Volume 6 Number 2 2005/p.251-273 esteyjournal.com

The Estey Centre Journal of
International Law and Trade Policy

Assessing the Impacts of the Chinese TRQ System and U.S. Subsidies on the World Cotton Market*

Suwen Pan - *Research Scientist*
Mark Welch - *Research Associate*
Samarendu Mohanty - *Associate Professor*
Mohamadou Fadiga - *Research Associate*
Don Ethridge – *Professor*

Department of Agricultural and Applied Economics, Texas Tech University

This article compares how eliminating the U.S. cotton subsidy program and the Chinese cotton tariff-rate quota (TRQ) would affect the world cotton market. The results show China's TRQ has a greater negative impact on the world cotton market than do U.S. subsidies. Compared to a base-level estimate, the elimination of China's TRQ increases the world cotton price and increases the quantity of world cotton traded, whereas the elimination of U.S. cotton subsidies increases the cotton price (but less than under TRQ elimination) and decreases the world cotton trade. The combined effect of eliminating both programs is also shown.

Keywords: cotton, international trade, subsidies, TRQ

> We recall the long-term objective referred to in the Agreement to establish a fair and market-oriented trading system through a programme of fundamental reform encompassing strengthened rules and specific commitments on support and protection in order to correct and prevent restrictions and distortions in world agricultural markets. We reconfirm our commitment to this programme. Building on the work carried out to date and without prejudging the outcome of the negotiations, we commit ourselves to comprehensive negotiations aimed at: substantial improvements in market access; reductions of, with a view to phasing out, all forms of export subsidies; and substantial reductions in trade-distorting domestic support.
>
> Ministerial Declaration, The Fourth WTO Ministerial Conference, Doha, Qatar, 2001

Introduction

As part of the Agreement on Agriculture referenced in the quote above, member nations of the World Trade Organization (WTO) during the Uruguay Round agreed to establish a more open, market-oriented agricultural trading system. The three main areas of concern, or "pillars" on which the free trade agenda is built, are (1) improving market access by reducing tariff rates and eliminating non-tariff barriers, (2) ending the subsidization of exports and improving export competition, and (3) reducing most internal governmental support given to producers. The goal of fair competition free from trade-distorting policies requires that progress be made in each area. As the WTO General Council has affirmed, "[T]he reforms in all three pillars form an interconnected whole and must be approached in a balanced and equitable manner".

Recently, two of these pillars have become the focus of a challenge to U.S. commodity programs by the nation of Brazil. The basic argument of the Brazilian case is that the domestic farm and trade policies of the United States depress world market prices. The contention is that such policies allow the United States to subsidize cotton exports, either explicitly or implicitly through production subsidies, and "dump" them on world markets (Beghin and Fabiosa, 2002). In 2004, the WTO Dispute Settlement Body found against the United States in support of Brazil's position. In a ruling that has been upheld on appeal, U.S. cotton price–related programs (marketing loans, counter-cyclical payments, market loss assistance, step 2 payments) were found to have caused serious harm to Brazil's cotton producers during the period 1999–2002.

The U.S. cotton subsidy issue has been investigated and debated since it was first contested by Brazil in 2002. Many researchers (ICAC, 2002; Sumner, 2003; Goreux,

2004; Pan et al., 2004a; Poonyth et al., 2004) have concluded that the U.S. cotton program depresses the world cotton price, but they differ significantly in their assessments of the magnitude of the effects. Meanwhile, in a study that compares the effects of subsidy policies and border protection, Hoekman, Ng, and Olarreaga (2003) find that "… tariffs matter significantly more than subsidy policies – tariff reductions generate welfare gains that are substantially greater than reductions in support policies" (p. 1). It seems that a discussion of trade-distorting policies will be incomplete without a consideration of all three mechanisms by which the WTO has agreed such distortions may arise.

Many of the nations involved in the world cotton market offer subsidies to their producers or place tariffs on imports. The expected effect of removing all trade-distorting policies in all nations would be to increase the world price for cotton and the quantity traded (Baffes, 2004). However, the United States has been singled out by the WTO due to its level of income support for its producers and its dominant position in the world cotton export market. Conversely, given that world cotton imports are dominated by a single nation with a substantial import tariff, it seems relevant to assess how market access restrictions by the world's leading cotton importer affect the world cotton market as well. Might it be that Chinese tariff barriers have a significant impact on the world cotton trade, perhaps even more so than U.S. domestic policy?

