchange rates). Using the U.S. average discount from export parity of 25 percent as the free-market cost of transportation and marketing, the additional 19-percentage-point discount relative to the world price received by Uzbek farmers indicated the implicit and explicit taxes resulting from government-administered prices backed by border controls. Our estimated taxes for 2000/01-2004/05 and the tax changes over time are consistent with findings from earlier studies,¹⁷ but new data indicate that the lower taxes maintained during 2005-08 have recently increased.

Table 2
Uzbek procurement and U.S. farm and world cotton prices

Marketing year	State procurement price (SPP)		U.S. farm price	World price
	Official exchange rate	Parallel exchange rate		
	<i>U.S. cents per pound</i>			
1999/00	29.4	7.2	45.0	52.8
2000/01	22.3	8.2	49.8	57.2
2001/02	17.8	8.4	29.8	41.8
2002/03	19.5	15.5	44.5	55.7
2003/04	27.9	27.7	61.8	69.2
2004/05	29.8	29.9	41.6	53.5
2005/06	30.5	30.8	47.7	56.1
2006/07	34.9	34.2	46.5	59.1
2007/08	38.6	37.1	59.3	72.9
2008/09	43.4	37.9	47.8	61.0
2009/10	42.0	30.7	62.9	77.5
2010/11	50.2	35.3	81.5	165.0
2011/12	38.0	25.8	90.5	103.5

Note: Procurement prices for seed cotton converted to fiber-equivalents by dividing by 32 percent ginning outturn ratio.

Sources: Procurement prices from USDA's attaché in Tashkent and the International Cotton Advisory Committee (ICAC). U.S. price from USDA, National Agricultural Statistics Service. World price from the Cotlook A Index. Exchange rates from the United Nations Development Programme (2006) and TCX Investment Management Company B.V.

Footnote 16 continued from page 9
Agricultural Policy Research Institute (FAPRI, 2005) estimated that the program added a 2.9 percent premium to the U.S. farm price relative to the world price. This is similar to the 2.3-percentage-point relative decline observed in the U.S. price between 2006/07 and 2009/10 compared with between 1999/00 and 2005/06.

¹⁷Rudenko et al. (2009) found that Uzbek farmers received 66 percent of the world price in 2004. Guadagni et al. (2005) cited a figure of 77 percent for 2004 and noted that implicit taxes as a result of price controls fell with the unification of exchange rates. Pomfret (2009) cited an estimate for marketing year 2001 of 54 percent export parity, and presented data consistent with a 37 percent parity using this methodology.

The Role of Marketing Costs

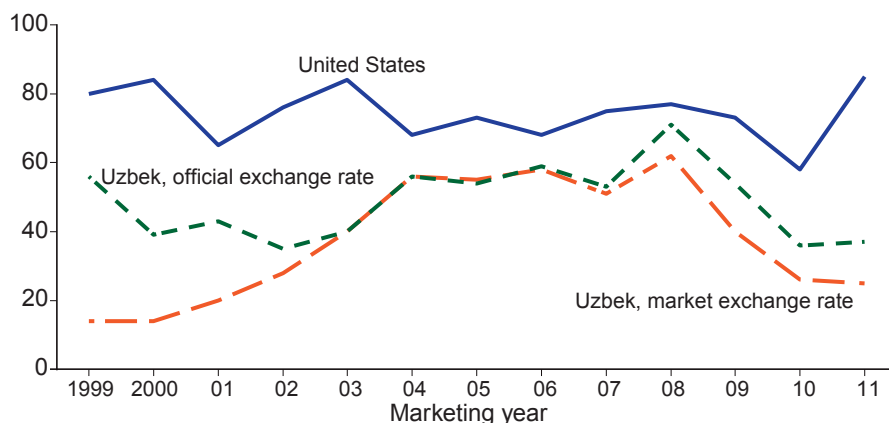
Export parity differences could, under some circumstances, stem from unavoidable differences in marketing costs—such as those introduced by poor infrastructure investment (World Bank, 1999)—but this does not appear to be the case with Uzbekistan. In developing countries, high costs can be introduced by small-scale marketing systems with poor vertical coordination and integration. Underinvestment in storage facilities can lead to large or potentially large post-harvest losses. Marketing in Uzbekistan happens on a large scale, with few intermediate steps in the marketing chain and significant vertical coordination. Uzbekistan’s relatively arid climate and the seasonality of its rainfall mean that precipitation during key points in processing and shipping is comparable with the U.S. Southwest, where USDA has permitted outdoor storage of cotton placed in the U.S. marketing loan program. Investment in terminal facilities within Uzbekistan—and in railways leading to export points—has been significant as Uzbekistan has adjusted to exporting outside the Commonwealth of Independent States (Cotlook, 2010).

