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**The Impacts of U.S. Cotton Programs
on the World Market: An Analysis
of Brazilian and African WTO Petitions**

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Introduction

Brazil, supported by Australia challenged U.S. cotton programs at the September 2003 meeting of the WTO settlement Body. Brazil complained that U.S. cotton subsidies such as marketing loans, export credits, commodity certificates, direct payments and counter cyclical payments are depressing world prices and are injurious to Brazilian farmers. In addition, the West and Central African Countries (WCA) countries of Benin, Burkina Faso, Mali and Chad have filed a petition with the WTO claiming that they are losing export earnings of 1 billion dollar a year as a result of subsidies by the United States and the European Union (BBMC, 2003). For WCA countries, both production and export of cotton have increased in the last decade but export revenues have declined during the same period due to lower prices.

Although it is clear that a combination of factors including a sluggish world economy, higher yields, and polyester prices played a significant role in the downfall in world cotton prices, the WCA countries were critical to the subsidies as the main reasons for their export earning losses.

The purpose of this study is to examine the effects of the elimination of U.S. cotton programs on the world market, particularly on cotton prices, using a partial equilibrium structural econometric model of world fiber market developed by the Department of Agricultural and Applied Economics at Texas Tech University. This preliminary analysis does not consider the impacts of subsidy programs related to other crops. The effects of these programs on cotton production may prove important, but they are omitted from this analysis due to time constraints.

The analysis compares likely outcomes under a scenario eliminating the cotton subsidy programs such as direct payments and counter-cyclical payments, marketing loan and step-2 payments to a baseline that includes current farm programs. See the appendix for a brief description of the program elements.

Methods and Procedures

The model includes 24 major cotton importers and exporters: (1) Asia (Great China, India, Pakistan, Taiwan, South Korea, Japan and other Asia); (2) Africa (Egypt and Other Africa); (3) North America (Mexico, United States, and Canada); (4) Latin America (Brazil, Argentina, and Other Latin America); (5) Oceania (Australia); (6) Middle East (Turkey and Other Middle East); (6) Former Soviet Union (Uzbekistan, Russia, and Other FSU); (7) Europe (European Union, Central and Eastern Europe, and other Western Europe). As shown in figure 1, representative country models include supply, demand and market equilibrium for cotton and man-made fibers. Area sown to cotton is modeled in a two-stage framework. The first stage determines the gross cropping area. The second stage uses economic variables such as expected net returns to allocate area among cotton and competing crops. Similarly, man-made fiber supply is estimated by modeling capacity and utilization separately. Cotton demand is estimated following a two-step process. In the first step, total textile consumption is estimated, and in the second step,

allocations among various fibers such as cotton, wool, and polyester (as a representative for man-made fibers) are estimated based on relative prices. Polyester price and A-index price are endogenous and determined by equalizing world exports and imports.

The U.S. model includes regional acreage response with cotton production divided into four regions: Delta, Southeast, West, and Southwest (irrigated and dryland). On the demand side, U.S. textile consumption is disaggregated into apparel, floor covering, home textiles, and others. The dataset used in this study are compiled from various sources, which include the Food and Agricultural Policy Institute (FAPRI) for the historical and projected macro variables (real GDP, exchange rate, population, and GDP deflator); the Production, Supply & Demand (PS&D) database of Foreign Agricultural Service (FAS) for cotton acreage, yield, production, mill use, ending stocks, and trade; and the FAO World Fiber Consumption Survey and Fiber Organon for the fiber mill consumption and man-made fiber data.

Policy Shock and Assumptions

The approach used to incorporate changes into the model for simulating program eliminations is as follows. A ten-year baseline was developed assuming a continuation of current farm programs. The United States has a number of programs to support domestic cotton production and mill use, which includes a target price, direct payments, counter-cyclical payments, marketing assistance loans and loan deficiency payments, and Step 2 payments. For the simulation, all U.S. cotton programs (loan rate, target price, direct payment and counter-cyclical payments, step 2 payments) were eliminated starting from 2004/05, while the rest of the world was allowed to react to the resulting price signals. The effects of program eliminations are measured by comparing supply, demand, and trade indicators before and after eliminations of these programs.