The United States is the largest cotton exporter, accounting for 40 percent of the total trade, and China is the largest cotton importer, with 25 percent of total imports. Both countries support their domestic cotton producers, but via different policy instruments. The United States employs a domestic price support program while China relies on a two-tier tariff structure for cotton imports, popularly known as a tariff-rate quota (TRQ).[1] TRQs have been discussed for products such as sugar (Skully, 2001; Petrolia and Kennedy, 2002; Vander, Beghin, and Mitchell, 2003), apples (Sreedharn et al., 2003), dairy (Balagtas, Rickard, and Sumner, 2002; Langley et al., 2003), and wheat (Koo, 2000), but very few studies focus on the Chinese cotton TRQ system. Although there is a broader body of literature on how China's WTO accession would affect the world cotton market (Wang, 1997; Fang and Babcock, 2003), a study has not been done on how TRQ elimination would affect the world cotton market. This may be due to the fact that only a few countries, such as China, have import TRQs (FAO, 2002).

The purpose of this article is to compare how the trade-distorting mechanisms of U.S. domestic support and Chinese market access restrictions affect the world cotton market. The objective of this article is to investigate the effects of these two policies under three scenarios:

- the elimination of all U.S. cotton programs such as direct payments and counter-cyclical payments, marketing loans, and step 2 payments;
- the elimination of the Chinese cotton TRQ system;
- the elimination of both the U.S. cotton programs and China's TRQ for cotton.

The results obtained under these discontinuation scenarios are compared to a baseline projection that includes current U.S. farm programs and Chinese imports given its present WTO commitments.

Effects of Price Subsidies and a TRQ

Following standard texts of international trade, table 1 summarizes the effects of domestic subsidy and TRQ (see the technical annex: *Economic Analyses*) on domestic and world prices, the quantities supplied and demanded in both importing and exporting countries, and trade. The price subsidy increases the domestic price in the exporting country with the subsidy and lowers the effective price in importing markets and the rest of the world. The TRQ causes a price rise in the domestic importing nation and a lower price for exporters and the world market. Quantity traded increases with a price subsidy and decreases with a TRQ.

Table 1 Estimated directional effects of a domestic subsidy by an exporting country and a TRQ by an importing country on prices and trade

	Subsidy	TRQ
P_{DX} (policy price effect in exporting country)	↑	
P_{DM} (policy price effect in importing country)		↑
X_S (quantity supplied in exporting country)	↑	↓
X_D (quantity demanded in exporting country)	↓	↑
M_S (quantity supplied in importing country)	↓	↑
M_D (quantity demanded in importing country)	↑	↓
ES (excess quantity supplied to world market)	↑	-
ED (excess quantity demanded in world market)	-	↓
Q_T (world quantity traded)	↑	↓
P_W (world price)	↓	↓

From this discussion it is possible to develop hypotheses in regard to the world market for cotton and the domestic policies of the two largest trading entities and their respective market-restricting policies:

> *Hypothesis 1: the elimination of U.S. subsidies for cotton will raise the world cotton price, decrease U.S. cotton exports, decrease China's imports of U.S. cotton, and decrease the quantity of world cotton traded.*
>
> *Hypothesis 2: the elimination of China's TRQ will increase the world cotton price, increase U.S. cotton exports, increase China's imports of cotton, and increase the quantity of world cotton traded.*
>
> *Hypothesis 3: the elimination of both U.S. subsidies for cotton and China's TRQ will raise the world cotton price.*

Whether the simultaneous discontinuation of both policies will increase or decrease the quantity of trade (Q_T) is not determined by the conceptual model since the directional arrows show contrary indications.

