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Subsidies and Regulatory Reform in West African Cotton: What are the Development Stakes?

Ben Shepherd and Claire Delpeuch¹

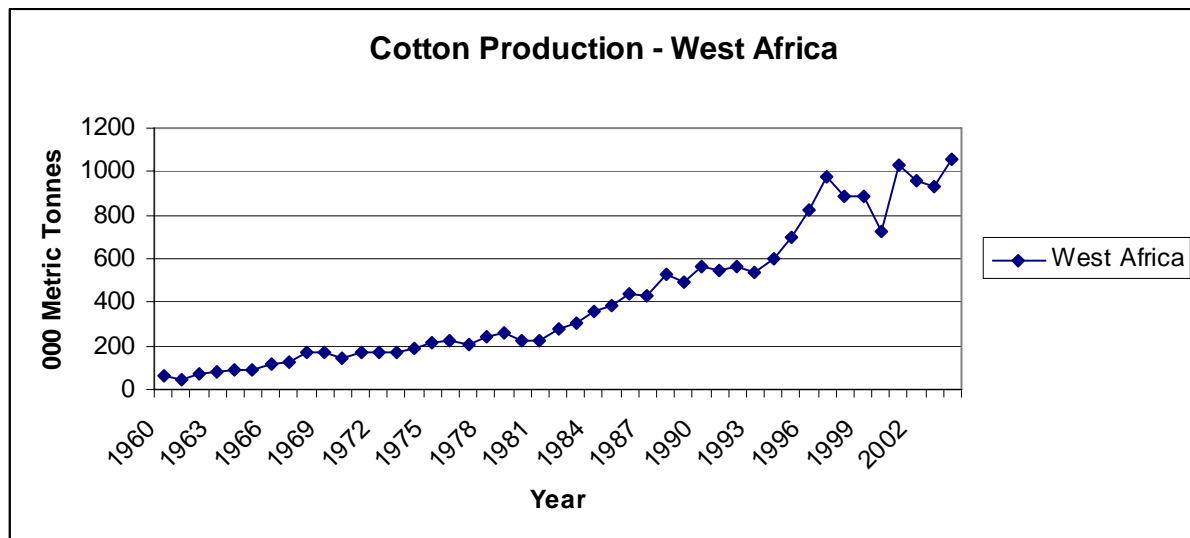
- Available evidence strongly suggests that cotton producers in West Africa are relatively unresponsive to changes in world prices. This means they are poorly placed to take advantage of improved market conditions that might result from the reduction or abolition of cotton subsidies in rich countries.
- To increase price responsiveness and ensure that the results of multilateral reform match producers' expectations it is now more urgent than ever to undertake comprehensive regulatory reform of cotton marketing structures.
- While most West African countries have already taken important steps in that direction, much work still remains to be done, in particular in Mali. The necessary path of reform is highly complex and country-specific, but we can suggest some overarching goals:
 - Assuring closer alignment between world and domestic (producer) prices;
 - Improving cotton sector productivity by reinforcing market infrastructure at crucial points in the supply chain, and ensuring openness to technological advances including biotechnology;
 - Investing in physical and informational infrastructure so as to bring farmers closer to markets.

Introduction

It is no secret that cotton is a vital development crop in West Africa. According to Oxfam (2004), it represents the main source of cash income and employment for some 10 million people across the region. Over the last forty years, West Africa has expanded cotton production at an impressive rate (Figure 1). In terms of the world market, it has come from almost nowhere (a mere 1.3% of world exports in 1960) to now be well established as an important player (13.6% of world exports in 2004). It was the third largest cotton exporting region in 2004, after North America and Central Asia.

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Figure 1: Cotton production in West Africa, 1960-2004



Source: ICAC²

Small wonder, then, that four West African countries - Benin, Burkina Faso, Chad, and Mali - should be at the forefront of international efforts to end rich countries' cotton subsidies.³ Those measures are said to lower world prices, and squeeze developing countries out of markets to the benefit of growers in Europe and, in particular, the United States. The WTO's Appellate Body seems to have agreed with them in principle: finding in favor of a Brazilian complaint, it concluded that certain US cotton subsidies were not consistent with its international obligations. While implementation of that decision is following a tortuous route, and is the subject of ongoing disagreements between Brazil and the US, the precedent has nonetheless been set: at a very minimum, the distortive effects of American subsidies on the world market will have to be reduced in the future. (Both the Brazil v. USA case and the Sectoral Initiative launched by the four West African countries are discussed by Sumner, 2006.)