Simulation Results

Simulation results are reported in Tables 1 and 2. Table 1 displays the effects on U.S. farm price, acreage, production, mill use, and exports. Table 2 summarizes the effects of program elimination on the world market including A-index, competing exporters, world production and trade. With the elimination of the cotton programs, farmers in the U.S. still produce 17.8 million bales as compared to the baseline production of 18 million bales in 2004/05 primarily because of a strong market price in 2003/04. However, farmers respond to a weaker market price in 2005/06 and reduce cotton acreage by more than 5 percent relative to the baseline level. Among various regions, the Southwest dryland and irrigated have the biggest drop in cotton acreage followed by the Southeast and the Delta regions. Within the Southwest, dryland acreage is estimated to decline by 8 percent in 2005/06 as compared to a 6 percent decline in an irrigated area. Harvested area in the West does not change much due to relatively high cotton prices in the region. On the demand side, elimination of the step 2 payments reduces domestic cotton mill use, partially offsetting the effects of the production decline on domestic price.

World cotton price is estimated to increase by 2.14 percent in 2005/06 due to 630 thousand bales (5.13 percent) less export from the United States. The fall in U.S. exports reflects the net change in US production, consumption, and inventories. Foreign producers respond to these high prices

by expanding their cotton production. Table 2 provides detailed information on where the foreign expansion occurs. Brazil is the biggest beneficiary from the elimination of cotton programs, with exports increasing more than 2%, followed by Australia with more than 1%. Africa has some gain from the falling of the US cotton export, but by less than 1%. Although China and India are the biggest cotton producers in the world, the production increase in these countries is estimated to be small due to land constraint.

By the end of the analysis period, world cotton price changes relative to the baseline are down considerably from the second-year highs. Adjustment by the competitors, who boost production, takes away most of the price increase. For example, increase in A-index price is approximately 0.86 percent in 2013/14 as compared to 2.14 percent in 2005/06 (Table 2). Similarly, the increase in U.S. farm price due to the program elimination is expected to mitigate over time (5 percent in 2005/06 to less than 1 percent in 2013/14).

In the initial year, world cotton trade declines by approximately 450 thousand bales (1.36 percent) from the baseline level. However, the trade effects are somewhat mitigated toward the later period and by the end of the projection period, the decline in trade is less than one percent. Similarly, decline in world cotton is estimated to be 778 thousand bales in 2005/06 as compared to 337 thousand bales in 2013/14.

Conclusions

The policy shock imposed in the scenario is extreme because the analysis assumes fixed prices for other crops. The general conclusion is that an elimination of the cotton subsidy programs would cause the production in the United States to decline, especially for the regions with low net returns (Southwest, Southeast, and Delta). The A-index and the United States Farm price would increase in the years immediately after the elimination. However, the effects die out as other countries increase their production. Given international competitiveness, this result is easily understood. This analysis assumes constant policies abroad and rules out any possibility of policy response in other countries (for example, the support price in India and Pakistan and procurement price in China). The elimination of other countries supporting policies would increase the price more than predicted by this scenario.

The analysis shows some effects, though limited, of the eliminations of these programs on cotton exports for various countries and regions. Brazil was found to be the main beneficiary, followed by Australia and Africa.

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Figure1, Representative Country Model

