U.S. Proposal for WTO Hong Kong Ministerial Conference: What's at Stake for Cotton Producers?

Mohamadou L. Fadiga, Sam Mohanty, Suwen Pan, Mark Welch

Respectively, Post Doctoral Research Associate, Associate Professor, Research Scientist, and Research Associate, Department of Agricultural and Applied Economics, Texas Tech University, Lubbock, Texas. Box 42132, Lubbock, Texas 79409, Email: Mohamadou.fadiga@ttu.edu

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Abstract

This study analyzed the cost to U.S. cotton producers of two policy alternatives under which the U.S. seeks to cut its total AMS payments for cotton by 60%. We considered two scenarios; the U.S. decides to act unilaterally versus conducting the policy initiative along with multilateral tariff and subsidy eliminations from the Rest of the World. The study found a 12% cut in target price and 8% cut in loan rate are necessary to reach the 60% AMS targeted reduction under the unilateral scenario. In that regards, U.S. net farm income decreases considerably despite an appreciation of U.S. farm price. Under a multilateral trade liberalization from the Rest of the World, a 9% cut in the loan rate and 4% in loan rate are enough to reach the AMS reduction threshold. The study found there is 20% chance that net farm income would appreciate and 80% chance that it would decline. However, the decline is less severe compared to the situation where the U.S. acts alone. Overall, the sole beneficiaries in both policies are mainly the major exporters such as Brazil, Australia, West Africa, and Uzbekistan.

Key Words: United States, Hong Kong, cotton subsidies, tariff, net farm income

JEL Classification: Q11, Q17

Introduction

The *Ministerial Declaration* that emerged from the recently concluded World Trade Organization (WTO) ministerial conference in Hong Kong encouraged member countries to continue their efforts to reform and liberalize the world cotton market (WTO, 2005). The emphasis on cotton may indicate that agreement in this area may open the door to broader agreement on the agricultural sector in general. It may also illustrate recognition of the nexus between trade and development and the potential role of cotton as an engine of economic growth for some of the world's least developed countries (LDCs) particularly in Sub-Saharan Africa (SSA) and Central Asia. The SSA countries' raw fiber exports as a share of total production have increased from 60% in 1980/82 to 85% in 2000/02 and as a share of world cotton trade from 6.9% to 17.3%. For the Central Asian countries, however, although cotton production declined by almost 30% between 1989/90 and 2003/04, total exports as a share of total production remains above 70%. While production in these two regions seems to be moving in opposite directions, cotton still has a vital place in the individual countries' overall economy. Cotton contributes between 4% and 10% of the GDP and between 20 and 45% of total export earnings for Burkina Faso, Chad, Benin, Mali, Uzbekistan, and Tajikistan (Baffes, 2005). These countries are vulnerable to downturns in world cotton price because any shortfalls in export earnings would lead to profound economic damages.

Production and export subsidies from developed countries, particularly the U.S., are at the core of the controversy surrounding the declining world cotton price and the need to create a freer and fairer international trade environment (Makori, 2005). Although China, the European Union, Turkey, and Egypt provide generous subsidies to their cotton producers [International Cotton Advisory Committee (ICAC), 2005], most of the attention is devoted to the U.S. farm

policies. The effects of the U.S. farm policies on the world market are magnified because of the continuous decline of the U.S. textile industry and the subsequent rise in raw fiber exports. The shipments of cotton from the U.S. amounted to 14.2 million bales in 2004/05, representing 41% of the world cotton exports (U.S. Department of Agriculture, 2006). The effects of subsidies on foreign markets are hard to prove on both economic and institutional grounds. As Cross (2006) stated, causal relationships between subsidies and economic prejudice are difficult to ascertain because of the cross-effects of other factors such as such as foreign textile manufacturing activities, oil price, and polyester prices. Moreover, countries also use the "peace clause" argument to undermine any challenge of their subsidy programs or devise other policy initiatives to remain below their mandated AMS ceilings. Thus, while provisions in the Farm Security and Rural Investment (FSRI) Act of 2002 allows producers to update their acreage and yield payment bases, institutionalizes the counter-cyclical payments (CCP), and increases crop insurance subsidies while lowering the deductible from 35% to 25% were all perceived as incentives for overproduction (Sumner, 2003), proving their detrimental effects on trade remain another matter.

Currently, the focus is on the CCP and the marketing loan programs, two policy schemes considered trade-distorting and classified as *Amber Box*. The policies that fall under this category were targeted for cuts under the Uruguay Round Agreement on Agriculture. These two policies determine the Aggregate Measure of Support (AMS). The CCP program, which started in 1998 as an emergency fund to provide income support to U.S. producers when world cotton prices fell to historical lows, became permanent under the FSRI Act. The CCP program is linked to the market price of a specific commodity and is triggered whenever effective market price falls below the target price. The overall deficiency payments were about 17% of total government outlays in 1998 when it started as an emergency fund to grow up to 25% in 2003/04 under the

CCP program. The 2002/03 payments were relatively lower because of higher international prices. The other component of the *Amber Box*, the Loan program, enables producers to hold their crops when prices are at or below the loan rate. Producers have the option to use their crop as collateral to take out loans. Participating producers may choose to repay the loan at a lower repayment rate for marketing loan gains. Producers may also elect to receive marketing loan benefits through loan deficiency payments. The loan program is widely used and payments for marketing loan benefits (i.e., marketing loan gains and loan deficiency) represent a significant portion of U.S. farm program outlays from 43% in 1997/98 to 76% in 2001/02. Thus, the enactment of the FSRI Act was perceived as a lack of commitment to free trade on the part of the U.S. (Sumner, 2003; Makori, 2005) because as components of the new farm bill, these programs are expected to remain in place for the next five years.