There are inefficiencies embedded in Uzbekistan’s marketing system, but they are largely a consequence of government-sanctioned or government-owned monopolies and oligopolies at various stages. Uzbekistan’s rigid adherence to export pricing based on widely published world prices provides a useful monitoring mechanism to avoid FTC under-invoicing and off-shore profit capture. Greater returns, however, might be possible with more flexible marketing (Butler, 2005). Similarly, while a greater number of competitors for transportation services for Uzbek exports might eventually lower costs, government policy limits market entry. Such inefficiencies are ultimately implicit taxes on the consumers of these services.

Figure 4

Export parity for U.S. and Uzbek cotton prices

Local farm price as percent of world



Sources: State procurement prices (SPP) from USDA’s attaché in Tashkent and the World Bank. U.S. farm price for cotton and cottonseed from USDA’s National Agricultural Statistics Service. U.S. ginning costs from USDA’s Economic Research Service cost and returns. U.S. cotton and cottonseed production data from USDA’s Foreign Agricultural Service Production, Supply and Distribution Online.

Nominal Rates of Assistance, by Policy

The discount from export parity provides an estimate of total implicit and explicit taxes—a negative NRA. This NRA can be disaggregated (table 3) into impacts resulting from SPP policy (NRA_{SPP}) and exchange rate policy (NRA_E) (see Appendix for details). Both measures are negative in virtually every year, suggesting that both the SPP and the exchange rate policy reduce producer revenues. NRA_{SPP} is more stable in certain respects than NRA_E but fluctuates consistent with the price-smoothing characteristic of the policy noted earlier. For example, when world prices fell precipitously in 2008, the NRA_{SPP} reached its lowest level of taxation, or 6 percent. Alternatively, when world prices reached record highs in 2010, the NRA_{SPP} reached one of its highest levels of taxation, or 52 percent. Taxation through NRA_{SPP} trended downward during the early 2000s, stabilizing around 25 percent during 2004-07 before rising during 2010-12. NRA_E remained at or close to zero during 2003-07 but rebounded afterward, reaching 16 percent in 2011.

Table 3

Implied nominal rates of assistance (NRA), by policy (NRA_{SPP} and NRA_E)

Marketing year	State procurement price (NRA_{SPP})	Exchange rate overvaluation (NRA_E)
	<i>Percent</i>	
1999/00	-26	-56
2000/01	-48	-33
2001/02	-43	-30
2002/03	-53	-10
2003/04	-46	0
2004/05	-26	0
2005/06	-28	1
2006/07	-21	-1
2007/08	-29	-3
2008/09	-5	-12
2009/10	-28	-19
2010/11	-52	-14
2011/12	-51	-16

Source: USDA, Economic Research Service calculations based on data from USDA's attaché, Cotlook Ltd, United Nations Development Programme (2006), and TCX Investment Management Company B.V.

Subsidies: Extensive and Hard To Measure

Subsidies comprise the other side of the balance sheet in an accounting of the net impact of government policy on cotton, and input subsidies are reportedly extensive in Uzbekistan. Abdullaev et al. (2009) found that subsidies amounted to \$400 million in 2004, or approximately 43 percent of the cotton crop's value, but asserted that they were lower in later years. Pomfret (2009) lists subsidies to cotton producers during 2000-04 that were equivalent to 2.1-8.1 percent of GDP (or \$251-\$830 million).¹⁸ Guadagni et al. (2005) cited extensive input subsidies (\$290-\$486 million) during 2000-04 for Uzbekistan cotton farmers that extended to fertilizers, pesticides, and machinery services. Rudenko et al. (2009) noted that farmers received credit at an annual interest rate of 3 percent, compared with 16 percent market rates. Gilham et al. (1995) noted that water was essentially free for farmers. Abdulleav et al. (2009) noted that Water Users Associations (WUA) were established for fee-based water distribution, but that farmers lacked the resources to pay for such services, rendering the payment scheme ineffective.

Veldwisch and Spoor (2008) found that subsidized fertilizer was available to farmers, with the amount distributed determined by their planted area and expected yield. Farmers also were entitled to subsidized diesel, however, the fuel was stored at Machine Tractor Parks (MTP) and distributed only with MTP services. This study also noted that subsidized farm credit was directed into bank accounts similar to settlement accounts used during the Soviet Era. These same accounts were used to deposit payments for cotton deliveries, while input costs from State-owned firms were deducted directly. Input deliveries may have been partly diverted by officials for personal gain and, according to numerous reports, it is very difficult if not impossible for farmers to withdraw cash from these bank accounts. Rudenko et al. (2009) found that the difficulty accessing the accounts was perceived by farmers as a constraint on cotton production.

Inconsistent subsidy estimates for Uzbek cotton partly reflect the reluctance of officials, traders, and farmers to share valuable information but also reflect the nature of Uzbekistan's economy. Markets for credit and other inputs are poorly developed, and, for example, bartering is commonplace. The conditions placed on the use of subsidized inputs add difficulty to calculating the actual value of input subsidies. On the other hand, without complete markets, assigning a value to State-provided services remains difficult and raises the possibility that their actual value exceeds that assigned in the studies discussed here. When considering the high degree of taxation found in numerous studies, it is important to fully appreciate the uncertainty of these calculations.