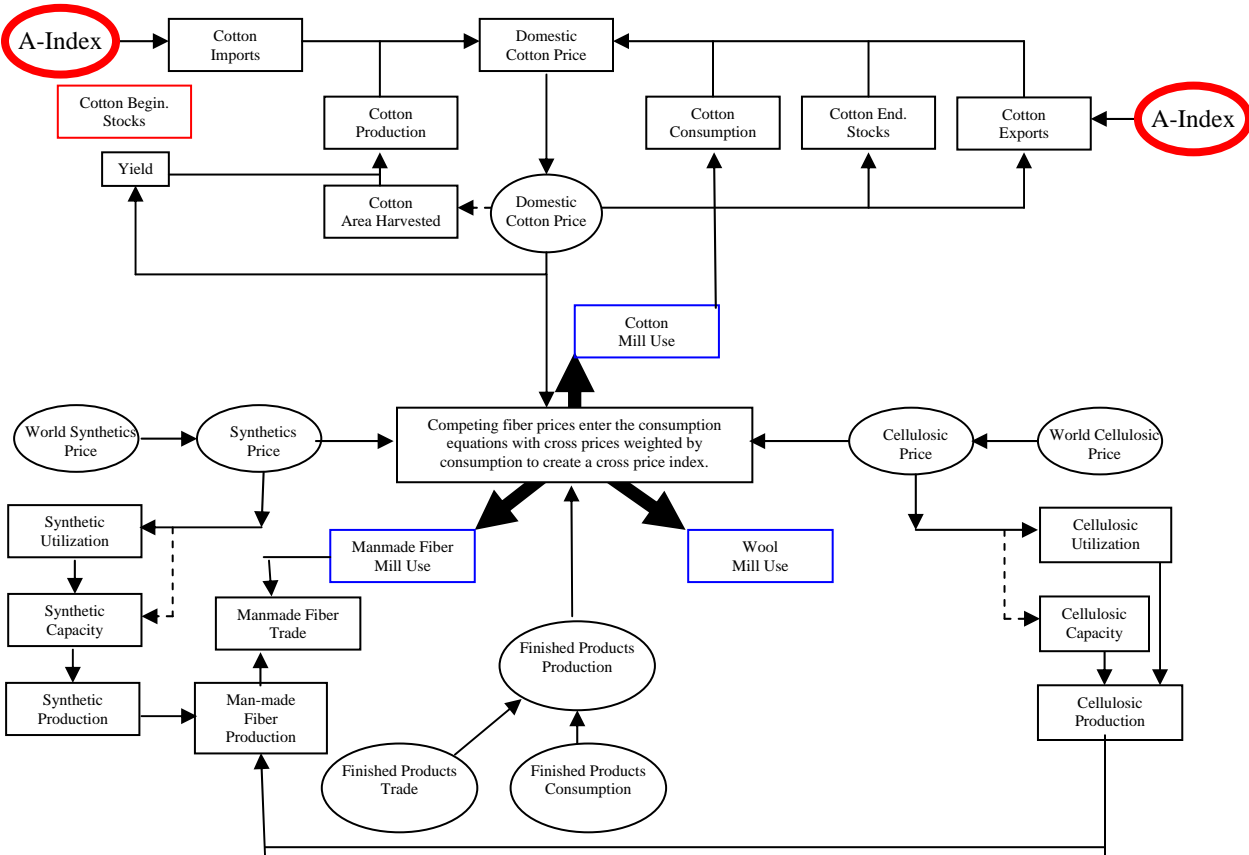


Table 1 Effects of Program Elimination on US Cotton Market

		2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	
		Cents Per Pound										
Farm Price	Base	55.72	55.51	57.14	57.39	58.53	58.61	59.56	59.78	60.72	61.90	
	Scenario	56.11	58.37	59.05	59.28	60.00	60.00	60.28	60.44	61.36	62.44	
	Change	0.70%	5.16%	3.34%	3.29%	2.51%	2.36%	1.21%	1.10%	1.05%	0.88%	
		Thousand Acres										
Acreage	Delta	Base	3,484.26	3,469.83	3,473.17	3,468.34	3,466.26	3,462.16	3,461.25	3,458.28	3,458.58	3,456.1
		Scenario	3,469.57	3,374.37	3,379.22	3,379.68	3,379.06	3,379.33	3,378.48	3,378.05	3,379.13	3,381.50
		Change	-0.42%	-2.75%	-2.71%	-2.56%	-2.52%	-2.39%	-2.39%	-2.32%	-2.30%	-2.18%
	Southeast	Base	3,065.73	3,030.74	3,055.11	3,036.94	3,031.59	3,017.21	3,018.15	3,009.61	3,013.47	3,084.41
		Scenario	3,026.08	2,869.45	2,895.03	2,897.49	2,896.74	2,898.82	2,898.59	2,899.26	2,905.19	2,915.52
		Change	-1.29%	-5.32%	-5.24%	-4.59%	-4.45%	-3.92%	-3.96%	-3.67%	-3.59%	-3.09%
	Southwest Irrigated	Base	1,996.77	1,970.71	1,970.99	1,967.99	1,966.01	1,962.49	1,960.73	1,957.82	1,955.97	1,954.27
		Scenario	1,968.60	1,837.93	1,841.64	1,842.55	1,841.85	1,842.14	1,840.89	1,840.35	1,840.43	1,842.46
		Change	-1.41%	-6.74%	-6.56%	-6.37%	-6.32%	-6.13%	-6.11%	-6.00%	-5.91%	-5.72%
	Southwest Dryland	Base	3,042.86	3,017.30	3,015.97	3,011.20	3,008.26	3,003.65	3,000.96	2,996.75	2,996.40	2,995.19
		Scenario	2,997.27	2,773.59	2,776.07	2,775.60	2,774.20	2,773.69	2,771.71	2,770.08	2,771.84	2,774.55
