EFFECTS OF ELIMINATING GOVERNMENT MEASURES IN COTTON[1]

Alejandro S. Plastina
Economist
International Cotton Advisory Committee
Washington, DC

Summary

The effects of removing government measures coupled to cotton production are simulated using a traditional log linear equilibrium displacement model. The Cotlook A Index would be higher in the absence of government measures, and world cotton production and mill use would be lower.

The model

For analytical purposes, the following regions are considered: the United States (US), the European Union (EU), Latin America (LA), Turkey (TU), China (Mainland) (CM), and the rest of the world (ROW). The model uses equations that represent cotton production and mill use in each region of the world to solve for approximate percentage changes in cotton production, mill use and imports as well as world prices due to the elimination of government measures coupled to production. By specifying the equations in log linear form, all factors that remain constant throughout the analysis (such as those factors that cause differences between cotton prices across regions) need not be explicitly modeled, since they do not affect the proportional response of the variables of interest to a policy shock.[2] For simplicity, beginning and ending stocks are assumed constant throughout the analysis.

For each region j, j={US, EU, LA, TU, CM, ROW}, the demand and supply relations in logarithmic differential form are, respectively:

(1) $dlnDj = \eta_j(dlnP)$

[1] Paper presented at the 66th Plenary Meeting of the International Cotton Advisory Committee in Izmir, Turkey, October 2007. Contact information: Alejandro Plastina, alejandro@icac.org

[2] This specification is standard in the literature. See Sumner (2006), footnote 4 for a list of studies that use this specification.

(2) $dlnSj = \varepsilon_j(dlnRj)$

where dlnDj stands for the approximate percentage change in mill use of cotton in region j, dlnSj stands for the approximate percentage change in the quantity produced in region j, and dlnP stands for the approximate parentage change in the market price as measured by the Cotlook A Index. The parameter η_j represents the price elasticity of mill use of cotton in region j, and is negative. The parameter ε_j represents the per-unit revenue elasticity of cotton production in region j, and is positive. The variable Rj represents the effective revenue per unit received by producers in region j, and equals market price, P, plus effective per-unit revenue received from government support coupled to cotton production, denoted Gj:

(3) $Rj = P+Gj$

Government support coupled to cotton production refers to loan deficiency payments, countercyclical payments, exchange certificate gains and marketing loans in the U.S.; area-based production aid in the EU; extra revenue captured by producers from border protection in China (Mainland); and payments from the price support mechanisms in Turkey, Mexico, Colombia and Brazil. Government measures coupled to cotton production are assumed non-existent in the rest of the world.

In logarithmic differential terms, per-unit revenue may be written as:

(4) $dlnRj = \alpha_j dlnP+(1-\alpha_j)dlnGj$

The expression dlnGj is the approximate percentage change in the effective government support (measured as a price-subsidy equivalent) in region j. The parameter α_j is the share of market price in effective producer revenue per unit in region j, i.e. $\alpha_j=P/Rj$. Note that $\alpha_{ROW}=1$.

The expressions for aggregate production and mill use are obtained by aggregating production and mill use across regions. Aggregate cotton production can be expressed as:

(5) $$dlnS = \sum_j \delta_{sj} dlnSj = \sum_j \delta_{sj}\, \varepsilon_j (dlnRj) = \sum_j \delta_{sj}\, \varepsilon_j [\alpha_j dlnP+(1-\alpha_j)dlnGj]$$

$$= dlnP \sum_j \delta_{sj}\, \varepsilon_j\, \alpha_j + \sum_j \delta_{sj}\, \varepsilon_j\, (1-\alpha_j) dlnGj$$

$$= dlnP \sum_{j} \delta_{sj}\, \varepsilon_j\, \alpha_j + \sum_{j \neq ROW} \delta_{sj}\, \varepsilon_j\, (1-\alpha_j) dlnGj$$

where δ_{sj} is the share of region j in world production. Aggregate mill use of cotton can be expressed as:

$$(6) \qquad dlnD = \sum_{j} \delta_{dj} dlnDj = \sum_{j} \delta_{dj} \eta_j\, (dlnP) = dlnP \sum_{j} \delta_{dj}\, \eta_j$$

where δ_{dj} is the share of region j in world mill use of cotton. To obtain the expression of the proportional change in the market price due to the elimination of government support across regions, aggregate mill use is set equal to aggregate production (dlnS=dnlD) and the resulting equation is solved for dlnP as a function of dlnGj:

$$(7) \qquad dlnP = \sum_{j \neq ROW} \delta_{sj}\, \varepsilon_j (1-\alpha_j) dlnGj \,/\, \sum_{j} (\delta_{dj}\, \eta_j - \delta_{sj}\, \varepsilon_j\, \alpha_j)$$