The discussion to this point has hypothesized the expected direction of changes relevant to the international trade of cotton. Critical to this analysis is a quantification of these effects. The magnitudes of these changes may be determined by the various supply and demand elasticities in these markets. Moreover, the effects of policy schemes such as TRQs and subsidy programs are dependent on the baseline level of price expectation and the quantity of world trade. If market prices are anticipated to be higher than the loan rate, there is no effect from the subsidy programs. The same holds for China's TRQ. The effects disappear if China imports less cotton than their quota. In order to ascertain the effects of each policy alone as well as their combined impacts, a model is constructed that estimates cotton demand and a baseline provided from which projections of the magnitude of each policy might be estimated (see the technical annex: *Basic Model Structure*).

Simulation Results

The baseline simulation was conducted with a set of assumptions about the general economy, agricultural policies, and technology changes in net exporting and net importing countries for the period 2004/05–2008/09. The baseline projections assume the continuation of current agricultural policies for the five years under analysis. Alternative scenarios were run on the basis of eliminating U.S. cotton subsidy programs (scenario 1), eliminating China's cotton TRQ (scenario 2), and eliminating both Chinese TRQs and U.S. cotton subsidy programs (scenario 3). The results of the three scenarios compared to the baseline are summarized in tables 2 through 5. Table 2 displays the effects on the cotton A-index, the U.S. cotton farm price, the Chinese

domestic cotton price, and the U.S. polyester price. Table 3 summarizes the effects on world cotton trade, production, consumption (mill use), and ending stocks. Tables 4 and 5 provide the effects on major cotton importing and exporting countries and regions respectively.

The International Cotton Market under the Base

In the base scenario, the cotton A-index is expected to increase by about 1.25 cents per pound per year over the projected time frame. World cotton production is expected to decrease by 12 percent in 2005/06 from historic highs in 2004/05 and is expected to begin annual increases thereafter. Cotton consumption (mill use) is expected to increase by about 6 percent between 2004/05 and 2008/09. As a result, world cotton traded is projected to increase by around 1.6 million bales in the time period.

Scenario 1: Elimination of the U.S. Cotton Subsidy Program

The effects of eliminating the U.S. cotton subsidy in this scenario are roughly equivalent to the findings of an earlier study (Pan et al. 2004). The world cotton price is estimated to increase by 2.39 percent in 2005/06 due to a 4.51 percent reduction in exports from the United States. The fall in U.S. exports reflects the net change in U.S. production, consumption, and inventories. Producers outside the U.S. respond to these higher prices by expanding their cotton production. Brazil is the biggest beneficiary from the elimination of U.S. cotton programs, with exports increasing by around 2 percent, followed by Australia (+0.78 percent). Western Africa and Uzbekistan also have gains in exports, but of less than 1 percent.

By the end of the analysis period, world cotton price changes relative to the baseline are down considerably from the second-year highs. Adjustments by competitors who boost production take away most of the price increase. For example, the increase in the A-index price is 0.48 percent in 2008/09 as compared to 2.39 percent in 2005/06 (table 2). In 2005/2006, the world cotton trade declines by approximately 250 thousand bales (-0.76 percent) from the baseline level. However, the trade effects lessen by the end of the projection period, when the decline in trade is about 0.5 percent.

Scenario 2: Elimination of China's TRQ

The liberalization of China's cotton market via the elimination of the TRQ system is projected to increase the world cotton price by 5.17 percent in the first year and by 1.92 percent at the end of the scenario period compared to the baseline. The Chinese cotton market price is expected to decrease by 4.48 percent in 2004/05 and 1.68 percent in 2008/09, while the U.S. farm price is expected to increase by 2.87 percent in 2004/05 and 1.27 percent in 2008/09.

World cotton production is expected to increase initially by 0.20 percent and average a 0.18 percent increase over the entire scenario. World cotton mill use is expected to increase in the first four years with a small decrease after that. This is mainly due to the textile adjustment from China and the rest of the world. The world trade of cotton increases by around 1.70 percent with the elimination of the TRQ. As for specific countries, China is expected to increase cotton imports by 8 percent, Japan is expected to decrease imports by about 3 percent, Pakistan and Taiwan are expected to decrease imports by between 1 and 2 percent, and India, South Korea, Mexico, and the European Union by less than 1 percent. Cotton exports from Australia and Brazil are expected to increase by about 2 percent and 3 percent, respectively, while exports from Uzbekistan, Western Africa, and the United States are expected to increase by less than 1 percent.