		Change	-1.50%	-8.80%	-7.95%	-7.82%	-7.78%	-7.66%	-7.64%	-7.56%	-7.49%	-7.37%
	West	Base	854.33	843.88	836.02	829.74	824.56	819.79	815.43	811.39	807.72	804.56
		Scenario	852.03	838.28	828.35	820.74	814.68	809.63	805.23	801.40	798.09	795.45
		Change	-0.27%	-0.66%	-0.92%	-1.09%	-1.20%	-1.24%	-1.25%	-1.23%	-1.19%	-1.13%
	Total	Base	12,443.94	12,332.46	12,351.27	12,314.22	12,296.67	12,265.31	12,256.52	12,233.85	12,232.13	12,219.34
		Scenario	12,329.55	11,693.61	11,720.31	11,716.05	11,706.53	11,703.61	11,694.89	11,689.14	11,694.67	11,709.49
		Change	-0.92%	-5.18%	-5.11%	-4.86%	-4.80%	-4.58%	-4.58%	-4.45%	-4.39%	-4.17%
			Thousand Bales									
	Production	Base	18,014.62	17,821.42	17,758.24	17,601.55	17,480.00	17,334.17	17,227.49	17,068.72	16,942.06	16,798.29
		Scenario	17,826.42	16,999.66	16,948.77	16,847.07	16,739.31	16,641.41	16,536.06	16,408.60	16,296.68	16,200.63
Change		-1.04%	-4.61%	-4.56%	-4.29%	-4.24%	-4.00%	-4.01%	-3.87%	-3.81%	-3.56%	
Mill Use	Base	6,160.14	5,701.95	5,622.66	5,526.78	5,456.06	5,343.51	5,297.12	5,183.34	5,122.47	5,047.18	
	Scenario	6,119.16	5,474.06	5,417.72	5,354.42	5,300.68	5,221.83	5,158.79	5,073.56	5,021.15	4,969.59	
	Change	-0.67%	-3.99%	-3.64%	-3.12%	-2.85%	-2.28%	-2.61%	-2.12%	-1.98%	-1.54%	
Exports	Base	12,377.16	12,290.91	12,255.01	12,190.92	12,139.77	12,082.77	12,037.96	11,975.09	11,922.36	11,857.92	
	Scenario	12,240.49	11,659.88	11,634.02	11,592.57	11,549.67	11,513.62	11,473.32	11,424.41	11,378.46	11,335.68	
	Change	-1.10%	-5.13%	-5.07%	-4.91%	-4.86%	-4.71%	-4.69%	-4.60%	-4.56%	-4.40%	