Equation (7) shows that the elimination of coupled government support in a specific region j (represented by setting dlnGj=-1.0) results in an increase in the world price of cotton, given that the denominator is always negative. Similarly, the elimination of government measures coupled to cotton production in more than one region simultaneously generates an even higher increase in the world price of cotton.
The proportional change in cotton production in region k due to the change in the world price of cotton resulting from elimination of government measures can be obtained by combining equations (2), (4) and (7) as:

$$(8) \qquad dlnSk = \varepsilon_k \{\alpha_k [\sum_{j \neq ROW} \delta_{sj}\, \varepsilon_j (1-\alpha_j) dlnGj \,/\, \sum_{j} (\delta_{dj}\, \eta_j - \delta_{sj}\, \varepsilon_j\, \alpha_j)] + (1-\alpha_k) dlnGk\}$$

Equation (8) says that cotton production in region k is negatively affected by the elimination of government measures in region k (direct effect) and positively affected by the increase in world prices due to the elimination of government measures in region k and other regions (indirect effect). The direct effect is expected to dominate the indirect effect, and cotton production in region k is expected to fall, but by less than the amount of the direct effect. Cotton production in the ROW is always expected to increase when government support coupled to production is eliminated in other regions.

The proportional change in mill use of cotton in region k due to the change in the world price of cotton resulting from elimination of government support can be obtained by combining equations (1), (4) and (7) as:

$$(9) \qquad dlnDk = \eta_k \{ \sum_{j \neq ROW} \delta_{sj} \, \varepsilon_j (1-\alpha_j) dlnGj \, / \sum_j (\delta_{dj} \, \eta_j - \delta_{sj} \, \varepsilon_j \, \alpha_j) \}$$

Equation (9) says that mill use of cotton in region k will decrease when government support is eliminated (given that the price elasticity of mill use is negative).

The impact of the elimination of government support coupled to cotton production on trade can be assessed through the proportional change in imports for each region k:

$$(10) \qquad dlnMk = dln(Dk-Sk) = (Dk/Mk) dlnDk - (Sk/Mk) dlnSk$$

$$= [(Dk/Mk) \, \eta_k - (Sk/Mk) \, \varepsilon_k \, \alpha_k \,] [\sum_{j \neq ROW} \delta_{sj} \, \varepsilon_j (1-\alpha_j) dlnGj \, / \sum_j (\delta_{dj} \, \eta_j - \delta_{sj} \, \varepsilon_j \, \alpha_j)]$$

$$- (Sk/Mk) \, \varepsilon_k \, (1-\alpha_k) \, dlnGk$$

If region k is an importer of cotton and dlnMk is positive (negative), then imports in region k increase (fall) due to the policy shock. If region k is an exporter of cotton and dlnMk is positive (negative), then exports in region k increase (fall) due to the policy shock. Latin America, the U.S. and the ROW are the exporting regions, and the EU, Turkey and China (Mainland) are the importing regions.

Model parameter values

In order to simulate the effects of eliminating government support coupled to cotton production in different regions on prices and quantities, some assumptions about the values of the parameters of the model must be made. Depending on the focus of the analysis, the elasticities might reflect immediate supply and demand responses to policy shocks (short run elasticities) or final responses after structural changes have taken place in the sector (long run elasticities). **In line with the objectives of the ICAC, the present analysis uses long run elasticities**. Table 1 summarizes the values of the parameters used in the simulation, based on information and analysis described later in this section.

Table 1. Model parameters and indicated values.