Scenario 3: Elimination of Both the Chinese TRQ and the U.S. Subsidy Programs

If both China and the United States liberalize their cotton trades, the world cotton price is expected to increase by 5.72 percent in 2004/05 and 2.30 percent in 2008/09. The increased price is mainly due to an overall decrease in cotton exports from the United States (-1.99 percent) and an increase in Chinese imports of about 8 percent, resulting in decreased production and increased consumption in the world market. The U.S. farm price under this scenario is expected to increase by 8.64 percent in 2005/06 compared with the base scenario, a much larger increase than expected under either scenario 1 or scenario 2.

Interestingly, the effects on world cotton production and cotton consumption are relatively small. World cotton production is expected to decrease by an average of 0.07 percent over the time frame and mill use is predicted to decline by 0.12 percent over the same time horizon. However, the world trade of cotton increases by more than 1 percent as a net effect of removing both China's TRQ and U.S. subsidy programs. This is mainly due to the decrease in U.S. exports and the increase in Chinese cotton imports.

The combined effect of liberalization on the world cotton market is expected to decrease U.S. exports (as shown) but increase exports from other major cotton producing regions. Using average values, exports from Brazil would show the biggest increase (4.99 percent) followed by Australia (2.69 percent), Uzbekistan (1.49 percent), and Western Africa (1.30 percent). While China is shown to significantly increase cotton imports, the rest of the nations in this model show decreases. These decreases range in magnitude from 3.74 percent in Japan to 0.59 percent in India.

Table 2 Estimated impact of eliminating U.S. cotton subsidies (scenario 1), China's TRQs (scenario 2), and both (scenario 3) on fibre prices

		2004/05	2005/06	2006/07	2007/08	2008/09	Average
Cotton A-index	Base (cents/lb)	51.87	53.78	56.98	57.94	58.19	55.75
	Scenario 1	0.18%	2.39%	1.63%	0.79%	0.48%	1.10%
	Scenario 2	5.17%	2.73%	1.94%	1.92%	1.92%	2.74%
	Scenario 3	5.72%	5.54%	3.24%	2.53%	2.30%	3.87%
U.S. cotton farm price	Base (cents/lb)	42.42	44.53	49.42	53.00	53.06	48.49
	Scenario 1	0.38%	6.97%	3.11%	3.03%	2.31%	3.16%
	Scenario 2	2.87%	1.89%	1.87%	1.35%	1.27%	1.85%
	Scenario 3	3.78%	8.64%	5.62%	4.04%	3.53%	5.12%
Chinese cotton market price	Base (yuan/lb)	5.81	6.50	6.39	6.63	6.58	6.38
	Scenario 1	0.02%	0.33%	0.10%	0.03%	0.03%	0.10%
	Scenario 2	-4.48%	-3.12%	-2.53%	-2.14%	-1.68%	-2.79%
	Scenario 3	-4.45%	-2.92%	-2.50%	-2.10%	-1.65%	-2.72%
U.S. polyester price	Base (cents/lb)	62.33	62.70	62.79	62.82	63.50	62.83
	Scenario 1	0.07%	1.34%	0.52%	0.17%	0.07%	0.43%
	Scenario 2	0.05%	0.08%	0.11%	0.42%	0.20%	0.17%
	Scenario 3	0.12%	1.42%	0.63%	0.59%	0.25%	0.60%

Table 3 Estimated impact of eliminating U.S. cotton subsidies (scenario 1), China's TRQs (scenario 2), and both (scenario 3) on the world cotton supply and utilization