To address what is generally perceived as a lack of transparency and equity in the world trading system and address the cotton subsidy problem in a genuine manner, the Office of the U.S. Trade Representative floated a proposal before the Hong Kong Ministerial summit. The proposal advocated major reforms in all three areas of concern identified in the Doha Development Agenda (i.e., domestic support, market access, and export competition) by all member countries, with some "special and differential treatment" for developing countries (U.S. Trade Representative, 2005a). With respect to domestic support, the proposal included a 60% reduction in the final bound total aggregate measure of support (AMS) for the United States (US$19.2 billion to US$7.6 billion) and an 83% reduction in the final bound total AMS for the European Union and Japan over a five-year period. For all other countries, except those classified as LDC, the proposed cut was 37% of the total bound AMS level. In the areas of market access and export competition, the proposal included substantial reductions in tariffs with

deeper cuts for higher tariffs and a complete elimination of all forms of export subsidies by 2010 for all products.

The Hong Kong *Ministerial Declaration* is in principle similar to the U.S. proposal. It too advocates an elimination of all export subsidies and meaningful reductions of tariffs and domestic support. However, it calls for the establishment of bands of AMS support and bands of tariff protection by which members offering higher levels of domestic support or higher tariff rates will be required to accept deeper cuts and reductions. The declaration agreement provides no specific thresholds or definitions of these bands and no consensus has been achieved regarding how much each respective band will be cut. Notwithstanding the proposal currently on the table, the African quartet (Benin, Mali, Burkina Faso, and Chad) co-sponsors of the sectoral initiative on cotton (WTO, 2003) countered with their own proposal on March 1, 2006. They advocated deeper cuts for cotton compared to agriculture in general, changing the base period to 1995-2000, and establishing a fund through bilateral and multilateral cooperation to supplement their income shortages through the transition period leading toward a world free of subsidies (WTO, 2006). The quartet viewed their new proposal consistent with the General Council August 2004 mandate to address the cotton problem in an ambitious, expeditious, and specific manner (WTO, 2005). Although a complete elimination of export subsidies and substantial cuts in domestic supports and tariff bindings would be major steps to reforming the world trade system, substantial reforms to improve agricultural and nonagricultural market access from all countries are necessary for the developing countries to realize their potential gains from agricultural trade (Anderson and Martin, 2005). This argument stems from the fact developing countries are trading among themselves more than ever before and it would be shortsighted to focus solely on developed countries.

While the office of the U.S. Trade Representative cites significant support from the American agriculture sector for its proposal (U.S. Trade Representative, 2005b), the fundamental question that arises is how the U.S. proposal to liberalize agricultural markets would affect U.S. producers. This question may be of special interest to the U.S. cotton sector since the cotton market has been targeted for special consideration. Since the U.S. cotton program is designed to provide income support to cotton producers, what would be the effect of substantial reductions in levels of domestic support on the net farm income of U.S. cotton farmers? Would improvements in market access around the world called for in the proposal offset potential losses in U.S. net farm income following substantial reduction in the AMS? To answer these questions, a partial equilibrium econometric model of the world fiber market, developed by the Cotton Economic Research Institute (CERI) at Texas Tech University, is used. The analysis considers two scenarios under which U.S AMS is reduced by 60%. The first scenario analyzes the effects of this proposal on world and domestic cotton prices, U.S. government outlays, gross and export revenues, and net farm income if the U.S. proceeds unilaterally. The second scenario analyzes these same effects as well as effects on cotton imports and exports of selected nations if the U.S. policy change is accompanied by multi-lateral trade reform (cuts in U.S. price support and the elimination of tariffs and cotton price supports internationally).

Conceptual Analysis

The conceptual analysis followed in this study builds on a previous analysis of the effects of U.S. cotton programs on the world market (Pan et al., 2005) and a study by Tokarick (2003) on the welfare effects of production and input subsidies elimination. The novelty pertains to the analysis of the effects of marketing loan benefit including the marketing loan benefit wedge on

production decision, the effects of Chinese tariff rate quota, and the effects of production and input subsidies used in other major producing and importing countries such as China, India, Pakistan, and Turkey. The CCP program is not specifically addressed in this section although it is understood that the provision of the FSRI act that allows producers to update their yield base is likely to have some impact on production decision.

Figure 1 analyzes the effects of the U.S. Marketing loan program on the world cotton market. As panel A-1 indicates, the loan rate plus the marketing loan benefit wedge ($LR + w$) acts as a price floor for U.S. cotton producers. The marketing loan benefit wedge (w) accounts for the effects of seasonality on price and the difference between posted county prices and national prices (Westhoff, Brown, and Hart, 2005). Gardner (2002) evaluated the average marketing loan benefit wedge at 9% above the loan rate; thus, it is an important component of U.S. producers' planting decision. As the price floor to which producers respond, the loan rate with the added marketing loan benefit wedge leads to a kinked U.S. supply curve, which becomes inelastic below $LR + w$. Since the loan program does not affect domestic demand, the rise in production leads to a declining domestic price from PE to PD. Hence, producers who participate in the loan program would realize a marketing loan benefit equals to $LR + w - PD$ as long as the domestic price is below the loan rate.

In the world market (Panel B-1), this translates to a kinked U.S. excess supply curve (ESus). The intersection of the U.S. excess supply curve and the Rest-of-the-world excess demand curve (EDrow) determines the price level (P_{W1}) under which the world market clears. If the U.S. reduces its loan rate, the graphical analysis shows a reduction in cotton production and a slight increase in domestic cotton price. In the world market, the excess supply would shift upward, leading to a reduction of exports and a slight appreciation in world cotton price. If the

loan rate were eliminated, cotton supply response in the United States would no longer be kinked resulting in an upward shift of the excess supply function from S to K. Overall, U.S. exports would decrease from (Q_{S1}-Q_{D1}) to (Q_{S2}-Q_{D2}) and world price would increase to P_{W2}.

Figure 2 illustrates the effects of a tariff-rate quota (TRQ) system and simple tariff schedules used to restrict imports. China uses the TRQ scheme, which causes major distortions in the fiber cotton market because of China's place as the world largest cotton importer (Pan et al., 2005). As part of its commitment to the WTO China has established a TRQ system for cotton imports in which the in-quota import level Q_{TRQ} is set to 890,000 metric tons with a tariff of 1% and the out-of-quota tariff was set to 40% in 2006. The effects of the TRQ and simple tariff schemes on the world cotton market was analyzed using the Morath-Sheldon framework (Morath and Sheldon, 1999) in which we consider the Chinese and the Rest-of the world importers separately. As Panel B-2 indicates, with the TRQ in place, Chinese importers face a kinked world excess supply curve $ES_{TRQ.}$ The excess supply curve is discontinuous at Q_{TRQ}, the quota level below and beyond which foreign exporters respond to price signals. The other importers who are subject to an *ad valorem* tax face a straight excess supply curve ES_{ST}. The distortionary effects of these two border policies depend on the position of the world excess demand curve relative to the world excess supply curve (Beghin et al., 2001).