Cotton producers do see some benefits from this centralized system. First, producers experience less inherent risk based on the price smoothing aspect of the SPP determination. Uzbek farmers were protected from shifts in relative world prices during 2000-08 that resulted in a 36-percent decrease in U.S. cotton planted area, compared with a 9-percent decrease in Uzbekistan. Second, the system supports the maintenance and operation of the country's irrigation system. Managing one of the world's more complex irrigation systems is a not an insignificant task, and operation and maintenance issues in Uzbekistan may be less critical than in some neighboring countries.

¹⁸Calculation based on GDP data from IHS Global Insight.

Taxation Offsets Subsidies for Uzbek Cotton

The data we analyzed only assessed the implicit taxation of cotton producers through prices. The comprehensive level of net taxation or subsidization depends on the impact of other policies as well. Earlier, comprehensive studies indicated that shifts in net aggregate support for cotton were highly correlated with pricing policy shifts. Shifts in net taxation also were correlated with shifts in Uzbekistan's cotton yields. Recent world price volatility makes analysis of recent pricing policies more complicated but, combined with recent cotton yield data, the shift in the relationship between domestic and world cotton prices suggests that total net taxation increased after 2008.

Guadagni et al. (2005) and Pomfret (2009) attempted to assess the overall taxation of Uzbek cotton. Guadagni et al. (2005) completed a detailed study that included input subsidies, exchange rates, the SPP, taxes, and debt restructuring. Debt restructuring was a significant share of government support in some years, which further complicated attempts to calculate support. They determined that, on a net basis, taxation of the cotton sector reached 5 percent of GDP in 2000 and trended downward to 1.8 percent in 2004. As a share of cotton farmers' gross income, taxation trended from 50 to 20 percent over the same period. Pomfret (2009) reported that net transfers from cotton producers as a share of GDP fell from 12.3 percent in 2000 to between 2.1 and 5.4 percent during 2000-04.

Results were not entirely consistent across studies. Nevertheless, they show that Uzbekistan's net taxation of cotton declined in 2000-05. Note that the estimated range of net taxation (20-50 percent) underestimates the total negative impact on cotton production in two ways. First, the costs to Uzbek cotton farmers were not fully enumerated even in the studies detailed here. Research by Rudenko (2008) and Velshwisch (2008) found that farmers also face payment delays and skewed classing¹⁹ when marketing their crop. Second, while subsidies partly offset taxes, they do so by introducing an additional set of distortions. Therefore, resource misallocations can persist or can even be amplified. Abdullaev et al. (2009) provided concrete examples of this situation with respect to water management.

¹⁹“Classification,” for our purposes, describes the application of standardized procedures for measuring the physical attributes of cotton, analogous to grading for grains. Gilham (1995) noted that, for the early 1990s, “Uzbekistan ginneries generally produce a higher percentage of higher grades than the percentage of these grades that are procured,” and cited the failure to pay farmers a premium for higher quality as one of the reasons.

Linking Policies To Cotton Production

Since 2008, increased observed implicit net taxation through prices has coincided with lower yields, similar in both respects to the years prior to 2004. While producers' efforts and actual yields could vary with producers' expected returns, an additional factor bolsters the link between taxation and reported yields: implementation of the State order system during periods of high taxation likely skews yield estimates for Uzbekistan.

Net taxation breaks the alignment of interests between cotton producers and the State. While the State observes producers' efforts to meet quotas, ultimately the asymmetry of information favors producers. To some extent, the asymmetry of information is less with respect to planting activity than with respect to the effort expended to achieve optimal yields. This ensures that some cotton area will be planted that producers later effectively neglect. Data on planting also is likely to be inflated, and the degree of inflation will be correlated with net taxation.