		2004/05	2005/06	2006/07	2007/08	2008/09	Average
		Million bales					
Trade	Base	32.60	33.07	33.50	33.95	34.20	33.46
	Scenario 1	-0.20%	-0.76%	-0.56%	-0.51%	-0.44%	-0.49%
	Scenario 2	1.93%	1.52%	1.58%	1.71%	1.75%	1.70%
	Scenario 3	1.85%	0.89%	1.08%	1.24%	1.35%	1.28%
Production	Base	115.64	102.16	106.56	109.73	111.82	109.18
	Scenario 1	-0.08%	-0.75%	-0.15%	-0.17%	-0.14%	-0.26%
	Scenario 2	0.20%	0.27%	0.16%	0.18%	0.11%	0.18%
	Scenario 3	0.12%	-0.48%	0.02%	0.00%	-0.03%	-0.07%
Mill use	Base	104.43	104.94	105.75	108.23	110.61	106.79
	Scenario 1	-0.03%	-0.40%	-0.30%	-0.22%	-0.18%	-0.23%
	Scenario 2	0.23%	0.11%	0.10%	0.05%	-0.02%	0.09%
	Scenario 3	0.18%	-0.28%	-0.17%	-0.15%	-0.18%	-0.12%
Ending stock	Base	47.12	43.74	44.28	45.55	46.77	45.49
	Scenario 1	-0.02%	-0.58%	-0.14%	-0.09%	-0.06%	-0.18%
	Scenario 2	-0.49%	-0.64%	-0.97%	-1.42%	-1.85%	-1.07%
	Scenario 3	-0.57%	-1.21%	-1.06%	-1.41%	-1.72%	-1.19%

Table 4 Impact of eliminating U.S. cotton subsidies (scenario 1), China's TRQs (scenario 2), and both (scenario 3) on cotton imports by major importing countries and regions

		2004/05	2005/06	2006/07	2007/08	2008/09	Average
		Thousand bales					
China	Base	8822.09	9484.27	10360.13	10804.30	10877.71	10069.70
	Scenario 1	-0.02%	-0.42%	-0.17%	-0.09%	-0.05%	-0.15%
	Scenario 2	9.88%	8.54%	8.02%	8.08%	8.05%	8.51%
	Scenario 3	9.86%	8.44%	7.99%	8.06%	8.04%	8.48%
India	Base	650.01	605.52	766.21	886.81	931.61	768.03
	Scenario 1	-0.01%	-0.21%	-0.26%	-0.25%	-0.25%	-0.20%
	Scenario 2	-0.27%	-0.36%	-0.40%	-0.43%	-0.50%	-0.39%
	Scenario 3	-0.30%	-0.60%	-0.66%	-0.67%	-0.73%	-0.59%
Pakistan	Base	1000.01	1442.99	1486.91	1559.46	1595.56	1416.99
	Scenario 1	-0.42%	-1.51%	-0.83%	-1.15%	-1.07%	-1.00%
	Scenario 2	-0.97%	-2.40%	-2.20%	-2.03%	-1.89%	-1.90%
	Scenario 3	-0.85%	-2.28%	-3.18%	-3.17%	-2.90%	-2.48%
Japan	Base	700.00	693.79	642.30	604.35	575.90	643.27
	Scenario 1	-0.02%	-0.50%	-0.75%	-0.99%	-1.24%	-0.70%
	Scenario 2	-1.73%	-2.22%	-2.86%	-3.61%	-4.47%	-2.98%
	Scenario 3	-1.82%	-2.82%	-3.67%	-4.65%	-5.75%	-3.74%
South Korea	Base	1275.01	1233.13	1217.21	1203.66	1175.53	1220.91
	Scenario 1	-0.02%	-0.41%	-0.27%	-0.19%	-0.15%	-0.21%
	Scenario 2	-0.75%	-0.64%	-0.58%	-0.55%	-0.52%	-0.61%
	Scenario 3	-0.81%	-1.07%	-0.83%	-0.73%	-0.66%	-0.82%
Taiwan	Base	1100.01	1064.43	1032.32	1009.21	991.24	1039.64
	Scenario 1	-0.07%	-1.57%	-0.46%	-0.18%	-0.13%	-0.48%
	Scenario 2	-3.05%	-1.10%	-0.84%	-0.82%	-0.82%	-1.33%
	Scenario 3	-3.28%	-2.73%	-1.12%	-0.97%	-0.91%	-1.80%
Mexico	Base	1600.01	1627.09	1612.95	1575.20	1510.55	1585.16
	Scenario 1	-0.01%	-0.30%	-0.47%	-0.48%	-0.41%	-0.33%
	Scenario 2	-0.63%	-0.74%	-0.79%	-0.73%	-0.74%	-0.73%
	Scenario 3	-0.67%	-1.08%	-1.28%	-1.21%	-1.13%	-1.07%
European Union	Base	2888.04	2615.15	2299.21	1994.47	1701.38	2299.65
	Scenario 1	-0.01%	-0.22%	-0.34%	-0.43%	-0.53%	-0.31%
	Scenario 2	-0.28%	-0.45%	-0.61%	-0.81%	-1.08%	-0.65%
	Scenario 3	-0.31%	-0.70%	-0.97%	-1.26%	-1.62%	-0.97%