Considering the situation in which the TRQ is binding, Panel B-2 displays the world market equilibrium under a TRQ system and the total imports amounts QTRQ. Under a simple tariff structure, the total world imports would be Q_{ST}, larger than Q_{TRQ}. If all forms of tariffs were eliminated, total imports would increase to Q_{CM} found at the intersection of ED and the world excess supply curve under a no tariff schedule (ES_{FT}). Thus, the elimination of the TRQ system and simple tariff system would lead to an expansion of trade worldwide.

The analysis of the effect of input and production subsidies removal draws from Tockarick (2003), which was extended to a two-panel diagram illustrated in Figure 3. Panel A-3 shows a supply and demand equilibrium under which input and production subsidies are provided to producers. At an effective price $PS_i = PD_i\left(1+s_i\right)+k$, the country i supplies Q_{S1} quantitiy of cotton while consuming Q_{D1} determined by the domestic price. The domestic price is assumed equal to the world price, which is determined from the excess supply and demand equilibrium in Panel B-3.

If the input and production subsidies are discontinued, the supply curve shifts inward, leading to similar movement of the excess supply curve in the world market (Panel B-3). This is followed by an increase in the world price from P_{W1} to P_{W2}, which is the new competitive price equilibrium. Under this new market condition, domestic demand falls to Q_{D2} and domestic supply falls to Q_{S2}. Overall, world cotton price appreciates under the new policy scheme.

The Model

The study applied the Cotton Economic Research Institute (CERI) partial equilibrium model for the world fiber market to investigate the effects of a 60% reduction of the AMS under the scenario in which U.S. acts alone and under a scenario, which considers a full trade liberalization of the world fiber market. The CERI world fiber model was used to estimate the effects of domestic and trade distortions in the world cotton market. This model included 24 countries and regions that include all major cotton exporters and importers. The model accounts for production area heterogeneity within some countries, substitutability between cotton and competing fibers, and linkage between raw fiber and the textile-manufacturing sector. For a representative

country, the model includes supply, demand, ending stocks, and market equilibrium conditions for both cotton and man-made fibers. Cotton production (PRD_i) was modeled using separate acreage (ACR_i) and yields (YLD_i) equations. The acreage response model was specified as a function of expected net return of cotton (ENR_i^c) and competing crops (ENR_i^o) and a time trend T . Similarly, yield was also specified as a function of expected farm price (FPR_i) and lag of rainfall (LRF_i). Lastly, cotton production in country i was derived by simply multiplying yield by total acreage. The full production model is as follow:

$$ACR_i^c = T^{\alpha_i}\left(ENR_i^c\right)^{\beta_i}\left(ENR_i^o\right)^{\gamma_i}$$

$$YLD_i = T^{\phi_i}\left(FPR_i\right)^{\varphi_i}\left(LRF_i\right)^{\rho_i}$$

$$PRD_i^c = ACR_i^c \times YLD_i^c$$

Fiber demand estimation followed a two-step procedure that connects textile output to fiber inputs. The first step involved the estimation of total domestic textile production that is total fiber demand (DM_i^f) from which the demand for all fibers was derived. In the second step, total domestic textile production was allocated among the various fibers mainly cotton, man-made fiber, and wool. Thus, demand for each fiber type was calculated based on its utilization in the textile production process. The total fiber demand (DM_i^f), total cotton demand (DM_i^c), and cotton ending stock (ES_i) were specified as follows:

$$DM_i^f = DM_i\left(FPI_i\right)^{\sigma_i}\left(GDP_i\right)^{\tau_i}$$

$$DM_i^c = \left(PD_i^c / PD_i^m\right)^{\rho_i}$$

$$ES_i = \left(BS_i\right)^{\omega_i}\left(PRD_i\right)^{\varpi_i}\left(FPR_i\right)^{\psi_i}$$

where DM_i is a constant representing the autonomous consumption, FPR_i is the fiber price index, GDP_i is the gross domestic product, PD_i^c and PD_i^m are the domestic prices of cotton and man-made fiber, respectively.

Man-made-fiber production was modeled using estimations of production capacity (CPT_i) and capacity utilization (CPU_i). Man made fiber production capacity is determined by lag of man-made-fiber domestic price (LPD_i^m), lag of oil price (LPD_i^l), and lag capacity ($LCPT_i^m$). Total capacity utilization is dictated by current domestic man-made-fiber price (PD_i^m) and current oil price (PD_i^l), and lag of capacity utilization ($LCPU_i^m$). Total man-made-fiber production (PDR_i^m) is derived by multiplying the production capacity by the capacity utilization. The full man-made-fiber production model is specified as

$$CPT_i^m = \left(LPD_i^l\right)^{\eta_i}\left(LPD_i^m\right)^{\mu_i}\left(LCPT_i^m\right)^{\kappa_i}$$

$$CPU_i^m = \left(PD_i^m / PD_i^l\right)^{\theta_i}\left(LCPU_i^m\right)^{\kappa_i}$$

$$PRD_i^m = CPT_i^m \times CPU_i^m$$

Exports demand (XPD_i) was modeled as a function of the ratio of international price of cotton (P_W) and domestic price of cotton (PD_i^c) with the international price in domestic currency. The imports demand equation (IMD_i) is a function of international price, exchange rates (XR_i), tariff rates t_i, and quota restrictions.

$$XPD_i = \left(P_W \times XR_i / PD_i^c\right)^{\varepsilon_i}$$

$$IMD_i = \left(P_W\left(1+t_i\right)\times XR_i\right)^{\pi_i}$$

The domestic market equilibrium is as follows

$$ES_i + DM_i + XPD_i = BS_i + PRD_i + IMD_i$$

Solving this equilibrium yields the domestic price of cotton. Moreover, at the world level, total exports by all countries equal total imports by all countries. The equilibrium in the world cotton market is

$$\sum_i XPD_i = \sum_i IMD_i .$$

The cotton world price (A-index) , domestic cotton price, cotton textile price index , non-cotton textile price index, farm price , and man-made fiber price were endogenously solved by equalizing world exports and imports.