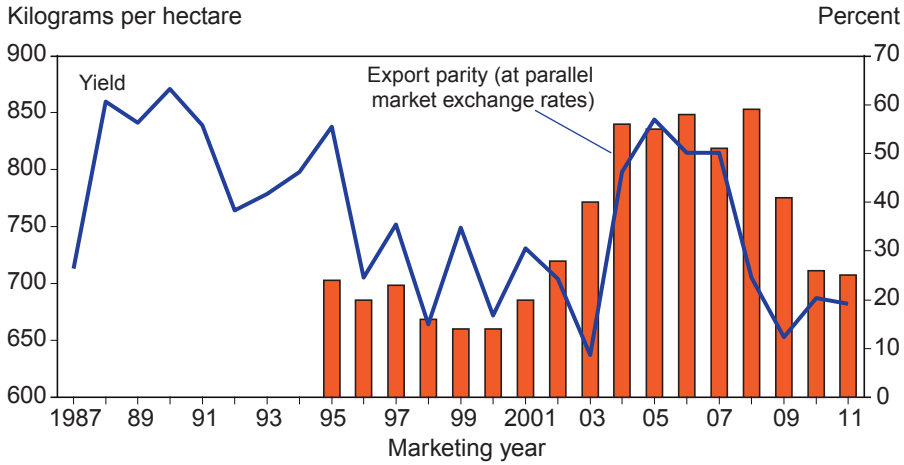
Pomfret (2000), USDA's attaché to Uzbekistan (USDA/FAS, 2000), and others have noted occasionally significant smuggling of Uzbek cotton to neighboring countries. Uzbek authorities cannot observe, for example, every time farmers achieve above-average yields, creating opportunities for producers to smuggle cotton out of the country. Thus, while we cannot observe every aspect of net taxation, we can expect reported yields to vary inversely with the level of taxation.

Uzbekistan's post-independence cotton yields trended downward but increased during the years when higher export parity indicated reduced taxation through pricing policy (fig. 5). Yields jumped to a higher plateau during 2004-07, averaging 19 percent higher than the previous 4 years.²⁰

²⁰Yield variability in each period is low, so the difference is significant at the 1-percent level.

Figure 5

Uzbek cotton yield and State procurement price (SPP) export parity



Note: Pre-1995 data is unreliable due to hyperinflation and the difficulties transitioning from Russia's ruble to a local currency.

Sources: Yield data from USDA's Foreign Agricultural Service Production, Supply and Distribution Online and ERS calculations (real SPP) based on data from USDA's attaché in Tashkent and the International Cotton Advisory Committee; the United Nations Development Programme (2006); and TCX Investment Management Company B.V.

Other Influences on Yield

Other issues may affect cotton yield, but policy differences appear to have accounted for the much of the difference between the two periods (1999-2003 and 2004-07). Gilham et al. (1995) ascribed the post-independence yield decline to the cumulative impact of limited crop rotation and reductions in chemical and mechanical inputs driven by foreign exchange constraints. The United Nations Environmental Program (UNEP, 2011) highlighted how rising salinity and reduced streamflow have affected yields in Uzbekistan's downstream provinces. With Uzbek cotton completely irrigated, yield variability is low but not completely eliminated. Significant problems with irrigation supplies in 2000 and 2008 likely accounted for below-average yields. In addition to reduced taxation, good weather in 2004 and 2005 helped sustain yields. In 2010, growing conditions were very favorable, but yields remained relatively low.²¹ Yields in 2010 were even lower than those in 2008, while water intake data from the Amu Darya River indicate more than ample water supplies for irrigation (Scientific Information Center, ICWC, 2012).

Post-2008 data show a rebound in estimated taxation but volatility in world cotton markets must be considered when assessing this data. The price-smoothing aspect of Uzbek policy means that plunging world prices in 2008 resulted in unprecedentedly low taxation levels through SPP (6 percent). Shortly thereafter, record-high 2010 world prices drove the estimated NRA_{SPP} to one of the highest taxation levels in this study (52 percent).²² Based on the recent shift in cotton yields and a rebound in implicit taxation through prices for almost every year since 2008, we concluded that net cotton taxation has rebounded. Given that yields are currently at their pre-2004 level, net taxation is likely also similar to its pre-2004 level, around 50 percent.

Data issues add a degree of uncertainty to our calculations. Subsidy values are difficult to calculate, as are the costs of such administrative procedures as delayed payments to farmers. Our research substitutes analysis of available aggregate information for a detailed accounting at each step along Uzbekistan's supply chain. But even such an accounting would hold significant ambiguity, given the structure of Uzbekistan's economy.

²¹On October 15, 2010, *Cotton Outlook's* Uzbekistan correspondent stated that, "this season's cotton production...has benefited from excellent growing conditions."

²²Note, however, that the export parity of U.S. cotton shifted significantly that year. Unprecedented price volatility and levels characterized world cotton markets in 2010. Farmers' prices in both the United States and Uzbekistan were largely determined before the mid-season peaks that drove the average 2010 world price to such an unprecedented level. U.S. farmers missed these peaks due to the timing of their marketing, and Uzbek farmers missed these peaks due to the timing of SPP determination and government policy.

Factors Driving Changes in Net Taxation

The variations in net taxation of cotton discussed here may be a result of policy shifts in three broader aspects of Uzbekistan's economy: food security, inflation, and the distribution of economic rents.