Table 5 Impact of eliminating U.S. cotton subsidies (scenario 1), China's TRQs (scenario 2), and both (scenario 3) on cotton exports by major exporting countries and regions

		2004/05	2005/06	2006/07	2007/08	2008/09	Average
		Thousand bales					
U.S.	Base	12700.12	12945.50	13264.36	13388.50	13694.17	13198.53
	Scenario 1	-0.66%	-4.51%	-3.01%	-2.73%	-2.40%	-2.66%
	Scenario 2	0.73%	0.45%	0.36%	0.40%	0.31%	0.45%
	Scenario 3	0.19%	-3.54%	-2.40%	-2.25%	-1.95%	-1.99%
Australia	Base	1700.02	2539.32	2798.95	3000.31	3108.88	2629.50
	Scenario 1	0.10%	1.41%	0.46%	0.81%	1.12%	0.78%
	Scenario 2	2.94%	2.52%	1.35%	1.94%	2.33%	2.22%
	Scenario 3	3.24%	2.12%	1.76%	2.85%	3.49%	2.69%
Brazil	Base	2000.02	2026.77	2673.04	2844.50	2953.66	2499.60
	Scenario 1	0.47%	2.58%	2.58%	3.03%	2.72%	2.28%
	Scenario 2	0.13%	3.01%	4.20%	4.60%	4.27%	3.24%
	Scenario 3	0.15%	3.44%	6.69%	7.73%	6.94%	4.99%
Uzbekistan	Base	3405.03	3317.88	3062.96	2979.62	2905.40	3134.18
	Scenario 1	0.04%	0.89%	0.83%	0.55%	0.34%	0.53%
	Scenario 2	1.14%	1.02%	0.96%	0.85%	0.87%	0.97%
	Scenario 3	1.27%	1.96%	1.73%	1.33%	1.15%	1.49%
Western Africa	Base	2925.02	2817.19	2829.58	2860.57	2905.62	2867.60
	Scenario 1	0.02%	0.39%	0.44%	0.56%	0.55%	0.39%
	Scenario 2	0.56%	0.70%	0.97%	1.08%	1.11%	0.88%
	Scenario 3	0.61%	1.15%	1.42%	1.66%	1.64%	1.30%

Sensitivity Analysis

A sensitivity analysis was conducted to ascertain the limit of variation of the results due to changes in the elasticity estimates. Two scenarios were considered: first, all the estimated elasticities were halved and second, the elasticities were doubled. The results are reported in table 6. When elasticities are reduced by one-half, the average A-index price under scenario 3 increases by an average 4.57 percent compared to initial estimates of 3.87 percent. When elasticities are doubled, the average A-index price increase under scenario 3 is 3.29 percent, slightly less than the initial estimate.

Table 6 Sensitivity analysis of price index for cotton

		2004/05	2005/06	2006/07	2007/08	2008/09	Average
Export elasticities reduced by 50% for U.S., Australia, Brazil, Uzbekistan, and Western Africa							
A-index	Scenario 1	0.50%	2.54%	1.81%	1.11%	1.06%	1.40%
	Scenario 2	5.29%	3.05%	2.26%	2.15%	2.11%	2.97%
	Scenario 3	5.79%	6.70%	3.99%	3.23%	3.13%	4.57%
Export elasticities doubled for U.S., Australia, Brazil, Uzbekistan, and Western Africa							
A-index	Scenario 1	0.09%	2.04%	1.06%	0.34%	0.32%	0.77%
	Scenario 2	5.09%	2.23%	1.68%	1.67%	1.64%	2.46%
	Scenario 3	5.68%	4.05%	2.75%	2.01%	1.96%	3.29%