The Impacts of Removing Subsidies: Quot Homines Tot Sententiae?⁴

Let us accept, then, that serious reductions in rich country cotton subsidies are on the cards for the medium term. What do we know about the potential development impacts of such a decision in West Africa? The mechanisms through which those impacts might come about are relatively free from dispute:

- i. *Price Effect.* To the extent that subsidies lower the world cotton price, then their reduction or removal should increase it (at least in the short term). West African producers can therefore gain by selling their cotton at a higher price.
- ii. *Quantity Effect.* To the extent that subsidies increase rich country production and exports, then their reduction or removal should decrease them. West African producers can therefore gain by selling a larger quantity of cotton on the world market.

² For the purposes of Figure 1, West Africa follows the ICAC definition of "Francophone Africa": Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Côte d'Ivoire, Madagascar, Mali, Niger, Senegal, and Togo.

³ In April 2003 Benin, Burkina Faso, Mali and Chad launched a Sectoral Initiative on cotton in a Special Session of the WTO Committee on Agriculture, in which they demanded a reduction of Western production and export support schemes and their progressive elimination over three years as well as temporary financial compensation for the losses incurred as long as the subsidies would remain.

⁴ "As many opinions as men" (Terence) seems to be a significant underestimate when it comes to assessing the economic impacts of cotton subsidies. As will be seen in this section, most economists who investigate the issue manage to generate multiple opinions.

Through a combination of these two effects, West African cotton producing countries should be able to increase their export earnings following any favorable changes in rich country subsidies. But as Table 1 shows, there is extensive disagreement amongst researchers as to the likely extent of those gains. On the low end, Tokarick (2003) estimated the subsidy-related prejudice to West African farmers at around \$26 million. By contrast, ICAC (2003) arrived at a figure of \$504 million. Why all this uncertainty? And what are cotton producers to make of it?

Table 1: Estimates of lost export earnings due to Northern cotton subsidies

Source	Prejudice to West Africa (US\$ million)
Tokarick (2003)	26
FAO (2004)	30
Goreux (2004)	37-254
Reeves et al. (2001)	76
FAPRI (2002)	90.37
Gillson et al. (2004)	93.8 - 354.6
Sumner (2003)	116
Anderson and Valenzuela (2006)	143
ICAC (2002)	274
ICAC (2003)	504

Source: FAO, 2004, updated by the authors

There are, of course, many differences in approach amongst the sources cited in Table 1. (See FAO, 2004, and Shui, 2004, for reviews.) In addition to the model structure, data sources, and base year, there are also substantial differences in the elasticities used. Of particular interest here is the supply elasticity, a parameter which effectively summarizes the responsiveness of farmers to changes in world prices. It is on that factor that the remainder of this Policy Brief focuses, since it intimately ties expected West African gains from subsidy reductions to the question of domestic regulatory reform in those same countries.

The Importance of Being Responsive

The estimate of the responsiveness of farmers to changes in world prices (i.e. the supply elasticity) is of vital importance in determining the extent to which West Africa will benefit from any reductions in rich country subsidies. When subsidies are reduced, or eliminated, Northern farmers face a price cut and restrict their production accordingly. This global production drop itself turns into a world price increase. However, the final outcome for West African countries ultimately depends on the capacity of farmers to respond to this price rise. That is, the more the world price increase is felt by farmers, and the more they are able to address supply-side constraints, the greater is the gain.⁵ (See also the discussion in Sumner, 2006.)

In light of how important price responsiveness is, it is striking that very few direct estimates of the supply elasticity are available for West Africa. Of the studies listed in Table 1, only Gillson et al. (2004) and Araujo Bonjean et al. (2006) did their own econometrics. The remainder used estimates from previous studies, or consensus "guesstimates" based on a combination of literature-based analysis and professional judgment.