Negative rates of assistance for cotton production make grain production relatively more attractive to producers and may play a role in food security policy. Uzbekistan's post-independence transition to hard-currency food grain imports was an important factor in the reduction of cotton area during the 1990s.²³ The shift from managed food-grain shipments between republics within the Soviet Union to international market exchange increased Uzbekistan's risk in relying on grain imports. In the mid-1990s, when Uzbekistan began taxing cotton production significantly, its grain import dependency ratio was 80 percent. By 1999/00, it had fallen to 12 percent, where it remained through 2007/08 (USDA/FAS, 2012). The global trade policy environment during this period also supported a reduced emphasis on food self-sufficiency as a result of low price volatility and a strong legacy of increasingly liberal trade arrangements around the world.

In 2008, these trends were disrupted. Irrigation problems throughout Central Asia sharply cut Uzbek grain production, and world grain prices soared sharply. Uzbekistan's main source of imported wheat—neighboring Kazakhstan—briefly imposed an export ban. In response, Uzbekistan announced an area shift for the next season from cotton to grains. The summer of 2008 also marked the reemergence of a parallel market premium for U.S. dollars, reducing the cost of importing grain.

Inflation and food security are closely linked in Uzbekistan, given food's large share of consumer expenditures. The large expenditure share for food and lack of central bank independence makes controlling inflation difficult with volatile food grain prices (Al-Eyd et al., 2012). Lacking efficient markets, there is greater reliance on administrative measures to limit price increases, prolonging the time needed for stabilization. In 2008, Uzbek policymakers explicitly linked exchange rate policy to inflation reduction (IMF, 2008) and, with world grain prices surging once again starting in 2010, this situation likely continued.

Another likely concern for policymakers is the level and distribution of economic rents. Acemoglu and Robinson (2012) characterize Uzbekistan as an economy with extractive economic institutions, and highlight cotton in this respect. IHS Global Insight observed that:

“Despite a high level of privatization, the country's economy remains tightly controlled by the top circle of leadership. Many, if not most, major private entities are held by members, friends, and family of the ruling elite.”

Reduced cotton production has implications for government revenues through excise taxes and to the beneficiaries of government-protected monopolies along the marketing chain. In the 1990s, when Uzbekistan's net cotton taxation rose sharply, cotton accounted for 40-60 percent of export earnings. By 2001, this share had fallen to 25 percent and fell to 11 percent by 2010 as gold

²³Uzbekistan's cotton area fell 29 percent between 1987 and 1995. Cotton area subsequently never exceeded its 1995 level by more than 1.5 percent but trended downward 5-8 percent in 2000 and 2009.

and natural gas grew in importance.²⁴ Increased taxation of cotton production, however, may sustain revenues provided by cotton, even as food security concerns reduce the volume of cotton output and associated rents.

Uzbekistan is often characterized as pursuing import-substitution industrialization (ISI). Under ISI, natural resource-based export sectors are taxed to finance investment in industry. Uzbekistan has had some success with ISI, raising textile output, boosting investment in energy production, and exporting cars. Policymakers may have decided to divert additional resources to industrialization after 2008 but evidence for such a shift appears slim.

Looking forward, two factors likely will determine if Uzbekistan's underlying policy environment continues to support a cotton policy that includes higher taxes on cotton producers:

- Water-related constraints on agricultural production, and
- Continued high world grain prices.

The balance between water availability and needs remains key to both the intensity of Uzbekistan's concern with food security and to local grain production costs. Regional surface temperatures have been trending up, while precipitation has been trending down in the catchment regions of Uzbekistan's irrigation system (UNEP, 2011). These environmental developments, combined with a growing reliance of upstream countries on winter hydroelectric output, have placed greater pressure on summer streamflows (Rakhmatullaev, 2010). As a result, Uzbekistan's food security concerns will remain in the forefront and local grain production costs may also face pressure, suggesting that continued higher levels of cotton taxation could remain to improve the relative attractiveness of grain production.

Trends in world food prices may ease inflationary pressures over time. USDA's baseline forecasts include a reduction in real food grain prices between 2010 and 2020 (USDA/ERS, 2012b). While relatively small, this decline marks a shift from the large increases of 2005-11. Although prices are not expected to return to the record lows seen before 2006, they will help drive consumer prices down. Reduced inflationary pressure could induce Uzbekistan to reduce its exchange rate overvaluation and help moderate the impact of food security concerns on cotton taxation.

²⁴Other energy and oil products accounted for 25 percent; and other major products included food (10 percent), metals (7 percent), machinery (6 percent), and chemicals (5 percent) (State Committee of the Republic of Uzbekistan on Statistics, 2011).

Conclusions

Uzbekistan is a landlocked, relatively low-income, and significantly rural nation that inherited a complex economic legacy from decades as a member of the former Soviet Union. Its economic institutions emphasize centralized control of the economy and the appropriation of rents from natural resources for industrialization and for the benefit of the governing elite. Relations with neighboring countries—all former members of the Soviet Union—are complex partly because of shared resources, such as the Amu Darya and Syr Darya rivers. These circumstances are not expected to change in the immediate future, and Uzbekistan's cotton sector likely will grow slowly under a relatively high tax burden.