There are some noteworthy differences between countries, especially on the supply side, namely the specification of the net return equation. While a per acre net return values is derived for the U.S., in most countries, an effective price (PS_i) is solely used. As in Tokarick(2003), the effective price is derived from the farm price, the total production subsidies s_i , and input subsidies k . The effective price equation is specified as follows

$$PS_i = FPR_i\left(1 + s_i\right) + k$$

For the U.S., the expected net return is derived as

$$ENR = EFPR \times YLD - TVC + 0.5 \times ECCP + EMLB$$

where $EFPR$ is the expected farm price, TVC the total per acre variable cost, $ECCP$ is the expected countercyclical payment rate, and $EMLB$ the expected marketing loan benefit rate. The expected marketing loan benefit rate is the loan rate less the loan repayment rate that is the lower of the loan rate or the adjusted world price; it is derived as

$$EMLB = \left(LR - \min\left(LR, AWP\right) + w\right) \times LYLD$$

where LR is the loan rate, AWP is the adjusted world price, $LYLD$ is the lag of yield, and w remains as previously defined. The difference between the target price and the effective market price (i.e., direct payment rate plus the higher between the loan rate and the average market price) represents the CCP rate. The expected countercyclical payment is derived as

$$ECCP = \left(TP - DP + \max\left(LR, LPD\right)\right) \times BYLD$$

where TP is the cotton target price set at 72.4 cents/lb. under the 2002 FSRI Act, DP the direct payment set at 6.67 cents/lb., LR is the loan rate set at 52 cents/lb, and $BYLD$ is the base yield, which corresponds to the 1998-2001 average yields.

In the above specifications the superscipts in greek letters are the coefficients to be estimated using historical data collected from various sources. The models were linearized by log transformations. Thus, the coeficients are the elasticities and may also be interpreted as impact multipliers and determine the magnitudes of the simulation results. Detailed results of the estimation and the derived elasticity estimates are available in Pan, et al.(2004) or from the authors upon request.

The data used in the study were compiled from various sources. The historical and predicted macroeconomic variables (real GDP, exchange rate, population, and GDP deflator) were obtained from the Food and Agricultural Policy Research Institute (FAPRI). Cotton production, consumption, ending stocks, imports, and export data were retrieved from U.S. Department of Agriculture Production, Supply & Distribution (PSD). Fiber mill consumption and man-made fiber data were retrieved from the Food and Agriculture Organization of the United Nations (FAO) World Fiber Consumption Survey (before 1994) and Fiber Organon (after 1994).

Policy Shock and Assumptions

The approach was to develop a five-year baseline (2006/07-2010/11) assuming a continuation of current domestic and border protection policies. Then a 60% reduction of AMS was targeted five years after the beginning of implementation holding all other policies unchanged. The threshold of 60% reduction was reached through linear cuts of the target price by 12% and the loan rate by 8% using a progressive formula of equal increments. The world cotton market was then allowed to react to the resulting price signals over a five-year period that is through 20010/11. The effects were measured by comparing the AMS under the baseline to its value after the policy changes. Additionally, the effects of these policies on world price, U.S. farm price, production, exports, government outlays, and net farm income were determined by evaluating their deviations with respect to their baseline values.

A second scenario with full trade liberalization from the Rest of the World established was considered. The full trade liberalization was established over a five-year period following incremental linear cuts of tariff rates and subsidies. In this case, the 60% AMS reduction threshold was accomplished by a 9% reduction in the target price and 4% reduction in the loan rate following the same formula. The effects of these policies were evaluated on the U.S. side and the Rest of the World. Finally, a stochastic analysis of the effects of policy changes on the U.S. net farm income was conducted to generate confidence bands and the cumulative distribution function of the changes with their associated probability levels. The stochastic simulation follows the same approach as in Fadiga, Mohanty, and Pan (2005). This approach was based on a multivariate empirical distribution (Richardson, Klose, and Gray, 2000) of historical exogenous data to generate 500 correlated random draws of the exogenous variables,

which are then substituted into the partial equilibrium model to solve for the 500 set of endogenous variables, including U.S. net farm income. The number of draws was set to 500 to be consistent with FAPRI approach to stochastic analysis of agricultural commodities (FAPRI, 2004). Moreover, there is no limit on the number of exogenous stochastic variables to use to generate the draws; however, one has to be mindful of the computational cost associated with large matrix. In this study, it was assumed that yields are at the basis of most of the uncertainty in the world fiber market and were used to generate the draws.

Simulation Results

The results in Table 1 summarize the effects of a 60% unilateral reduction in AMS on U.S. prices, policy instruments, and government outlays. While such an action by the U.S. yielded modest effects on world cotton prices (3.47% on average), the effects on U.S. farm prices were relatively high (5.04% on average). The magnitude of the increase is due to a contraction of acreage because of reduction of target price by 12% and loan rate by 8% over 5 years. Loan deficiency payments decreased by 40.93% while countercyclical payments fell by 100% by 2010/11. A 60.56% reduction of AMS relative to the WTO 1999-2001 base was achieved by 2010/11.

Although world price slightly increased, the results in Table 2 show U.S. cotton export dropped by 4% on average because of production reduction. Since the LDP is coupled while the CCP is assumed 50% coupled in the CERI model, a reduction in these policy instruments lead to less acreage, hence to reduced production level. This further explains the decline in the variable cost of production. While gross revenue increases because of appreciating U.S farm price, the U.S. net farm income fell considerably because of substantial reduction in government payments.

The fall in net farm income starts at the beginning of the policy shocks and rapidly declines by 26.01% in 2010/11. Overall, the U.S. treasury was the sole beneficiary of a unilateral move from the U.S with an average reduction in total government payments by 30.82%.