Model symbol	Parameter definition	Parameter value
ε_{US}	Elasticity of cotton production in the United States in response to changes in per-unit revenue	0.80
ε_{EU}	Elasticity of cotton production in the European Union in response to changes in per-unit revenue	0.60
ε_{LA}	Elasticity of cotton production in Latin America in response to changes in per-unit revenue	0.95
ε_{TU}	Elasticity of cotton production in Turkey in response to changes in per-unit revenue	0.90
ε_{CM}	Elasticity of cotton production in China (Mainland) in response to changes in per-unit revenue	0.14
ε_{ROW}	Elasticity of cotton production in the rest of the world in response to changes in per-unit revenue	0.30
η_{US}	Elasticity of mill use of cotton in the United States in response to changes in the Cotlook A Index	-0.23
η_{EU}	Elasticity of mill use of cotton in the European Union in response to changes in the Cotlook A Index	-0.16
η_{LA}	Elasticity of mill use of cotton in Latin America in response to changes in the Cotlook A Index	-0.32
η_{TU}	Elasticity of mill use of cotton in Turkey in response to changes in the Cotlook A Index	-0.25
η_{CM}	Elasticity of mill use of cotton in China (Mainland) in response to changes in the Cotlook A Index	-0.26
η_{ROW}	Elasticity of mill use of cotton in the rest of the world in response to changes in the Cotlook A Index	-0.20
δ_{sUS}	Share of U.S. production in world cotton production (model uses average for 2004 through 2006)	0.19
δ_{sEU}	Share of EU production in world cotton production (model uses average for 2004 through 2006)	0.02
δ_{sLA}	Share of Latin America production in world cotton production (model uses average for 2004 through 2006)	0.06
δ_{sT}	Share of Turkey production in world cotton production (model uses average for 2004 through 2006)	0.03
δ_{sCM}	Share of China (Mainland) production in world cotton production (model uses average for 2004 through 2006)	0.26

Model symbol	Parameter definition	Parameter value
δ_{sROW}	Share of the rest of the world production in world cotton production (model uses average for 2004 through 2006)	0.44
δ_{dUS}	Share of U.S. mill use in world mill use of cotton (model uses average for 2004 through 2006)	0.05
δ_{dEU}	Share of EU mill use in world mill use of cotton (model uses average for 2004 through 2006)	0.02
δ_{dLA}	Share of Latin America mill use in world mill use of cotton (model uses average for 2004 through 2006)	0.05
δ_{dT}	Share of Turkey mill use in world mill use of cotton (model uses average for 2004 through 2006)	0.06
δ_{dCM}	Share of China (Mainland) mill use in world mill use of cotton (model uses average for 2004 through 2006)	0.38
δ_{dROW}	Share of the rest of the world mill use in world mill use of cotton (model uses average for 2004 through 2006)	0.43
S_{US}/M_{US}	Ratio of U.S. cotton production to U.S. cotton imports (model uses average for 2004 through 2006)	-1.34
S_{EU}/M_{EU}	Ratio of EU cotton production to EU cotton imports (model uses average for 2004 through 2006)	6.82
S_{LA}/M_{LA}	Ratio of Latin America cotton production to Latin America cotton imports (model uses average for 2004 through 2006)	-13.57
S_{T}/M_{T}	Ratio of Turkey cotton production to Turkey cotton imports (model uses average for 2004 through 2006)	1.19
S_{CM}/M_{CM}	Ratio of China (Mainland) cotton production to China (Mainland) cotton imports (model uses average for 2004 through 2006)	2.84
S_{ROW}/M_{ROW}	Ratio of rest of the world cotton production to rest of the world cotton imports (model uses average for 2004 through 2006)	-6.22
D_{US}/M_{US}	Ratio of U.S. mill use of cotton to U.S. cotton imports (model uses average 2003 through 2005)	-0.34
D_{EU}/M_{EU}	Ratio of EU mill use of cotton to EU cotton imports (model uses average for 2004 through 2006)	7.82
D_{LA}/M_{LA}	Ratio of Latin America mill use of cotton to Latin America cotton imports (model uses average for 2004 through 2006)	-12.57

