Distortions to Cotton Sector Incentives in West and Central Africa

John Baffes

World Bank
jbaffes@worldbank.org

Agricultural Distortions Working Paper 50, December 2007

This is a product of a research project on Distortions to Agricultural Incentives, under the leadership of Kym Anderson of the World Bank's Development Research Group (www.worldbank.org/agdistortions). The author would like to thank Kym Anderson for providing numerous comments and suggestions on earlier drafts, Gerald Estùr for providing detailed country data, and Marianne Kurzweil for performing statistical analysis. The author is grateful also for funding from World Bank Trust Funds provided by the governments of Ireland, Japan, the Netherlands (BNPP) and the United Kingdom (DfID). An earlier version of the paper was presented at the CSAE conference "Economic Development in Africa", 19-20 March 2007, University of Oxford.

Distortions to Cotton Sector Incentives in West and Central Africa

John Baffes

Following decades of development efforts, cotton became the dominant cash crop in most West and Central Africa (WCA) countries. Apart from suitable agro-climatic conditions, the increase in cotton production is believed to have reflected the vertically-integrated structure of the sectors—similar in all WCA cotton-producing countries—which circumvented the free riding risks that would have otherwise constrained its performance.

The WCA cotton sectors share a number of similarities. The industries were pioneered by the French state-owned company CFDT (*Compagnie Française de Développement des Fibres Textiles*)—renamed to DAGRIS (*Développement des Agro-Industries du Sud*) in 2001—in conjunction with national state-owned cotton companies.[1] Initially, cotton was used to supply the French textile industry. The cotton companies had a legal monopsony in cotton buying, and most had a monopoly on primary processing, marketing, and supplying inputs. Typically, the companies would announce a panterritorial base buying price before planting, sometimes supplementing that price with a second payment (payable in the following season as a bonus) based on the company's financial health. Although throughout the 1980s and 1990s there have been several attempts to change the ownership, management structure, and the pricing mechanisms of the cotton companies, the panterritorial/panseasonal pricing along with the heavy government involvement in the sector have been the key characteristics of the sectors all along.

Most cotton used to be marketed through COPACO (*Compagnie Cotonnière*), a CFDT subsidiary but that changed during the mid-1980s when most cotton companies begun marketing their cotton through independent marketing channels. The cotton industries also benefited from research carried out by the French Agricultural Research Institute CIRAD

[1] In addition to their core activity which is ginning, the cotton companies would often engage in numerous other activities such as input distribution, provision of research and extension services, and maintenance of rural roads.

(*Centre de Cooperation Internationale en Recherche Agronomique pour le Développement*) (see Table 1 for key institutions involved in the cotton sectors of WCA countries).

All WCA countries are also similar in that they share a common currency, the CFA franc (CFAf) which is fixed against the euro (see Box 1). Consequently, their cotton industries (along with the other export-oriented sectors) enjoy the benefits or suffer the consequences of the €/$ exchange rate fluctuations. Moreover, the fact that the CFAf is fixed against the euro often leads to episodes of misalignment. For example, the overvaluation of the CFAf during the early 1990s had adversely affected the competitiveness of the export sectors in all WCA countries, including cotton. In 1994 the CFAf was devalued against the French franc, thus temporarily restoring the currency equilibrium and competitiveness of the cotton industries.

The objective of this paper is to review the cotton sector policies and reform efforts of Benin, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Mali, Senegal and Togo and examine the nature and degree of distortions to price incentives.[2] These countries account for almost all WCA cotton output which is equivalent to about 3.5 percent of global production. The period under consideration spans 1970 to 2005. During this period the prices received by growers in all eight countries have been remarkably stable, fluctuating between CFAf 150 and 200 per kilogram of seed cotton (in real 2000 terms). Given the high variability of world prices, the gap between world and domestic prices reflects, for the most part, world price movements.

This paper argues that there have been four periods with distinct but also similar characteristics regarding incentives to cotton growers in all eight countries. First, from 1970 to 1984 (when the price collapse took place) the cotton sectors were heavily taxed with growers receiving about one third of the world price (ranging from a low of 30 percent in Mali to a high of 45 percent in Côte d'Ivoire). The second period which spans 1985 through 1993 (the year prior to the CFAf devaluation) was characterized by low world prices and an overvalued currency with growers in the region averaging 55 percent of the world price. The cotton companies faced severe financial difficulties during the end of that period and they had to be rescued repeatedly through budgetary support measures. The third period begins in 1994 and ends in 1997 when the East Asian financial crisis caused the commodity price collapse (including cotton). This period mirrors the first period in terms of high world price

[2] The eight countries studied here account for 99 percent of WCA cotton output. Three minor WCA cotton producers not included here are Central Africa Republic, Guinea, and Niger.

and the low share received by growers (42 percent of world price). Similarly, the last period, 1998 to the present, is a mirror image of the 1985-93 period, characterized by low world prices, growers receiving a relatively high share of world price (59 percent), the CFAf being (most likely) overvalued, and the cotton companies facing financial difficulties. The similarities between second and fourth period extend to the consideration of policy reforms; the key difference is that during the second period policy reforms called for restructuring the cotton companies so they become more efficient without altering their ownership structure. On the contrary, current policy reforms call for privatizing them.