As Table 3 illustrates, if the changes in U.S. policy were conducted with multilateral trade liberalization of the world cotton market, a reduction of the target price by 9% and the loan rate by 4% were sufficient to achieve the 60% AMS reduction goal. This was possible because the U.S. farm price and the world price of cotton appreciated more under the multilateral liberalization scenario. A 60% AMS reduction under multilateral liberalization induced relatively high changes in the A-index, averaging 10.57% over the simulation period. The dynamics of the changes were also noteworthy, increasing steadily as the cumulative effects of the linear cuts in the target price and loan rate increases to reach a high at 13.28% in 2009/10. In 2010/11, the A-index adjusts to new market equilibrium with a 12.74% change relative to the baseline. The U.S. farm price follows a similar pattern, but the changes were slightly higher because of further cuts in U.S. acreage. As in the unilateral policy implementation scenario, higher domestic and international cotton prices under multilateral reform lead to a rapid reduction in LDP and CCP with the latter declining by almost 100% in 2010/11. However, these effects were achieved with much smaller cuts in the loan rate and the target price than the unilateral scenario.

The results in Table 4 indicate that U.S. cotton production and exports decline by 0.55% and 0.66% on average. Projected U.S. net farm income values still lay below their baseline levels in the multilateral trade liberalization scenario. From a small decrease of 1.76% at the beginning of the simulation period, losses in net farm income grew rapidly, reaching 18.72% in

2009/10. Thus, by these estimates, multilateral liberalization only partially offsets the losses in income due to the cuts in AMS.

For the Rest of the World, the results are analyzed by looking at the effects of the U.S. trade proposal when accompanied with multilateral tariff and subsidy eliminations. For cotton importing countries (Table 5), the overall effects depend on the degree of protection that existed prior to the trade liberalization. In China for instance, the elimination of the tariff rate quota system and production subsidies leads to higher import demand. As Table 5 indicates, on average, Chinese imports are, on average, expected to increase by 6.72% (over 800 thousands bales) relative to the baseline. For Pakistan, imports increase by over 4.20% on average. Imports by India follow a relatively stable pattern increasing by about 4.17% throughout the period. Turkey and the European Union provide subsidies to their producers, which if phased out would lead to a decline in production, especially in the case of the European Union where subsidies are much higher. The contraction in production leads to higher imports, averaging 3.36% above the baseline. Higher international prices of cotton are not favorable to Korean, Taiwanese, and Japanese textile industries, which rely almost exclusively on imports for their operations. For these countries, imports are expected to decline relative to their baseline values. Of the major cotton importers reported here, the smallest effects from the U.S. proposal are seen in the area of Mexican cotton imports. While Mexican imports and exports to the U.S. are traded in a free market environment due to the North American Free Trade Agreement (NAFTA), the removal of cotton import tariffs in Mexico will spur a small increase in demand with other trading partners.

As for cotton exporters (Table 6), it was expected that the non- and low-subsidizing countries would capture production displacement from subsidizing and less cost competitive

countries. Brazil is expected to increase its cotton exports by an average 10.65%, followed by Australia (5.80%), West Africa (5.49%), and Uzbekistan (4.76%). For Brazil, these export levels were expected in the context of liberalization as more area in the expanding frontier region enters production because of higher prices. As for Australia, cotton farming is a tributary of water availability, which serves as a constraint on cotton production and thereby cotton exports. For West Africa, limited technological innovation and continued subjugation to weather variability prevent these countries from taking full advantage of higher prices.

Finally, figure 4 captures the probabilistic outcome of the changes in U.S. net farm income under unilateral and multilateral settings in 2010/11, the year when the 60% AMS reduction and the trade liberalization are fully implemented. It is important to note the difference in the results obtained under the deterministic analysis compared to the stochastic analysis. Concerning the unilateral scenario, the change in net farm income under the deterministic analysis (Table 4) amounted to -26.01% while the stochastic mean amounted to -13.48%. Under the multilateral scenario, the deterministic and stochastic means are -18.89% and -6.36%, respectively. There is a strong deviation in the results obtained under the two modeling strategies. The results show the probability of an increase in net farm income under the first scenario is close to zero. Moreover, it is highly likely (60% chance) that the change in net farm income would fall by more than 15%. However, under a multilateral liberalization, there would be 20% chance that the net farm income would increase between 0% and 9.5% while the likelihood that the net farm income would fall between 5% and 15% is relatively high (60% chance). The average changes in net farm income are respectively -13.48% and -6.36% under the unilateral and multilateral scenarios.

Conclusions

This study analyzed the cost to U.S. cotton producers of a 60% AMS reduction if the U.S. decided to act unilaterally versus if the policy initiative is accompanied with multilateral trade liberalization from the Rest of the World. The study shows that if the U.S. acts alone, substantial cuts in the target price and the loan rate are needed to meet the targeted AMS reduction (12% and 8%, respectively). U.S. net farm income decreases considerably because of considerable cutbacks in government payments that cannot be compensated by the moderate increase in U.S. farm price. If the policy change is conducted with multilateral trade liberalization from the Rest of the World, the negative effects on U.S. net farm income are somewhat mitigated, but do not fully compensate for the losses in government price support (9% target price and 4% loan rate reduction). Thus, net farm income decreases relative to the baseline in both scenarios. For competing cotton exporters, substantial increases in cotton exports from Brazil indicate that that nation is a primary beneficiary of the U.S. proposal, followed by other leading cotton exporters Australia, West Africa, and Uzbekistan.