Shifts in Uzbekistan's cotton policy have exacerbated shifts in world cotton markets since 2000. In the middle of the last decade—when world cotton prices reached record lows relative to other commodities—Uzbekistan reduced the economic burden on its cotton producers, resulting in higher yields, output, and exports and driving world cotton prices even lower. Then, as world cotton markets tightened and prices rose to new peaks, Uzbekistan cut cotton output and exports, partly through increased taxation, adding upward pressure on world prices.

USDA's longrun baseline estimates for Central Asia indicate that cotton production and exports likely will increase slowly over the next 10 years, and the region's share of world output is expected to decrease. The slow pace of economic reform in Uzbekistan, which accounts for two-thirds of Central Asia's cotton output, will remain a key factor driving the modest outlook for cotton in the region. The high level of net taxation illustrated here suggests that significant output gains could be achieved under alternative policies. However, sustaining such gains may require further reforms and investments resulting in more efficient use of inputs, particularly water.

References

- Abdullaev, I., C. De Fraiture, M. Giordano, M. Yakubov, and A. Rasulov. "Agricultural Water Use and Trade in Uzbekistan: Situation and Potential Impacts of Market Liberalization," *Water Resources Development* 25(1): pp. 47–63, 2009.
- Acemoglu, Daron, and James Robinson. *Why Nations Fail: The Origins of Power, Prosperity, and Poverty*, Random House, 2012.
- Anderson, K., M. Kurzweil, W. Martin, D. Sandri, and E. Valenzuela. "Measuring distortions to agricultural incentives, revisited," *World Trade Review* 7: pp. 675-704, 2008.
- Al-Eyd, Ali, David Amaglobeli, Bahrom Shukurov, and Mariusz Sumlinski. *Global Food Price Inflation and Policy Responses in Central Asia*, Working Paper No. 12/86, International Monetary Fund, 2012.
- Ayers, R.S., and D.W. Westcot. *Water Quality for Agriculture*, FAO Irrigation and Drainage Paper 29 Rev. 1, Food and Agriculture Organization of the United Nations, 1994.
- Barros, Geraldo. "Brazil: The Challenges in Becoming an Agricultural Superpower," *Brazil as an Economic Superpower? Understanding Brazil's Changing Role in the Global Economy*, Lael Brainard and Leonardo Martinez-Diaz (Eds.), Brookings Institution Press, 2009.
- Butler, R. "Factors Influencing International Cotton Prices," *Cotton Outlook Special Feature: Uzbekistan-2005 International Cotton and Textile Conference*, pp. 6-10, 2005.
- Cotlook Ltd. "Uzbekistan," *Cotton Outlook* 88(45): p. 7, 2011.
- Cotlook Ltd. *Uzbekistan: Weaving a Way Into the Developed World*, Merseyside, UK, 2010.
- Djanibekov, Nodir, Inna Rudenko, John P.A. Lamers, and Ihtiyor Bobojonov. "Pros and Cons of Cotton Production in Uzbekistan," *Food Policy For Developing Countries: The Role Of Government In The Global Food System*, Case Study #7-9, 2010.
- Environmental Justice Foundation. *White Gold: The True Cost of Cotton*, London, UK, 2005.
- Food and Agricultural Policy Research Institute (FAPRI). *Impacts of Commodity and Conservation Reserve Program Provisions in House and Senate Reconciliation Bills*, FAPRI-UMC Report #15-05, 2005.
- Gemayel, E., and D. Grigorian. *How Tight is Too Tight? A Look at Welfare Implications of Distortionary Policies in Uzbekistan*, Working Paper No. 05/239, International Monetary Fund, 2005.