Table 2 summarizes what little is known about price responsiveness amongst West African cotton farmers, and provides comparisons with other major

⁵ For a graphical analysis, see Appendix 1, page 7.

producers. It makes for generally unhappy reading. Most studies indicate that West African countries have relatively low price responsiveness. For instance, Gilbert & Modena (2004) and Shepherd (2006) find elasticities of between 0.1 and 0.2, often statistically indistinguishable from zero. Even the higher estimates of Araujo Bonjean et al. (2006) suggest that West Africa's supply responsiveness lags behind that of other major producers, such as Australia. Moreover, the trend does not clearly appear to be positive. While Gillson et al. (2004) produce some evidence that West African supply has been become more elastic in recent years, the conclusions of Shepherd (forthcoming) are more nuanced: whereas the average elasticity in Mali between 1990 and 2004 is slightly higher than between 1969 and 1989, it has nonetheless been trending downwards sharply since 1996 and the results are even starker once improvements in technology are netted out.

Table 2: Estimates of cotton supply elasticities for West Africa and other major producers.

	Poonyth et al. (2004) ⁶	Gilbert & Modena (2004)	Gillson et al. (2004)	Hugon (2005)	Sumner (2003)	Araujo Bonjean et al. (2006)	Shepherd (2006)
Australia	0.8		0.68		0.3	0.62	0.46
Benin	0.8	0.13	0.25	0.22/0.50		0.75/0.88	0.02
Burkina Faso	0.8	0.09	0.32-0.58	0.10/0.74		0.47	0.01
Brazil	1.2				0.4	0.5	0.63
Cameroon	0.2		0.35-0.47	-0.35/0.10			0.39
Chad	0.8	0.13	0.36	0.07/0.74			0.24
China	1.2		0.48		0.14	0.32/0.45	0.14
Côte d'Ivoire	0.8		0.46-0.57	-0.83/0.16		0.67	0.00
Mali	0.8	0.14	0.34-0.59	-0.36/-0.03		0.46/0.90	0.20
Togo	0.2	0.21	0.47-0.75	-0.26/0.04			0.19
USA	0.8				0.361/0.424		0.16
World							0.18

Note: A slash (/) separates short and long terms estimates whereas a dash (-) indicates an estimated range.

Source: Shepherd, 2006.

We can use the Goreux (2004)⁷ model to get an idea of the extent to which West Africa's supply elasticity matters in dollar terms.⁸ In that paper, the preferred estimates of West Africa's potential gains from the elimination of industrialized countries' subsidies use uniform supply and demand elasticities of 0.5 and -0.1 respectively. These parameters result in a notional world price increase of 13.4% and a production increase of 6.5% in West Africa, thus allowing West African producers' income to grow by 20.8%, using price, production and subsidy data averaged over the 1999-2002 crop years.⁹ In light of Table 2, however, we consider a supply elasticity of 0.5 to be too high for West Africa. If we assume instead an elasticity of 0.1, while maintaining an elasticity of 0.5 for the rest of the world, and re-run the Goreux model, then the resulting production increase in West Africa is only 1.3%. As the world price increase is comparable to that of the baseline scenario (13.7%), the yearly increase in total producer income is only

⁶ These are literature/judgment based estimates presented for comparison only.

⁷ It is particularly interesting to focus on the results of this paper as the four West African states used it (in its first version) as their reference to launch the Sectoral Initiative on cotton at the WTO.

⁸ Under West Africa, we consider the four major regional cotton producers, which are also the countries which launched the cotton initiative in the WTO: Mali, Benin, Burkina Faso and Chad.

⁹ It is beyond the scope of this paper to examine the accuracy of the Goreux (2004) estimate. We simply take it as a useful baseline, and one which has been important in subsequent discourse. We note in passing, however, that the estimated subsidy impact is surely on the high side, since it essentially treats all budgetary expenditures as equivalent to market price support. In reality, the production distortions introduced by particular subsidy programs will differ (OECD, 2001). The impact is therefore likely to be somewhat smaller, which is the general direction in which the literature has moved since Goreux (2004).