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Table 1. U.S. Proposal in a Unilateral Reform Setting: Impacts on Cotton Prices and Government Programs Payments

	2006/07	2007/08	2008/09	2009/10	2010/11	Average
			(Cents/pound)			
A-index						
Baseline	60.91	62.64	64.16	64.59	64.49	63.36
Unilateral Reforms	62.68	64.98	66.53	67.05	66.56	65.56
% Change	2.91%	3.74%	3.71%	3.81%	3.21%	3.47%
U.S. Farm Price						
Baseline	47.56	49.54	50.19	52.52	53.94	50.75
Unilateral Reforms	48.97	51.67	52.74	56.01	57.28	53.34
% Change	2.97%	4.30%	5.09%	6.66%	6.19%	5.04%
			($US million)			
LDP						
Baseline	1376.81	1304.25	1257.20	1267.19	1288.60	1298.81
Unilateral Reforms	1119.83	942.46	808.02	729.55	761.12	872.20
% Change	-18.66%	-27.74%	-35.73%	-42.43%	-40.93%	-33.10%
CCP						
Baseline	914.21	904.80	907.36	871.13	781.38	875.77
Unilateral Reforms	780.26	568.78	386.88	65.53	0.00	360.29
% Change	-14.65%	-37.14%	-57.36%	-92.48%	-100.00%	-60.33%
AMS Base						
Baseline	1930.00	1930.00	1930.00	1930.00	1930.00	1930.00
Unilateral Reforms	1900.09	1511.24	1194.90	795.07	761.12	1232.48
% Change	-1.55%	-21.70%	-38.09%	-58.80%	-60.56%	-36.14%
Government Outlays						
Baseline	3201.53	3119.56	3075.07	3048.83	2980.49	3085.10
Unilateral Reforms	2810.60	2421.75	2105.42	1705.58	1671.64	2143.00
% Change	-12.21%	-22.37%	-31.53%	-44.06%	-43.91%	-30.82%

Table 2. U.S. Proposal in a Unilateral Reform Setting: Impacts on the U.S. Cotton Industry

	2006/07	2007/08	2008/09	2009/10	2010/11	Average
			(Thousand of bales)			
Production						
Baseline	21853.82	21568.73	21720.82	21867.79	21969.75	21796.18
Unilateral Reforms	21452.78	20979.08	20998	20984.35	21069.29	21096.70
% Change	-1.84%	-2.73%	-3.33%	-4.04%	-4.10%	-3.21%
Exports						
Baseline	15843.74	16024.73	16627.31	17086.77	17236.13	16563.74
Unilateral Reforms	15478.23	15458.71	15921.24	16237.32	16345.58	15888.21
% Change	-2.31%	-3.53%	-4.25%	-4.97%	-5.17%	-4.04%
Mill-use						
Baseline	5988.55	5906.21	5850.79	5420.81	5241.26	5681.524
Unilateral Reforms	5988.65	5905.00	5847.69	5414.03	5231.50	5677.374
% Change	0.00%	-0.02%	-0.05%	-0.13%	-0.19%	-0.08%
			($US million)			
Net Farm Income						
Baseline	3840.28	3856.52	3812.86	3982.54	3965.21	3891.48
Unilateral Reforms	3576.64	3338.52	3062.62	2935.18	2933.82	3169.36
% Change	-6.87%	-13.43%	-19.68%	-26.30%	-26.01%	-18.46%

Table 3. U.S. Proposal in a Multilateral Reform Setting: Impacts on Cotton Prices and Government Payments

	2006/07	2007/08	2008/09	2009/10	2010/11	Average
			(cents/pound)			
A-index						
Baseline	60.91	62.64	64.16	64.59	64.49	63.36
Multilateral Reforms	64.84	68.23	71.51	73.16	72.71	70.09
% Change	6.47%	8.92%	11.46%	13.28%	12.74%	10.57%
U.S. Farm Price						
Baseline	47.56	49.54	50.19	52.52	53.94	50.75
Multilateral Reforms	50.13	53.47	54.63	58.07	59.34	55.13
% Change	5.41%	7.93%	8.85%	10.58%	10.00%	8.55%
			($US million)			
LDP						
Baseline	1376.81	1304.25	1257.20	1267.19	1288.60	1298.81
Multilateral Reforms	1152.09	984.58	826.58	748.91	776.09	897.65
% Change	-16.32%	-24.51%	-34.25%	-40.90%	-39.77%	-31.15%
CCP						
Baseline	914.21	904.80	907.36	871.13	781.38	875.77
Multilateral Reforms	797.59	549.91	387.01	74.62	0.00	361.83
% Change	-12.76%	-39.22%	-57.35%	-91.43%	-100.00%	-60.15%
AMS Base						
Baseline	1930.00	1930.00	1930.00	1930.00	1930.00	1930.00
Multilateral Reforms	1949.68	1534.48	1213.59	823.53	776.09	1259.48
% Change	1.02%	-20.49%	-37.12%	-57.33%	-59.79%	-34.74%
Government Outlays						
Baseline	3201.53	3119.56	3075.07	3048.83	2980.49	3085.10
Multilateral Reforms	2860.20	2445.00	2124.10	1734.04	1686.60	2169.99
% Change	-10.66%	-21.62%	-30.92%	-43.12%	-43.41%	-29.95%

Table 4. U.S. Proposal in a Multilateral Reform Setting: Impacts on U.S. Cotton Industry

	2006/07	2007/08	2008/09	2009/10	2010/11	Average
			(Thousand bales)			
Production						
Baseline	21853.82	21568.73	21720.82	21867.79	21969.75	21796.18
Multilateral Reforms	21905.24	21564.13	21623.31	21646.17	21637.68	21675.3
% Change	0.24%	-0.02%	-0.45%	-1.01%	-1.51%	-0.55%
Exports						
Baseline	15843.74	16024.73	16627.31	17086.77	17236.13	16563.74
Multilateral Reforms	15895.19	15977.08	16527.29	16922	16934.06	16451.12
% Change	0.32%	-0.30%	-0.60%	-0.96%	-1.75%	-0.66%
Mill-use						
Baseline	5988.55	5906.21	5850.79	5420.81	5241.26	5681.524
Multilateral Reforms	6048.19	6004.71	5883.50	5406.15	5220.84	5712.679
% Change	1.00%	1.67%	0.56%	-0.27%	-0.39%	0.51%
			($US million)			
Net Farm Income						
Baseline	3840.28	3856.52	3812.86	3982.54	3965.21	3891.48
Multilateral Reforms	3772.65	3590.94	3324.30	3237.02	3215.99	3428.18
% Change	-1.76%	-6.89%	-12.81%	-18.72%	-18.89%	-11.82%

Table 5. U.S. Proposal in a Multilateral Reform Setting: Impacts on Major Cotton Importers