The paper concludes that when all costs are considered, including inefficiencies in the ginning operations, the sector has been taxed quite heavily. With the exception of Cameroon during 1986-93, all countries have been taxed during all periods. Consistent with the share of prices received by producers, the rates of taxation were high during 1970-84 and 1994-97 (averaging 47 and 42 percent, respectively) and low during 1985-93 and 1998-2005 (averaging eight and five percent, respectively). With a few exceptions, these taxation rates have been remarkably similar across all countries. Note, however, that when ginning inefficiencies are not factored into the analysis, the second and fourth periods are characterized by subsidization.

The rest of the paper is structured as follows. The next section discusses the stylized facts of the WCA cotton sectors. The third section outlines the reasons why the reform efforts currently under consideration should be deepened. The subsequent section gives summary descriptions of the history and structure of each cotton sector along with the (limited) reform efforts. The penultimate section makes a quantitative assessment of the distortions, while the last section concludes.

Stylized facts of the WCA cotton sectors

The cotton industries performed well …

The performance of the WCA cotton industries has been viewed as a success story (Lele et al. 1989). Indeed, between 1970 and 1988, WCA cotton yields grew at 6.1 percent per annum, which compared to the 1.9 percent annual growth in world yields implies that if trends continued, WCA yields would have been similar to world yields by the early 1990s.

Moreover, cotton production in WCA increased 10-fold during the last 35 years, from a little over 100,000 tons in 1970 to one million tons in 2005.

In the eight WCA countries studied here, cotton provides income to more than 1.5 million households, equivalent to some 10 million people. During 2001-03, cotton contributed 10 percent to the merchandize exports and 2.1 percent to the GDP of the eight countries under consideration (see Table 2 for the importance of cotton as well numerous other statistics in all eight countries). In three of the eight countries (Benin, Burkina Faso and Mali) cotton is perhaps the single most important economic activity.

… but is not so healthy in terms of productivity …

Yet, the seemingly successful performance of the industries masked a number of weaknesses that called into question their long term sustainability. The post-1980 production increase solely reflects area expansion (in contrast to pre-1980 which reflected yields increase, mainly in response to fertilizer use). A growth decomposition analysis for the 1980-2005 period reveals that cotton yields in WCA countries remained (statistically) stagnant (see Figures 1 and 2). In fact, yields in six of the eight countries declined (Table 3). This compares unfavorably with the 1.7 percent annual growth rate of global cotton output, which is a reflection of yield increases only (see bottom panel of Table 3). Moreover, a comparison of WCA with Southern and Eastern Africa (SEA) shows that, despite their low level, SEA's yields have been growing at the same rate as world yields.

… and has a grossly inefficient pricing mechanism …

The panterritorial pricing mechanism, common to all WCA countries, while it delivered remarkable price predictability and stability, as it will be shown later, and also turned out to be a convenient and socially popular income redistribution mechanism, in effect transferring resources from efficient cotton growers (or growers with transportation and/or location advantages) to less efficient ones. This common price within each country has thus constrained overall growth and innovation in the industry by penalizing the most productive entities (or areas) of the sector.

Furthermore, growers received low prices even when world prices were extremely high (Figures 3-10). For example, during the early 1980s, WCA cotton producers were receiving 60-70 CFAf per kilogram for their seed cotton while the world price ranged

between (the equivalent of) 200 and 250 CFAf.[3] (For a description of the world price of cotton, often referred to as the A Index, see Appendix A.) Similarly, following the 1994 devaluation of the CFAf, producer prices were adjusted upwards but far less than the increase in world price, thus denying WCA cotton growers the high prices enjoyed by cotton producers elsewhere. In fact, as the econometric evidence will show later, there is practically no comovement between world prices and prices received by cotton growers. This is ironic considering that the various price formulae devised to determine the price to be paid to growers by the cotton companies use as their staring point the world price of cotton.