- Ghei, Nita, and Stephen B. Kamin. "The use of the parallel market rate as a guide to setting the official exchange rate," Board of Governors of the Federal Reserve System, 1996.
- Gillham, F.E., T.M. Bell, T. Arin, G.A. Matthews, C. Le Rumeur, and A.B. Hearn. *Cotton Production Prospects for the Next Decade*, Technical Paper No. 287, The World Bank, 1995.
- Guadagni, M., M. Raiser, A. Crole-Rees, and D. Khidirov. *Cotton Taxation in Uzbekistan: Opportunities for Reform*, ECSSD Working Paper No. 41, The World Bank, 2005.
- IHS Global Insight. Country & Industry Forecasting, Uzbekistan, Economic Growth: Recent Developments, 2011.
- International Cotton Advisory Committee (ICAC). Uzbekistan cotton price database, March 2011.
- International Monetary Fund. *Republic of Uzbekistan: 2006 Article IV Consultation—Staff Report; Public Information Notice on the Executive Board Discussion; and Statement by the Executive Director for the Republic of Uzbekistan*, IMF Country Report No. 07/133, 2007.
- International Monetary Fund. *Republic of Uzbekistan: 2008 Article IV Consultation—Staff Report; Public Information Notice on the Executive Board Discussion; and Statement by the Executive Director for the Republic of Uzbekistan*, IMF Country Report No. 08/235, 2008.
- Isengildina, Olga, C.W. Herndon, and O.A. Cleveland. "Cotton industry in Uzbekistan: Structure and current developments," *Beltwide Cotton Conferences* Vol. 1, pp. 297-301, 1998.
- Josling, T., K. Anderson, A. Schmitz, and S. Tangermann. "Understanding International Trade in Agricultural Products: One Hundred Years of Contributions by Agricultural Economists," *American Journal of Agricultural Economics* 92(2): pp. 424-46, 2010.
- Lindauer, David. "Parallel, fragmented, or black? Defining market structure in developing economies," *World Development* 17(12): pp. 1871-80, 1989.
- Naumov, Y., I. Pugach, and Y. Yusupov. *Uzbekistan's Textile Industry: How to Implement Development Potential?* Policy Brief No. 1(14), United Nations Development Programme, 2010.
- Piggott, N.E., and M. Wohlgenant. "Price elasticities, joint products, and international trade," *The Australian Journal of Agricultural and Resource Economics* 46(4): pp. 487-500, 2002.
- Pomfret, Richard. "Agrarian Reform in Uzbekistan: Why has the Chinese Model Failed to Deliver?" *Economic Development and Cultural Change* 48(2): pp. 269-84, 2000.
- Pomfret, R. "Tajikistan, Turkmenistan, and Uzbekistan," *Distortions to Agricultural Incentives in Europe's Transition Economies*, K. Anderson and J. Swinnen (Eds.), The World Bank, pp. 297-338, 2008.

- Rakhmatullaev, S., F. Huneau, P. Le Coustumer, M. Motelica-Heino, and M. Bakiev. "Facts and Perspectives of Water Reservoirs in Central Asia: A Special Focus on Uzbekistan," *Water* Vol. 2: pp. 307-20, 2010.
- Rosenberg, C., and M. De Zeeuw. "Welfare Effects of Uzbekistan's Foreign Exchange Regime," *IMF Staff Papers* 48(1): pp. 160-78, 2001.
- Rudenko, Inna. *Value Chains for Rural and Regional Development: The Case of Cotton, Wheat, Fruit and Vegetable Value Chains in the Lower Reaches of the Amu Darya River, Uzbekistan*, dissertation thesis, University of Hannover, 2008.
- Rudenko, I., J. Lamers, and U. Grote. "Can Uzbek Farmers get More for their Cotton?" *European Journal of Development Research* 21: pp. 283-96, 2009.
- Sadler, Marc. "Vertical Coordination in the Cotton Supply Chains in Central Asia," *The Dynamics of Vertical Coordination in Agrifood Chains in Eastern Europe and Central Asia*, Working Paper No. 42, Johan Swinnen (Ed.), The World Bank, pp. 73-114, 2006.
- Scientific Information Center, Interstate Coordination Water Commission of Central Asia. Database of the Amudarya river basin, 2012, <http://www.cawater-info.net/amudarya/>.
- Shtaltovna, A., A-K. Hornidge, and P.P. Mollinga. *The reinvention of Agricultural Service Organisations in Uzbekistan – a machine-tractor park in the Khorezm-region*, ZEF Working Paper Series 75, University of Bonn, Center for Development Research, 2011.
- State Committee of the Republic of Uzbekistan on statistics. Statistical Review of Uzbekistan, 2011, <http://www.stat.uz/en/reports/177/>.
- TCX Investment Management Company B.V. Personal communication, Jos Kramer, Vice President, 2012.
- United Nations Development Programme (UNDP). *How to Boost Exports in Uzbekistan: Policies and Institutions*, Policy Brief No. 4, 2006.
- United Nations Environmental Programme (UNEP). *Environment and Security in the Amu Darya Basin*, report prepared on behalf of the partner organizations of the Environment and Security Initiative, 2011.
- U.S. Department of Agriculture, Economic Research Service (USDA/ERS). Commodity Costs and Returns: Cotton 2010-11, 2012a, <http://www.ers.usda.gov/data-products/commodity-costs-and-returns.aspx>.
- U.S. Department of Agriculture, Economic Research Service. International Baseline Data: Cotton Supply and Use, 2012b, <http://www.ers.usda.gov/data-products/international-baseline-data.aspx>.
- U.S. Department of Agriculture, Farm Service Agency (USDA/FSA). Personal communication, Tom Bickerton, Economist, January 2012.
- U.S. Department of Agriculture, Foreign Agricultural Service (USDA/FAS). *U.S. Team reports on Soviet cotton production and trade*, FAS-M-277, 1977.