15.2%. In absolute terms this means that the yearly producers' gain is \$90.25 million instead of \$123.78 million.¹⁰

Regulatory Reform: The Final Frontier

There can be no dispute that West Africa's ability to benefit from changes in rich country cotton subsidies depends in part on the price responsiveness of its farmers. Since sectoral institutions mediate between the domestic and world markets¹¹ - and determine the speed and extent of price signal transmission - they condition producers' responsiveness to changes in the world cotton price. To the extent that West African producers currently exhibit low supply responsiveness, the problem therefore resides partly in these institutions.

The West African cotton sector has already seen its share of reforms, although in the region's largest producing country, Mali, reform has been considerably slower and less far-reaching. However, there is real scope to refocus those efforts on the question of supply responsiveness. The time is therefore ripe to have a fresh look at the institutions and regulations governing the sector, and the extent to which they are compatible with a high degree of price responsiveness.

Box 1: Brief outline of West African cotton sectors' regulatory structure¹²

Traditionally, in all West African countries, the cotton sector has been organized according to a "filière intégrée" model (that is a vertically integrated public sector): state-owned enterprises enjoying a monopsony for seed cotton purchase and cotton inputs sale have regulated the sectors. They dealt, most often, with the services related to production and marketing (including research dissemination, transport, ginning and exporting) and, sometimes, even provided public services in the rural cotton areas. This system was coupled with a mechanism of fixed prices at the country-level and guaranteed sales for producers. The whole sector organization certainly contributed to the rapid growth of cotton production, among other things, by providing stability and an efficient input-credit system. However, as from the mid-eighties and continuous low cotton prices, the system became unsustainable and critical audits on the management performances of the national enterprises led financial institutions to condition their bailouts on reforms. West African countries therefore engaged in a range of more or less in-depth reforms according to differing time paths but along the same lines: progressive liberalization and privatization, refocusing para-statals on core activities, reforming the producer price setting mechanism, and increasing involvement of producers in the sector's governance.

What can West African cotton producing countries do to reform their sectoral institutions so as to promote supply responsiveness? We do not claim to have all the answers to such a broad and important question. Indeed, any attempt to defend a simple answer - such as "liberalize" or "centralize" - is likely to obscure more than it reveals about the intricate issues of regulation and institution design that ultimately need to be addressed (see Brambilla and Porto, 2006, on the Zambian case). We therefore limit the following discussion to highlighting three directions that deserve fuller exploration, as well as more detailed analysis at the micro-level.

¹⁰ The adaptation of the Goreux Model to multiple supply elasticities is given in Appendix 2, page 8. Table 3, page 9, sums up the differences in outcomes between the baseline scenario according to the initial parameters of the Goreux model as well as two alternative scenarios.

¹¹ See Box 1.

¹² See Baffes (2004), Goreux and Macrae (2003) and Shepherd (forthcoming) for Mali.

First, producer prices need to be brought more closely into line with world prices. It is, of course, a fiction that the two were ever completely de-linked: governments and external donors often had to pump emergency funds into cotton para-statal, which in turn had to slowly and incompletely adjust to world market conditions in order to stay afloat. Even prior to the reforms of the 1980s and 1990s, world and producer prices were therefore linked, but in a highly opaque way. And in recent times, there have been clearer movements towards creating a more explicit, short-run link between world and producer prices (Goreux and Macrae, 2003), most recently in Mali (2005). However, evidence for Mali prior to the latest reform (Shepherd, forthcoming) suggests these past changes may not have had a major impact on supply responsiveness. The only policy shift that did was the 1994 CFA franc devaluation. This suggests that in order to shift producers' price expectations, it is important not just to change the pricing mechanism, but to do so in an obvious and transparent way that is relatively difficult to reverse. More therefore needs to be done to "lock in" future price mechanism reforms.

Second, it is urgent to improve cotton sector productivity. Shepherd (forthcoming) shows that yields are declining in Mali, more or less in tandem with supply responsiveness. What can be done about this? On the one hand, it is clearly important to support efficiency in input and intermediate markets, including for seed, fertilizer, transport, and ginning (see the discussion of East Africa in Poulton et al., 2004). At the same time, West Africa needs to ensure it is not locked out of technological progress in the cotton sector. One important vector of change at the present time is biotechnology - and as Anderson and Valenzuela (2006) show, the potential benefits for producers are significant. Some countries are already positioning themselves to take advantage of the potential productivity gains that biotech cotton offers, and if Africa is to maintain and improve its relative position it will clearly need to consider the costs, benefits, and potential risks of this option.