	2006/07	2007/08	2008/09	2009/10	2010/11	Average
			(Thousand Bales)			
China						
Baseline	16077.23	16333.21	17477.24	19029.15	20021.02	17787.57
Multilateral Reforms	17013.49	17328.76	18694.02	20418.18	21506.44	18992.18
% Change	5.82%	6.10%	6.96%	7.30%	7.42%	6.72%
India						
Baseline	801.91	707.06	631.83	572.13	681.56	678.90
Multilateral Reforms	838.15	737.36	656.59	595.09	709.50	707.34
% Change	4.52%	4.29%	3.92%	4.01%	4.10%	4.17%
Pakistan						
Baseline	1681.70	2020.28	2133.69	2192.62	2060.81	2017.82
Multilateral Reforms	1739.28	2083.67	2221.71	2297.07	2175.29	2103.40
% Change	3.42%	3.14%	4.13%	4.76%	5.55%	4.20%
Japan						
Baseline	719.03	698.64	644.21	578.60	516.35	631.37
Multilateral Reforms	716.43	682.93	630.33	563.96	503.91	619.51
% Change	-0.36%	-2.25%	-2.15%	-2.53%	-2.41%	-1.94%
South Korea						
Baseline	1225.85	1148.93	1098.18	1042.53	963.39	1095.78
Multilateral Reforms	1218.44	1135.35	1076.17	1012.04	926.70	1073.74
% Change	-0.60%	-1.18%	-2.00%	-2.92%	-3.81%	-2.10%

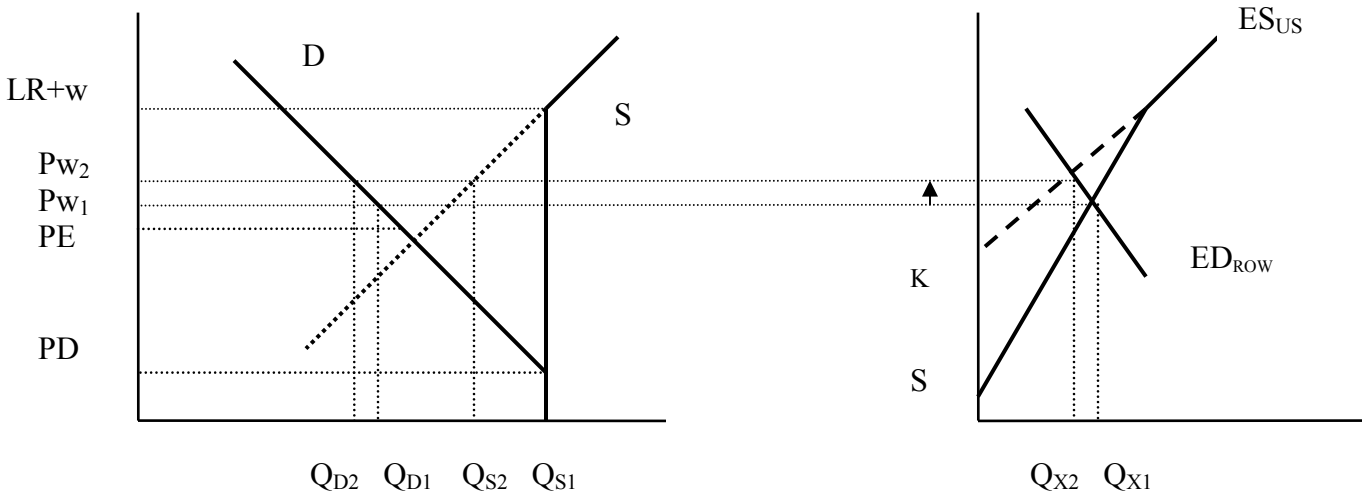
Table 5. (Continued) U.S. Proposal in a Multilateral Reform Setting: Impacts on Major Cotton Importers

	2006/07	2007/08	2008/09	2009/10	2010/11	Average
			(Thousand bales)			
Taiwan						
Baseline	1209.35	1225.51	1162.53	1148.72	1133.32	1175.89
Multilateral Reforms	1209.43	1181.62	1115.37	1102.68	1083.62	1138.54
% Change	0.01%	-3.58%	-4.06%	-4.01%	-4.39%	-3.21%
Mexico						
Baseline	1401.18	1306.83	1278.94	1235.38	1219.50	1288.37
Multilateral Reforms	1399.49	1313.05	1291.10	1251.72	1238.35	1298.74
% Change	-0.12%	0.48%	0.95%	1.32%	1.55%	0.83%
European Union						
Baseline	2241.37	1673.55	1598.49	1525.91	1450.87	1698.04
Multilateral Reforms	2313.12	1726.73	1656.56	1575.40	1502.59	1754.88
% Change	3.20%	3.18%	3.63%	3.24%	3.56%	3.36%
Turkey						
Baseline	3462.73	3497.15	3391.30	3310.63	3269.29	3386.22
Multilateral Reforms	3564.77	3608.76	3506.74	3423.12	3372.57	3495.19
% Change	2.95%	3.19%	3.40%	3.40%	3.16%	3.22%

Table 6. U.S. Proposal in a Multilateral Reform Setting: Impacts on Major Cotton Exporters