Model symbol	Parameter definition	Parameter value
$\mathbf{D_T/M_T}$	Ratio of Turkey mill use of cotton to Turkey cotton imports (model uses average for 2004 through 2006)	2.19
$\mathbf{D_{CM}/M_{CM}}$	Ratio of China (Mainland) mill use of cotton to China (Mainland) cotton imports (model uses average for 2004 through 2006)	3.84
$\mathbf{D_{ROW}/M_{ROW}}$	Ratio of rest of the world mill use of cotton to rest of the world cotton imports (model uses average for 2004 through 2006)	-5.22
α_{US}	Share of Cotlook A Index in effective producer revenue per unit in the U.S. (model uses average for 2005 through 2006)	0.75
α_{EU}	Share of Cotlook A Index in effective producer revenue per unit in the EU (model uses average for 2005 through 2006)	0.52
α_{LA}	Share of Cotlook A Index in effective producer revenue per unit in Latin America (model uses average for 2005 through 2006)	0.90
α_{TU}	Share of Cotlook A Index in effective producer revenue per unit in Turkey (model uses average for 2005 through 2006)	0.85
α_{CM}	Share of Cotlook A Index in effective producer revenue per unit in China (Mainland) (model uses average for 2005 through 2006)	0.84
α_{ROW}	Share of Cotlook A Index in effective producer revenue per unit in the rest of the world (model uses average for 2005 through 2006)	1

The elasticity of cotton production to total per-unit revenue in the U.S. used by Sumner (2006) is 0.8. Reports by the ICAC (2004) and FAPRI (2004) used a value for the planted acreage elasticity in the U.S. of approximately 0.5. Other studies report different values for the elasticity of cotton production in the U.S. to the international price of cotton: Poonyth et al (2004), 0.8; Coleman and Thigpen (1991), 0.27-0.95; Shepherd (2006), 0.0-0.41. The present study sets the elasticity of cotton production to total per-unit revenue in the U.S. to 0.8.

The value of the elasticity of cotton production to the Cotlook A Index in the EU (EU15) is estimated to be in the range of 0.00-0.38 by Shepherd (2006), and set to 0.60 by Sumner (2003), based on a study by FAPRI (2002). The present study sets the elasticity of cotton production to total per-unit revenue in the EU to 0.6.

The value of the elasticity of cotton production to the Cotlook A Index in Latin America is estimated to be in the range of 0.51-0.95 by Shepherd (2006), while Sumner (2003) reports a value for the region excluding Argentina, Brazil and Mexico of 0.30. Sumner (2003) reports the following production elasticities for the latter countries: Argentina: 0.50, Brazil: 0.40, Mexico: 0.50. Shepherd (2006) also calculated production elasticities for those countries to be 0.54-1.55 in Argentina, 0.31-0.95 in Brazil, and 0.66-1.49 in Mexico. Shepherd (2006) also estimated the production elasticity to be 0.23-0.85 in Colombia. The present study sets the elasticity of cotton production to total per-unit revenue in Latin America to 0.95.

The value of the elasticity of cotton production to the Cotlook A Index in Turkey is estimated to be in the range of 0.01-0.27 by Shepherd (2006), while Sumner (2003) uses an elasticity of 0.30, Poonyth et al (2004) report an elasticity of 1.2, and Coleman and Thigpen (1991) report an elasticity of 0.33. The present study sets the elasticity of cotton production to total per-unit revenue in Turkey to 0.90.

The value of the elasticity of cotton production to the international price of cotton in China (Mainland) is estimated to be in the range of 0.01-0.37 by Shepherd (2006), while Sumner (2003) uses an elasticity of 0.14, Poonyth et al (2004) report an elasticity of 1.2, Coleman and Thigpen (1991) report an elasticity of 0.11, and Gillson et al (2004) report an elasticity of 0.48. The present study sets the elasticity of cotton production to total per-unit revenue in China (Mainland) to 0.14.

The value of the elasticity of cotton production to the Cotlook A Index in Africa is estimated to be in the range of 0.00-0.18 by Shepherd (2006), while Sumner (2003) uses an elasticity of 0.30, and Gillson et al (2004) report an elasticity of 0.6. The value of the elasticity of cotton production in South East Asia is estimated to be in the range of 0.19-0.60 by Shepherd (2006), while Sumner (2003) uses an elasticity of 0.30. The elasticity of cotton production in the Far East is estimated to be in the range of 0.08-0.37 by