Conclusions

U.S. cotton production has been protected by federal subsidy programs under farm bills, while the Chinese cotton market has been protected by TRQs under their WTO commitments. As a result, both the U.S. cotton farm price and the Chinese domestic cotton price are higher than the A-index. These policies separately and conjointly depress the world price for cotton. Brazil, along with other cotton exporting nations, has called for major reforms in the trade of cotton. In seeking support from the WTO Dispute Settlement Body, these petitioners have aimed their cases solely at U.S. farm policy, with the demand that the U.S. eliminate its cotton subsidies. This study confirms the negative impact of U.S. farm policy on the world cotton trade but also takes an interconnected perspective with regard to the other "pillars" of overall agriculture negotiations that relate to cotton. A much larger negative impact on cotton prices is shown to be China's system of TRQs for cotton, which restricts market access.

Under the trade liberalization scenario in which the United States eliminates its subsidy programs while others maintain their current policies, the maximum increase in the A-index is expected to be 2.39 percent, and this in the second year of the scenario. The overall price effect is estimated to be about +1 percent. Of the exporting nations included in this model, Brazil would be the greatest beneficiary of such a plan, with their exports increasing by 2 percent. The cotton producing nations of Western Africa, which also have complained of the negative impacts of U.S. farm subsidies, would see their levels of cotton exports increase slightly (0.39 percent). However, the overall annual world trade for cotton will decline by about 164,000 bales (0.49 percent).

Alternatively, when China eliminates TRQs and others keep their programs, the A-index is expected to increase by 5.17 percent in the first year and level off to an overall average of +2.74 percent, more than twice the benefit of eliminating U.S. farm

subsidies. The U.S. would see its cotton exports increase by 0.45 percent over the long term and Brazil would expect its exports to increase by 3.24 percent, 1 percent more than the effect of eliminating U.S. cotton subsidies. The nations of Africa in this model are predicted to increase exports by about 1 percent (0.88 percent), roughly twice the benefit from reform of U.S. cotton programs. Rather than decease the world trade of cotton, this policy change would increase the amount of cotton traded by 1.70 percent per year over the life of the five-year model presented here.

If both China and the United States liberalize their cotton markets, the A-index is expected to increase by 5.72 percent in the first year and sustain a five-year average of almost a 4 percent gain (3.87 percent). China is projected to increase its cotton imports (+8.48 percent) and the annual average of world cotton traded is projected to increase (+1.28 percent). The United States is likely to see a decrease in cotton exports (-1.99 percent) but all other exporters in this model show gains. Specifically, Brazil is projected to increase its cotton exports by about 5 percent and Western Africa sees a 1.30 percent increase.

If trade negotiations are to proceed in a "balanced and equitable manner" as called for by the WTO General Council, changes must be discussed with regard to each dimension of trade rather than with regard only to a single policy in a single nation. This study indicates that the removal of trade restrictions in either the U.S. or Chinese cotton markets would increase global net welfare. At the same time, the elimination of both the U.S. subsidy programs and Chinese TRQs is a desirable option for the world's cotton producers. This scenario would provide radical reform in the trade of cotton and promote greater access to the world's markets.

References

Baffes, John. 2004. Cotton: Market setting, trade policies, and issues. World Bank Policy Research Working Paper 3218, February.

Balagtas, J. V., B. J. Rickard, and D. A. Sumner. 2002. Effects of proposed trade barriers for milk protein concentrate and casein imports on the U.S. dairy industry. Presented at the American Agricultural Economics Association annual meeting, Long Beach, California, July 27-30, 2002.

Beghin, J., and J. Fabiosa. 2002. The Doha Round of the World Trade Organization: Appraising further liberalization of agricultural markets. Working Paper, Food and Agricultural Policy Research Institute, Iowa State University and University of Missouri-Columbia, November.

Fang, C., and B. A. Babcock. 2003. China's cotton policy and the adoption on the Chinese and U.S. cotton sectors. Working paper 03-WP-322, Center for Agricultural and Rural Development, Iowa State University, Ames, IA, 50011.

Foreign Agricultural Service (FAS). 2001. People's Republic of China, cotton and products annual 2001. Gain Report number CH 1036, August.