- U.S. Department of Agriculture, Foreign Agricultural Service, Global Agricultural Information Network. "Uzbekistan, Republic of: Cotton and Products Update," GAIN Report Number UZ0012, 2000, <http://www.fas.usda.gov/gainfiles/200010/50678605.pdf>.
- U.S. Department of Agriculture, Foreign Agricultural Service, Global Agricultural Information Network. "Uzbekistan, Republic of: Cotton and Products Annual," GAIN Report Number UZ5004, 2005, <http://www.fas.usda.gov/gainfiles/200504/146119488.pdf>.
- U.S. Department of Agriculture, Foreign Agricultural Service, Global Agricultural Information Network. Uzbekistan Cotton and Products Updates, 1995-2011, 2011, <http://gain.fas.usda.gov/Pages/Default.aspx>.
- U.S. Department of Agriculture, Foreign Agricultural Service. Production, Supply and Distribution Online, 2012, <http://www.fas.usda.gov/psdonline/>.
- U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS). Quick Stats, 2011, http://www.nass.usda.gov/Data_and_Statistics/Quick_Stats/index.asp.
- Veldwisch, G. *Cotton, Rice & Water: The Transformation of Agrarian Relations, Irrigation Technology and Water Distribution in Khorezm, Uzbekistan*, Inaugural-Dissertation zur Erlangung der Doktorwürde der Philosophischen Fakultät der Rheinischen Friedrich-Wilhelms-Universität zu Bonn, 2008,
- Veldwisch, G.J.A., and M. Spoor. "Contesting rural resources: Emerging 'forms' of agrarian production in Uzbekistan," *Journal of Peasant Studies* 35(3): pp. 424-51, 2008.
- Verma, A. "Shipping Cotton to China: Cost and Influencing Factors," *Cotton: Review of the World Situation* 61(5): pp. 16-7, 2008.
- World Bank. *India Foodgrain Marketing Policies: Reforming to Meet Food Security Needs, Volume II: Annexes and Statistical Tables*, Report No. 18329-IN, Rural Development Sector Unit, South Asia Region, August 17, 1999.

Appendix: Nominal Rate of Assistance (NRA)

The discount from the export parity calculated here can be disaggregated into separate impacts resulting from the State procurement price policy (NRA_{SPP}) and the exchange rate policy (NRA_E) using tools found in the agricultural economics literature. Given that cotton exports are under a complete foreign exchange surrender requirement and that control of domestic and international trade means that domestic consumption of cotton fiber is based on world price (less a 15 percent discount, which essentially accounts for transportation according to Naumov, et al.), the approach used by Anderson et al. (2009) can be decomposed to illustrate the relative impact of the two policy instruments. The divergence of the State procurement price (SPP) from the world price can be analyzed as an export tax, and the divergence of official exchange rates (E_O) from parallel rates (E_P) can be treated as a separate additional tax. We define P_W^* as the A Index in U.S. currency terms (P_W) multiplied by 0.75 (i.e., 1-0.25, to adjust to a farm-equivalent), then:

$$NRA_{SPP} = \frac{E_P \times P_W^* (1 - t_x) - E_P \times P_W^*}{E_P P_W^*}.$$

and,

$$t_x = 1 - \frac{SPP}{P_W^* \times E_O}.$$

Following Anderson et al. (2009), when exchange rates are overvalued, the price of exportables is reduced by the fraction e_x . Since cotton is a “centralized” commodity with a 100 percent foreign exchange surrender requirement for exporters,

$$e_x = \frac{E_O}{E_P}.$$

Thus, the total border support nominal rate of assistance is,

$$NRA = \frac{e_x \times E_P \times P_W^* (1 - t_x) - E_P \times P_W^*}{E_P P_W^*}, \text{ and,}$$

$$NRA_E = NRA - NRA_{SPP}.$$

A complete accounting of assistance also would require data on subsidies. While subsidies for inputs have been significant in some accounting efforts, input market distortions call these measures into question. The cost of late payments and skewed cotton classing also factor into farmers’ costs, offsetting some of a given year’s input subsidies.

As noted previously, earlier studies with access to subsidy estimates from the same period found that taxes on cotton exceeded subsidies, resulting in a net taxation of cotton producers ranging from 20 to 50 percent. The appendix figure

¹Note that the exchange rate in the parallel market, E_P , is not the long-term equilibrium rate. The macroeconomic policies associated with the overvaluation of the exchange rate directly and indirectly drive the parallel market rate below the long-term rate, but it is the equilibrium rate in the context of those policies (Ghei and Kamin, 1999).

illustrates the relationships between world prices (P_w), the efficient farm equivalent of world prices (F_w^*), the SPP, and total taxes and net taxes.

The measure of total implicit and explicit taxes, or the NRA, is $\frac{SPP}{E_p} - F_w^*$.

NRA_{SPP} can be translated into the terms used in the appendix figure and

simplified to $\frac{SPP}{E_o} - P_w^*$.

Appendix figure

Price-based estimate of total and net taxation