Shepherd (2006). The elasticity of cotton production in the Former USSR is estimated to be in the range of 0.00-0.04 by Shepherd (2006), while Sumner (2003) uses an elasticity of 0.30. The elasticities of cotton production in the Near East, North East Asia, South Asia and the world as a whole are estimated by Shepherd (2006) to be, respectively, in the range of 0.06-0.25, 0.10-0.35, 0.07-0.40 and 0.09-0.27. Sumner (2005, p.12) suggests that production elasticities averaging 1.0 may be reasonable for medium term analyses in the U.S., the EU and Brazil, while elasticities closer to 0.5 might be reasonable for "poorer countries". Finally, Sumner (2006) sets the elasticity of cotton production to total per-unit revenue in the world-less-the U.S. to 0.2. In the present study, the elasticity of cotton production to total per-unit revenue in the rest of the world is set to 0.30.

Sumner (2005, p.11) suggests that a demand elasticity close to -1.0 should be used in all regions for long run effects of removing government support for cotton, and a demand elasticity in all regions below -0.5 is more consistent with the econometric evidence for short-run analyses. Based on parameters from the Iowa State CARD international cotton model, Sumner (2006) sets the demand elasticities in the U.S. and the world-less-the U.S. to -0.2. This value is twice the magnitude of the demand elasticity parameter used by Goreux (2003), -0.1, and four times the magnitude of the demand elasticity parameter used by ICAC (2004), -0.05. The present study, based on demand elasticities reported in Sumner (2003), sets the elasticities of mill use of cotton with respect to the international price of cotton as follows: -0.23 in the U.S., -0.16 in the EU, -0.32 in Latin America, -0.25 in Turkey, -0.26 in China, and -0.2 in the rest of the world.

Results

Six scenarios were simulated, according to the specific region(s) assumed to eliminate government support coupled to cotton production. Scenario 1 simulates the approximate percentage changes in the Cotlook A Index, cotton production, mill consumption and trade resulting from the simultaneous elimination of government support coupled to cotton production in all regions (Table 2). The Cotlook A Index is expected to increase by 10.3%, and world cotton production and mill consumption to fall by 2.4%. Cotton production would fall by 26% in the EU, by 14% in the U.S., by 6% in Turkey, and by

1% in China (Mainland) and Latin America. However, cotton production would increase by 3% in the rest of the world. Mill use would fall by about 3% in Latin America, China (Mainland) and Turkey, and by about 2% in all other regions. Exports are expected to decline by 18% in the U.S., and to increase by about 30% in Latin America and the ROW. Given the significant expected decline in domestic production, imports in the EU are expected to increase by 163%. Turkey imports are expected to increase by 1%, while China (Mainland) imports are expected to decline by 7%.

Table 2. Scenario 1: All regions eliminate government support coupled to cotton production

Region	Percentage change in the Cotlook A Index (equation 7)	Percentage change in Production (equation 8)			Percentage change in mill use (equation 9)	Percentage change in Imports (equation 10)		
		Indirect Effect	Direct Effect	Total Effect		Indirect Effect	Direct Effect	Total Effect
	10.3							
US		6.2	-20.5	-14.3	-2.4	9.1	-27.5	-18.4
EU		3.2	-29.0	-25.8	-1.7	-34.8	198.1	163.3
LA		8.8	-9.7	-0.9	-3.3	161.3	-131.8	29.6
TU		7.9	-13.7	-5.8	-2.6	-15.1	16.3	1.2
CM		1.2	-2.3	-1.1	-2.7	-13.8	6.6	-7.2
ROW		3.1	0.0	3.1	-2.1	30.1	0.0	30.1
World (weighted average)				-2.4	-2.4			

The second scenario simulates the effects of the elimination of government support coupled to cotton production only in the U.S. (Table 3). In this scenario, the Cotlook A Index would increase by 6.7%, and world cotton production and mill use would fall by 1.6%. U.S. production would fall by 17%, and higher international prices would stimulate production in all other regions. Production would increase by 6% in Latin America, by 5% in Turkey, by 2% in the EU and the ROW, and by 1% in China (Mainland). Mill use of cotton would decline by about 2% in Latin America, Turkey, China (Mainland) and the U.S., and by about 1% in the EU and the ROW. Exports from the U.S. would fall by 22%, while exports from Latin America would double and exports from the ROW would increase by 19%. Imports to the EU would fall by 22%, and imports to Turkey and China (Mainland) would fall, respectively, by 10% and 9%.