Third, there is much to be done to bring farmers into more direct contact with markets in general, and with the world market in particular (see Balat et al., 2006). We have already referred to the importance of creating or extending efficient markets at crucial steps in the supply chain. But poor physical infrastructure - primarily roads and ports - hampers producers in bringing their goods to market, and drives an additional wedge between producer and world prices. At the same time, it is also clearly important that farmers be aware of what is happening on the world market in order to properly respond. Information infrastructure and support of market information systems therefore also has a role to play (e.g., Tollens, 2002).

Conclusion

West Africa has made enormous progress in having its cotton grievances heard loud and clear in the international community. But it would be unfortunate if the energy devoted to the foreign policy aspects of the cotton question distracted attention from the important "behind the border" reforms that also need to be undertaken. As we have shown in this Brief, West Africa's ability to benefit from whatever successes its foreign policy might bring is partly conditioned on its willingness to increase supply responsiveness through domestic institutional reforms. The point is particularly important for Mali, which has undertaken less far-reaching reforms than its neighbors.

Unlike the Sectoral Initiative and the Doha Development Agenda negotiations, the outcome of regulatory reform is not dependent on policy reforms in other countries. Nor does it require a complex, slow, and extremely expensive multilateral process. West African countries can implement institutional change themselves, through their own political processes. The extent of results obtained, as well as the speed with which they come, can therefore largely be controlled by national governments. At a time when progress in Geneva is hard to identify, and

the place of the Sectoral Initiative in a final deal is far from certain, West African governments might be well advised not to put all their eggs in one basket.

Our analysis also highlights that West African governments need to be careful not to become victims of their own success. The prominence of the Sectoral Initiative is setting producers' expectations high in terms of the likely impacts of international cotton market reforms. Unless supportive regulatory reform is undertaken at home, those hopes risk being dashed—and producers' confidence in their own governments severely dented.

Appendix 1: Graphical Analysis

The vital importance of the supply elasticity in determining the extent to which West Africa will benefit from any reductions in rich country subsidies is illustrated in Figure 2, which reproduces the basic mechanism used by Goreux (2004).

This model divides the world into two aggregate regions: subsidizing countries and non-subsidizing countries (left and right panels respectively). The world price P_w is common to both regions. To see the impact of eliminating subsidies, we proceed as follows. On impact, producers in subsidizing countries stop receiving the subsidized price P_s , and receive only P_w . As a result, part of their production is withdrawn from the market. Without subsidies, producers in subsidizing countries will supply Q'_i rather than Q_i . At the level of the world market, this translates into a leftwards shift of the world supply curve from S_w to S'_w to reflect the fact that for given P_w there will now be less production than there was when subsidies were in place. The intersection with the world demand curve establishes a new (higher) equilibrium price at P'_w . The final step in the analysis is for producers in both regions to adjust to this new world price. Their respective supply curves (S_i and S_k , the solid lines) show that production in subsidized countries will stabilize at Q''_i (between Q_i and Q'_i), and for non-subsidized countries at Q'_k (greater than the original level Q_k). In terms of the two mechanisms evoked at the outset, the shift from P_w to P'_w reflects the price mechanism, while the shift from Q_k to Q'_k is the quantity mechanism.

Figure 2: The significance of the supply elasticity in non-subsidizing countries.