Table 2 Effects of Program Elimination on World Cotton Market

		2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
		Cents Per Pound									
A-index	Base	61.20	60.30	60.51	61.33	62.77	63.97	65.27	66.72	68.28	69.29
	Scenario	61.48	61.59	61.50	62.08	63.46	64.61	65.93	67.35	68.92	69.89
	Change	0.45%	2.14%	1.63%	1.23%	1.10%	1.01%	1.00%	0.95%	0.93%	0.86%
		Thousand Bales									
World Production	Base	99,205.99	100,052.19	100,872.11	101,971.98	103,024.31	104,060.01	105,012.50	105,875.03	106,775.17	107,662.51
	Scenario	99,026.08	99,273.81	100,317.64	101,528.91	102,588.03	103,658.99	104,598.83	105,487.39	106,394.29	107,325.32
	Change	-0.18%	-0.78%	-0.55%	-0.43%	-0.42%	-0.39%	-0.39%	-0.37%	-0.36%	-0.31%
World Trade	Base	31,947.29	32,705.09	33,280.58	33,766.20	34,193.32	34,638.43	35,076.90	35,490.19	35,905.84	36,414.25
	Scenario	31,855.22	32,259.96	32,849.17	33,365.99	33,803.81	34,262.43	34,701.55	35,123.65	35,543.45	36,067.19
	Change	-0.29%	-1.36%	-1.30%	-1.19%	-1.14%	-1.09%	-1.07%	-1.03%	-1.01%	-0.95%
Competing Exporters											
Australia	Base	2,145.13	2,129.83	2,103.61	2,109.14	2,138.82	2,176.85	2,218.45	2,261.87	2,308.23	2,347.95
	Scenario	2,148.04	2,145.82	2,125.69	2,137.85	2,170.28	2,208.08	2,248.84	2,291.16	2,336.81	2,375.60
	Change	0.14%	0.75%	1.05%	1.36%	1.47%	1.43%	1.37%	1.30%	1.24%	1.18%
Africa	Base	6,607.37	6,643.10	6,682.82	6,740.66	6,822.96	6,912.58	7,010.04	7,115.84	7,222.10	7,324.57
	Scenario	6,613.99	6,678.93	6,732.52	6,791.92	6,872.25	6,959.29	7,055.11	7,159.53	7,264.93	7,365.91
	Change	0.10%	0.54%	0.74%	0.76%	0.72%	0.68%	0.64%	0.61%	0.59%	0.56%
Brazil	Base	1,950.43	2,432.24	2,832.35	3,123.49	3,352.41	3,559.86	3,767.12	3,979.51	4,216.79	4,432.07
	Scenario	1,960.34	2,484.49	2,900.61	3,201.87	3,433.60	3,639.31	3,844.98	4,055.51	4,291.88	4,505.43
	Change	0.51%	2.15%	2.41%	2.51%	2.42%	2.23%	2.07%	1.91%	1.78%	1.66%
FSU	Base	5,267.07	5,408.53	5,476.96	5,540.71	5,589.33	5,674.55	5,760.10	5,815.68	5,867.71	6,027.35
	Scenario	5,278.24	5,457.70	5,501.14	5,560.61	5,610.01	5,694.17	5,780.27	5,834.87	5,887.06	6,044.82
	Change	0.21%	0.91%	0.44%	0.36%	0.37%	0.35%	0.35%	0.33%	0.33%	0.29%

Appendix: Major U.S. Cotton Programs

Direct Payments

Under the 2002 Farm Act, farmers and eligible landowners receive annual fixed payments. The amount of the direct payment is equal to the product of the payment rate, payment acres, and payment yield. The 2002 Farm Act sets the payment rate for upland cotton at 6.67 cents per pound for crop years 2002-07. Payment acreage is set at 85 percent of base acreage. Payment yields for direct payments remain at levels specified by the 1996 Farm Act.

Counter-Cyclical Payments

Counter-cyclical payments are available to contract holders whenever a program crop's target price is greater than the effective price. The upland cotton target price is 72.4 cents per pound for the duration of the farm bill. The effective price is equal to the sum of 1) the direct payment rate for the commodity, and 2) the higher of the national average farm price for the marketing year or the national loan rate for the commodity.

Marketing Assistance Loan and LDP Programs

The Farm Service Agency (FSA) administers commodity loan programs with marketing loan provisions for upland cotton through the Commodity Credit Corporation (CCC). Commodity loan programs allow producers of designated crops to receive a loan from the government at a commodity-specific loan rate per unit of production by pledging production as loan collateral. After harvest, a farmer may obtain a loan for all or part of the new production. These loans may be repaid in three ways: at the loan rate plus interest costs (CCC interest cost of borrowing from the U.S. Treasury plus 1 percentage point); by forfeiting the pledged crop to the CCC at loan maturity; or at the alternative loan repayment rate. The marketing loan rate for upland cotton is 52 cents per pound for 2002-07.

Step 2 payments

Step 2 payments are issued to exporters and domestic mill users of upland cotton in a week following a consecutive 4-week period when the lowest U.S.-Northern Europe price quotation exceeds the Northern Europe price quotation by more than 1.25 cents per pound, and the AWP does not exceed 134 percent of the U.S. loan rate. Payments are made in cash or certificates to domestic users on documented raw cotton consumption and to exporters on documented export shipments, at a payment rate equal to the difference between the U.S.-Northern Europe price and the Northern Europe price during the fourth week of the period, minus 1.25 cents per pound (the threshold). The 2002 Farm Act delayed the 1.25-cent threshold until August 1, 2006. Consequently, Step 2 payment calculations for the 2002-05 marketing years are based on the difference between the U.S.-Northern Europe price and the Northern Europe price.