Table 3. Scenario 2: Only the U.S. eliminates government support coupled to cotton production

Region	Percentage change in the Cotlook A Index (equation 7)	Percentage change in Production (equation 8)			Percentage change in mill use (equation 9)	Percentage change in Imports (equation 10)		
		Indirect Effect	Direct Effect	Total Effect		Indirect Effect	Direct Effect	Total Effect
	6.7							
US		4.0	-20.5	-16.5	-1.5	5.9	-27.5	-21.7
EU		2.1	0.0	2.1	-1.1	-22.4	0.0	-22.4
LA		5.7	0.0	5.7	-2.1	104.1	0.0	104.1
TU		5.1	0.0	5.1	-1.7	-9.7	0.0	-9.7
CM		0.8	0.0	0.8	-1.7	-8.9	0.0	-8.9
ROW		2.0	0.0	2.0	-1.3	19.4	0.0	19.4
World (weighted average)				-1.6	-1.6			

The third scenario simulates the effects of the elimination of government support coupled to cotton production only in the European Union (Table 4). In this scenario, the Cotlook A Index would increase by about 1%, and world cotton production and mill consumption would fall by 0.2%. Cotton production in the EU would fall by about 29%, while cotton production in all other regions would increase by less than 1%. Mill use of cotton would fall by less than half a percentage point in all regions. Imports of cotton to the EU would almost triple, and imports to Turkey and China (Mainland) would slightly fall by about 1%. Exports from Latin America would increase by 14%, exports from the ROW would increase by 3%, and exports from the U.S. would increase by 1%.

Table 4. Scenario 3: Only the EU eliminates government support coupled to cotton production

Region	Percentage change in the Cotlook A Index (equation 7)	Percentage change in Production (equation 8)			Percentage change in mill use (equation 9)	Percentage change in Imports (equation 10)		
		Indirect Effect	Direct Effect	Total Effect		Indirect Effect	Direct Effect	Total Effect
	0.9							
US		0.5	0.0	0.5	-0.2	0.8	0.0	0.8
EU		0.3	-29.0	-28.8	-0.1	-3.0	198.1	195.1
LA		0.8	0.0	0.8	-0.3	13.9	0.0	13.9
TU		0.7	0.0	0.7	-0.2	-1.3	0.0	-1.3
CM		0.1	0.0	0.1	-0.2	-1.2	0.0	-1.2
ROW		0.3	0.0	0.3	-0.2	2.6	0.0	2.6
World (weighted average)				-0.2	-0.2			

The fourth scenario simulates the effects of the elimination of government support coupled to cotton production only in Latin America (Table 5). In this scenario, the Cotlook A Index would increase by 1%, and world cotton production and mill consumption would fall by 0.2%. Latin America cotton production would fall by about 9%, while cotton production in all other regions would increase by less than 1%. Mill use of cotton would fall by about 0.3% in Latin America, Turkey and China (Mainland), and by 0.2% in the U.S., the EU and the ROW. Latin America would change from being an exporter to being an importer of cotton, with the volume of imports being equivalent to about 16% of its current exports. Imports would fall by 4% in the EU, by 2% in Turkey, and by 1% in China (Mainland). Exports from the U.S. would increase by about 1%, and exports from the ROW would increase by about 3%.

Table 5. Scenario 4: Only Latin America eliminates government support coupled to cotton production

Region	Percentage change in the Cotlook A Index (equation 7)	Percentage change in Production (equation 8)			Percentage change in mill use (equation 9)	Percentage change in Imports (equation 10)		
		Indirect Effect	Direct Effect	Total Effect		Indirect Effect	Direct Effect	Total Effect
	1.0							
US		0.6	0.0	0.6	-0.2	0.9	0.0	0.9
EU		0.3	0.0	0.3	-0.2	-3.5	0.0	-3.5
LA		0.9	-9.7	-8.8	-0.3	16.0	-131.8	-115.8
TU		0.8	0.0	0.8	-0.3	-1.5	0.0	-1.5
CM		0.1	0.0	0.1	-0.3	-1.4	0.0	-1.4
ROW		0.3	0.0	0.3	-0.2	3.0	0.0	3.0
World (weighted average)				-0.2	-0.2			