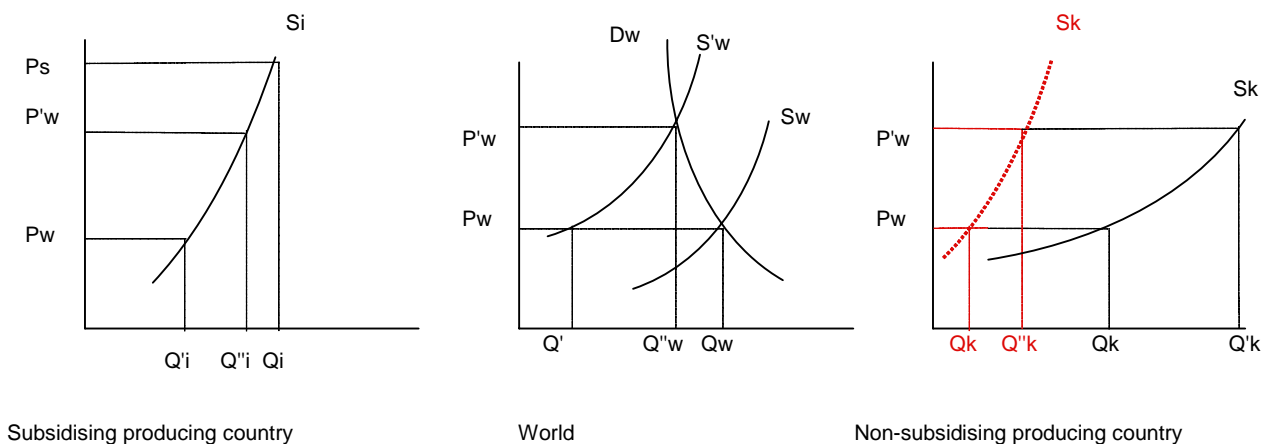


Figure 2 also highlights the role played by the supply elasticity in non-subsidizing countries like those in West Africa. The dotted line (for the supply curve S_k) in the right-hand panel shows what happens if non-subsidizing producers are less responsive to prices, i.e. their supply schedule is steeper. Instead of expanding production all the way to $Q''k$ as under the original (high elasticity, i.e. solid S_k) scenario, the low elasticity scenario means that they only produce at the lower level of $Q''k$. Their gains from the abolition of subsidies are correspondingly reduced, due to a diminished quantity effect. To summarize: West Africa gains more from lower subsidies the greater is the price responsiveness of its own producers.

Appendix 2: Algebraic Analysis Using the Goreux (2004) Model

Let Q be the total quantity of cotton produced and consumed in the world at the initial (subsidized) equilibrium. As such, $Q = S + A + R$, where S is production in subsidized countries (with $\varepsilon_S^s = 0.5$), A is production in Africa (with $\varepsilon_A^s = 0.1$), and R is production in the rest of the world ($\varepsilon_R^s = 0.5$).

We want to examine the case where subsidized countries stop paying a subsidy σ to their farmers, above the world price p_w .

The first step is to look at the amount of production removed from the market upon impact of the change in subsidy policy. This is given by:

$$\log\left(\frac{S'}{S}\right) = \varepsilon_S^s \log\left(\frac{p_w}{p_w + \sigma}\right)$$

Now we need to calculate the new global equilibrium $Q' = S'' + A' + R'$. To do this, we make use of a supply equation for each of the three regions:

$$\log\left(\frac{S''}{S'}\right) = \varepsilon_S^s \log\left(\frac{p'_w}{p_w}\right)$$

$$\log\left(\frac{A'}{A}\right) = \varepsilon_A^s \log\left(\frac{p'_w}{p_w}\right)$$

$$\log\left(\frac{R'}{R}\right) = \varepsilon_R^s \log\left(\frac{p'_w}{p_w}\right)$$

We also have a global demand equation, which with market clearing takes the following form:

$$\log\left(\frac{Q'}{Q}\right) \equiv \log\left(\frac{S'' + A' + R'}{S + A + R}\right) = \varepsilon^d \log\left(\frac{p'_w}{p_w}\right)$$

This gives us a system of five equations in five unknowns (S' , S'' , A' , R' , and p'_w), since we have data for the remaining variables (p_w , σ , S , A , R , and the elasticities). We can therefore solve numerically for the variables of interest.

We do this by using the Solver module in Excel to choose a new world price p'_w such that excess demand is eliminated.

Table 3: Outcomes of the Goreux model according to three scenarios for West Africa's supply elasticity¹³

Scenario	Price (%change)	Production (% change)	Producers' income (% change)	Producers' income (\$ million)
Baseline : $E_o=0.5$	13.4	6.5	20.8	123.78
E_o West Africa = 0.1	13.7	1.3	15.17	90.25
E_o West Africa = 1.0	13.09	13.09	27.90	165.91

Note: The last scenario is improbable. Results are given only in order to illustrate the importance of the supply elasticity in the final outcomes.

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