Gaisford, J. D., and W. A. Kerr. 2001. *Economic Analysis for International Trade Negotiations: The WTO and Agricultural Trade.* Northampton, MA: Edward Elgar.

Goreux, L. 2004. Cotton after Cancun. Mimeo. World Bank, March. Available at http://www.oecd.org/dataoecd/38/48/30751318.pdf.

Hoekman, B., F. Ng., and M. Olarreaga. 2003. Reducing agricultural tariffs versus domestic support: What's more important for developing countries? Policy Research Working Paper # 2918, The World Bank Development Research Group, March.

International Cotton Advisory Committee. 2002. Production and trade policies: Affecting the cotton industry. Available at http://www.icac.org/icac/ Meetings/cgtn_conf/documents/icac_ccgtn_report.pdf.

Koo, W. W. 2000. The impacts of China's accession into the WTO on the U.S. wheat industry. Agricultural Economics Report # 440, Department of Agricultural Economics, North Dakota State University.

Langley, S., D. Blayney, J. Stout, A. Somwaru, M. A. Normile, J. Miller, and R. Stillman. 2003. A trade liberalization in international dairy markets. Presented at the American Agricultural Economics Association annual meeting, Montreal, Canada, July 27-30, 2003.

Pan, S., S. Mohanty, D. Ethridge, and M. Fadiga. 2004a. The impacts of U.S. cotton programs on the world market: An analysis of Brazilian and West and Central African WTO petitions. Working paper, Department of Agricultural and Applied Economics, Texas Tech University, Lubbock, TX, 79414.

———. 2004b. Structural models of the United States and the rest-of-the-world natural fiber market. CER # 04-03, Cotton Economics Research Institute, Department of Agricultural and Applied Economics, Texas Tech University.

Petrolia, D. P., and P. L. Kennedy. 2002. A partial-equilibrium simulation of increasing the U.S. tariff-rate sugar quota for Cuba and Mexico. Presented at the American Agricultural Economics Association annual meeting, Long Beach, California, July 27-30, 2002.

Poonyth, D., A. Sarris, R. Sharma, and S. Shui. 2004. The impact of domestic and trade policies on the world cotton market. FAO Commodity and Trade Policy Research Working Paper, April.

Sreedharn, P., S. Devadoss, L. Stodick, and T. Wahl. 2003. Effects of trade barriers on U.S. apple exports. Presented at the American Agricultural Economics Association annual meeting, Montreal, Canada, July 27-30, 2003.

Skully, D. W. 2001. Economics of tariff-rate quota administration. Market and Trade Economics Division, Economic Research Service, U.S. Department of Agriculture, Technical Bulletin no. 1893, April.

Sumner, D. A. 2003**.** A quantitative simulation analysis of the impacts of U.S. cotton subsidies on cotton prices and quantities. Mimeo. Department of Agricultural and Resource Economics, University of California, Davis.

Vander, M. D., J. Beghin, and D. Mitchell. 2003. Implementing tariff rate quotas in CGE models: An application to sugar trade policies in OECD countries. Presented at the American Agricultural Economics Association annual meeting, Montreal, Canada, July 27-30, 2003.

Wang, Z. 1997. The impact of China and Taiwan joining the World Trade Organization on U.S. and world agricultural trade: A computable general equilibrium analysis. Washington, D.C.: Economic Research Service, U.S. Department of Agriculture.

Endnotes

* This research was funded by CSREES, USDA and by Cotton Inc.

1. The TRQ system was adopted by China after its admission into the WTO in 2001. Under the agreement, China agreed to raise the in-quota import levels from 7,400,000 metric tons in 2002 to 8,900,000 metric tons in 2004 with a tariff of one percent. The out-of-quota tariff, which was 76 percent above 7,800,000 metric

tons in 2002, is scheduled to drop to 67 percent above 8,200,000 metric tons in 2003, 58 percent above 8,600,000 metric tons in 2004, 49 percent above 8,900,000 metric tons in 2005, and 40 percent above 8,900,000 metric tons in 2006 (FAS, 2001). China has not agreed to nor is it currently obligated to reduce the out-of-quota tariff below 40 percent or raise the in-quota import levels for years beyond 2006.

The technical annex to this paper, pages 267-273 is available as a separate document.