The fifth scenario simulates the effects of the elimination of government support coupled to cotton production only in Turkey (Table 6). In this scenario, the Cotlook A Index would increase by about 1%, and world cotton production and mill consumption would fall by 0.2%. Turkey cotton production would fall by 13%, while cotton production in the other regions would only increase marginally. Cotton consumption would fall by less than a quarter of a percentage point in all regions. Imports to Turkey would increase by 12%, while imports to the EU and China (Mainland) would fall, respectively, by 3% and 1%. Exports from Latin America would increase by 12%, while exports from the ROW and the U.S. would increase, respectively, by 2% and 1%.

Table 6. Scenario 5: Only Turkey eliminates government support coupled to cotton production

Region	Percentage change in the Cotlook A Index (equation 7)	Percentage change in Production (equation 8)			Percentage change in mill use (equation 9)	Percentage change in Imports (equation 10)		
		Indirect Effect	Direct Effect	Total Effect		Indirect Effect	Direct Effect	Total Effect
	0.7							
US		0.4	0.0	0.4	-0.2	0.7	0.0	0.7
EU		0.2	0.0	0.2	-0.1	-2.5	0.0	-2.5
LA		0.6	0.0	0.6	-0.2	11.7	0.0	11.7
TU		0.6	-13.7	-13.1	-0.2	-1.1	16.3	15.2
CM		0.1	0.0	0.1	-0.2	-1.0	0.0	-1.0
ROW		0.2	0.0	0.2	-0.1	2.2	0.0	2.2
World (weighted average)				-0.2	-0.2			

Finally, the sixth scenario simulates the effects of the elimination of the equivalent to government support coupled to cotton production only in China (Mainland) (Table 7). In this scenario, the Cotlook A Index would increase by 1%, and world cotton production and mill consumption would fall by 0.2%. Cotton production would fall by 2% in China (Mainland) and by less than 1% in all other regions. Mill use of cotton would fall by less than a third of a percentage point in all regions. Imports to China (Mainland) would increase by 5%, while import to the EU and Turkey would fall, respectively, by 3% and 1%. Exports from Latin America would increase by 15%, exports from the ROW would increase by 3% and exports from the U.S. would increase by 1%.

Table 7. Scenario 6: Only China (Mainland) eliminates government support coupled to cotton production

Region	Percentage change in the Cotlook A Index (equation 7)	Percentage change in Production (equation 8)			Percentage change in mill use (equation 9)	Percentage change in Imports (equation 10)		
		Indirect Effect	Direct Effect	Total Effect		Indirect Effect	Direct Effect	Total Effect
	1.0							
US		0.6	0.0	0.6	-0.2	0.9	0.0	0.9
EU		0.3	0.0	0.3	-0.2	-3.4	0.0	-3.4
LA		0.9	0.0	0.9	-0.3	15.7	0.0	15.7
TU		0.8	0.0	0.8	-0.3	-1.5	0.0	-1.5
CM		0.1	-2.3	-2.2	-0.3	-1.3	6.6	5.2
ROW		0.3	0.0	0.3	-0.2	2.9	0.0	2.9
World (weighted average)				-0.2	-0.2			

Concluding Remarks

This report simulates the effects over several years of removing government measures coupled to cotton production across different regions of the world on the Cotlook A Index, and regional cotton production, mill consumption and trade. As expected, the largest increase in the Cotlook A Index (+10%) –and, concurrently, the largest decline in world cotton production and mill use of cotton (-2.5%)- would result from a simultaneous elimination of government support coupled to cotton production in all regions of the world. The simulated increase in price is in line with expected price increases reported by Goreux (2003) (+2.9% to +13.4%) and FAPRI (2002) (+11.4%) from the elimination of government support to cotton production in developed countries. However, the simulated increase in price in this study is smaller in magnitude than the expected price increases reported by Gillson et al (2004) (+18% to 28%) and ICAC (2002) (+30%)[3]; and greater in magnitude than the expected price increase reported by Poonyth et al (2004) (+2.3% to +5.0%).