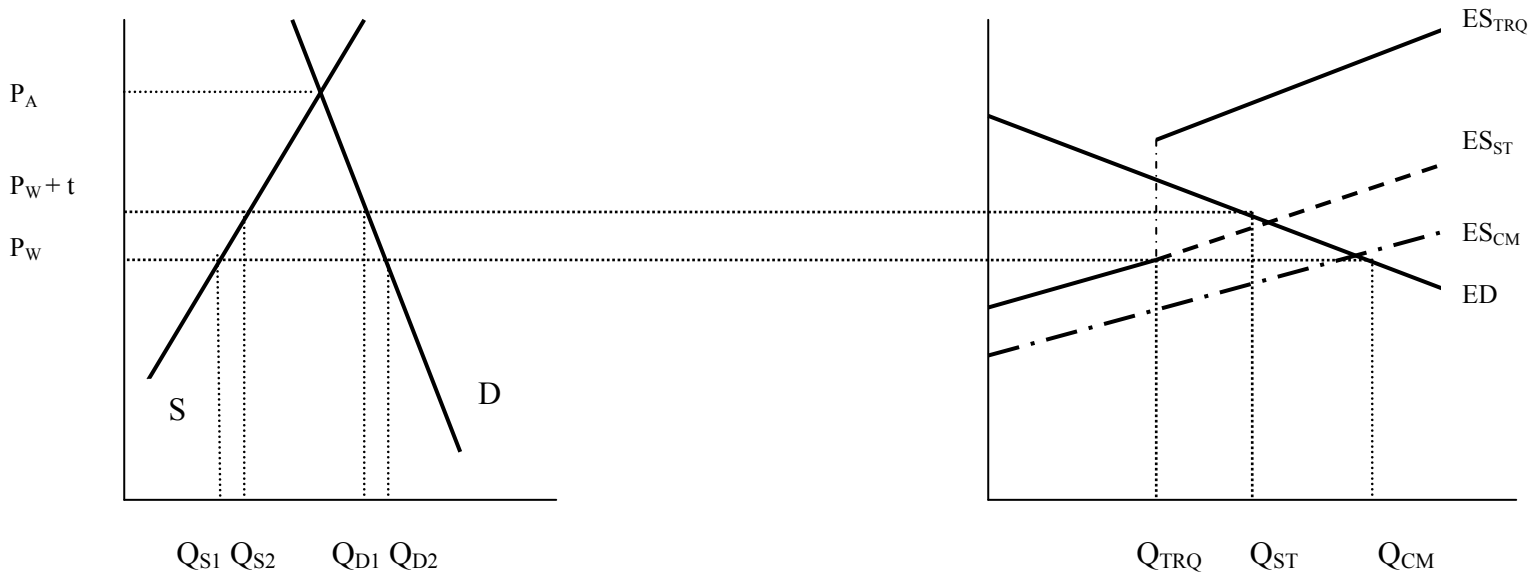
	2006/07	2007/08	2008/09	2009/10	2010/11	Average
			(Thousand bales)			
Australia						
Baseline	2859.96	2876.18	2794.36	2813.25	2860.43	2840.84
Multilateral Reforms	2985.54	3021.55	2944.06	2992.29	3085.16	3005.72
% Change	4.39%	5.05%	5.36%	6.36%	7.86%	5.80%
Brazil						
Baseline	2132.16	2831.67	3029.53	3269.68	3623.30	2977.27
Multilateral Reforms	2300.06	3102.20	3369.23	3651.89	4091.03	3302.88
% Change	7.87%	9.55%	11.21%	11.69%	12.91%	10.65%
Uzbekistan						
Baseline	4495.75	4553.77	4585.97	4673.44	4712.16	4604.22
Multilateral Reforms	4686.32	4773.41	4825.80	4890.54	4941.80	4823.57
% Change	4.24%	4.82%	5.23%	4.65%	4.87%	4.76%
West Africa						
Baseline	3654.31	3820.23	3980.78	4109.05	4182.71	3949.42
Multilateral Reforms	3825.20	4014.71	4201.32	4353.17	4441.34	4167.15
% Change	4.68%	5.09%	5.54%	5.94%	6.18%	5.49%

Figure 1. Effects of Removing U.S. Loan Program on World Market



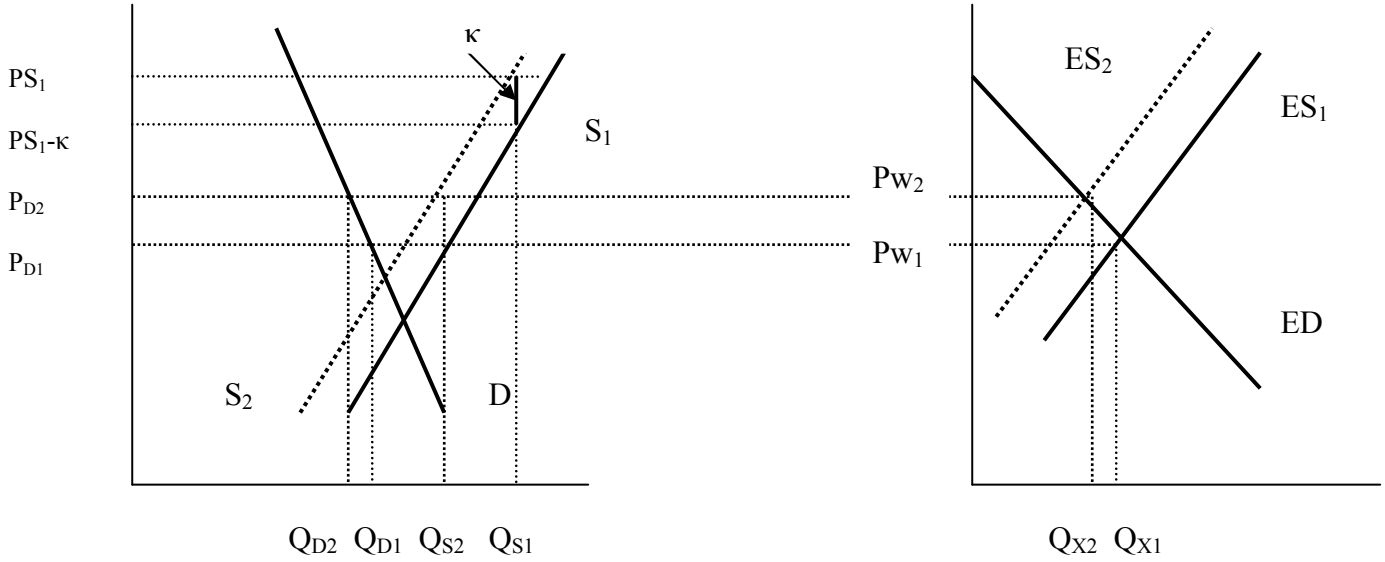
Panel A-1 **Panel B-1**

Figure 2. Effect of Removing TRQ and Simple Tariff on World Market



Panel A-2 **Panel B-2**

Figure 3. Effects of Removing Production and Input Subsidies on World Market



Panel C-1 **Panel C-2**

Figure 4 Cumulative Distribution of Change in U.S. Net Farm Income under a Unilateral vs. Multilateral Action in 2010/11