The second largest increase in the Cotlook A Index (+6.5%) would result from the elimination of U.S. government support coupled to cotton production. Correspondingly, world cotton production and mill use of cotton would fall by 1.5% and U.S. cotton production would fall by 16%, and U.S. cotton exports would fall by 21%. Given that coupled payments represent about 80% of all government support received by U.S. cotton producers, these results are in line with those from Sumner (2003), who estimated that eliminating all U.S. cotton support (coupled and decoupled payments) would reduce U.S. production by 25-30%, reduce U.S. exports by about 40%, and raise world prices about 10%. The results from the present study are also consistent with the results Sumner (2006) obtains from the simulation of the removal of the U.S. marketing loan and counter-cyclical payments under static expectations: the Cotlook A Index would increase by 8.91%, U.S. cotton production would fall by 16.23% and U.S. exports would fall by 22.51%.

[3] The focus of previous ICAC reports on the effects of removing government measures was only in short term effects, i.e. one-year expected responses to policy shocks.

The elimination of government support coupled to cotton production in only one region other than the U.S. would generate increases in the Cotlook A Index of about 1%, and reductions in cotton production and mill use of cotton of less than a quarter of a percentage point.

Disclosure

The model used in this article is an extension of the model developed by Professor Daniel Sumner to assess the effect of removing government support for U.S. upland cotton on world cotton prices and quantities (Sumner 2006).

References:

Coleman, Jonathan and M. Elton Thigpen. 1991. "An Econometric Model of the World Cotton and Non-Cellulosic Fibres Markets," World Bank Staff Commodity Working Paper No. 24.

FAPRI (Food and Agricultural Policy Research Institute), 2002. "Doha Round of the World Trade Organization: Appraising Further Liberalization of Agricultural Markets," 02-WP 317, November (available at http://www.card.iastate.edu/publications/DBS/PDFFiles/02wp317.pdf)

---, 2004. "Documentation of the FAPRI Modeling System" FAPRIUMC Report # 12-04 (available at http://www.fapri.missouri.edu/outreach/publications/2004/FAPRI_UMC_Report_12_04.pdf).

FAO (Food and Agriculture Organization). 2004. "The Impact of Cotton Sector Support on Developing Countries: A Guide to Contemporary Analyses." FAO, Rome, September.

Gillson, Ian, Colin Poulton, Kelvin Balcombe and Sheila Page. 2004. "Understanding the Impact of Cotton Subsidies on Developing Countries," London, England, ODI (available at: www.odi.org.uk/publications/briefing/bp_july04_cotton.pdf).

Goreux, Louis, 2003. "Prejudice caused by industrialised countries subsidies to cotton sectors in Western and Central Africa," Background document to the submission made by Benin, Burkina Faso, Chad and Mali to the WTO (TN/AG/GEN/4), Geneva, Switzerland, WTO, June (available at: http://www.diplomatie.gouv.fr/fr/IMG/pdf/Prejudices_COTON_FR.pdf).

ICAC (International Cotton Advisory Committee). "Production and Trade Policies Affecting the Cotton Industry," Various years.

Poonyth, Daneswar, Alexander Sarris, Ramesh Sharma and Shangnan Shui. 2004. "The Impact of Domestic and Trade Policies on the World Cotton Market," FAO Commodity and Trade Policy Research Working Paper No. 8 (available at: ftp://ftp.fao.org/docrep/fao/007/j2731e/j2731e00.pdf).

Shepherd, Ben, 2006. "Estimating Price Elasticities of Production for Cotton: A Structural Time-Series Approach," MPRA Paper 1252, University Library of Munich, Germany.

Sumner, Daniel A., 2006. "Effects of U.S. Upland Cotton Subsidies on Upland Cotton Prices and Quantities," November 10.

---, 2005. Reducing Cotton Subsidies: The DDA Cotton Initiative. In A*gricultural Trade Reform and the DOHA Development Agenda*. Will Martin and Kym Anderson, eds. Washington, D.C.: The World Bank: 271-294.

---, 2003. "A Quantitative Simulation Analysis of the Impacts of U.S. Cotton Subsidies on Cotton Prices And Quantities," Annex I to Brazil's Further Submission of 9 September, Table 3 (available at http://www.mre.gov.br/portugues/ministerio/sitios_secretaria/cgc/analisequantitativa.pdf).