On the other hand, the early announcement of prices which often reflected political considerations rather than marker realities without any proper hedging mechanism in place implied that the cotton companies (and hence taxpayers of the respective countries or even aid agencies) assumed all the risks associated with world price and currency movements. Indeed, that meant that in periods of low prices and/or overvalued currency, most cotton companies experienced financial difficulties which in turn led to demands for fiscal transfers from government budgets, thus putting into jeopardy the fiscal position of these countries. For example, during the late 1990s the cotton company of Mali was in no position to manage the downturn in cotton prices because the stabilization fund, created to set aside a portion of profits from earlier periods of high prices, turned out to be empty, resulting in financial losses of CFAf 56 billion ($100 million).[4] Eventually, the cotton company was bailed out. Similar bailouts took place in several WCA countries following the two cotton price collapses—in the mid-1980s and in the late 1990s.[5] More recently, Burkina Faso, which was supposed to be

[3] Cotton refers to cotton lint, sometimes called cotton fiber (the internationally traded commodity). When reference to seed cotton (the farm product) is made, it is explicitly mentioned. The rate of conversion from seed cotton to cotton lint—the ginning outturn ratio—is currently about 42 percent in all WCA countries, i.e., one kg of seed cotton produces 0.42 kgs of cotton lint and 0.58 kgs of seeds, which, in turn, are transformed into cotton oil and cotton cake.

[4] Despite the poor performance of price stabilization funds and supply controls (see Gilbert 1996) there have been renewed calls for such mechanisms. See, for example, discussions in Ravry et al. (2006) and OXFAM (2007). The failure of stabilization mechanisms should not be surprising if one considers that during the seven 12-month intervals between March 1995 and March 2002, cotton prices declined six times and remained at the same level once, without experiencing any increase. Under such circumstances, any stabilization fund is likely to go bankrupt no matter how well is run. Conversely, if prices experience continued increases—a less likely scenario considering their long term downward trend—the stabilization fund is likely to be subject to misuse, as was the case in several WCA countries.

[5] The 1985 cotton price collapse was a result of a policy shift in US commodity programs (including cotton). It also reflects a policy shift in China that favored cotton production there. The decline in the late-1990s reflects the East Asian financial crisis, again common to most commodities. Nevertheless, cotton has not been part of the recent price boom (see Figure 11) with the likely reasons reflecting a combination of the following: (i) cotton subsidies continue to depress prices considerably; (ii) productivity gains from genetically modified (GM) cotton and other technological advances have kept production costs low, compared to other commodities; and (iii) the price increase in the overall commodity price index is due to the increasing demand of certain commodities for biofuels production (e.g., maize and sugarcane for ethanol and rapeseed for biodiesel).

the star cotton performer in WCA revealed a 3-year cumulative deficit of more than € 100 million.

Cotton companies still play a central role, but they are inflexible

Because of their inefficient and inflexible structure, the cotton companies were not sufficiently prepared (in terms of improved sales strategies, price and exchange rate risk management tools, and adoption of new technologies) to respond to the changing nature of the external environment, especially the downward trend and volatile nature of world prices—a reflection of technological changes and to some extent subsidies by some countries.[6] For example, consider that more than one third of global cotton output is now of genetically modified origin. Yet, with the exception of Burkina Faso, none of the WCA countries has allowed even field trials to assess the likely benefits and risks of such technology.[7] Furthermore, research has shown that the benefits of fully utilizing biotechnology may be even higher that the benefits from the elimination of all cotton trade distortions (Anderson, Valenzuela and Jackson 2008).

The exchange rate environment is not conducive

As noted earlier, the CFAf is fixed against the euro (or the French franc prior to 1999) and has been subjected to only one adjustment since 1948—from CFAf 50 to CFAf 100 per FF in 1994—it often leads to unintended consequences in the sense that WCA cotton growers may lose (or gain) from an over (under)-valued CFAf. This should not be surprising given the different structure of the euro zone economies compared to those of the WCA countries. Therefore, not only the WCA countries have been unable to adjust their currencies in accordance to the external environment they faced, cotton growers have been adversely affected by the recent weakness of the dollar against the euro. Consider, for example, that during 2005/06 the US$ A Index average was roughly the same as in 2000/01. However,

[6] For a review of the distortions in the global cotton market see Baffes (2005). The US cotton subsidies were subject to a WTO case brought by Brazil (see Schnepf 2004). Benin, Burkina Faso, Chad, and Mali also brought a case to the WTO demanding compensation from the countries that subsidize their cotton sectors (see Sumner 2006; Anderson and Valenzuela 2006).

[7] Under the West Africa Regional Biosafety Program, a $23.4-million World Bank technical assistance operation, the WAEMU countries are expected to establish national and regional biosafety policies and procedures in order to ensure proper assessment of the risks and benefits of biotechnology products (World Bank 2006).

during the same period the CFAf appreciated from 731 CFAf/$ to 535 CFAf/$, effectively reducing the world price of cotton in CFAf terms by 37 percent. Within the current political and macroeconomic setting it is beyond the control of individual WCA governments to choose the exchange rate regime that is consistent with the structure of their economies—but that makes the case for reforms even stronger, because the governments have one less policy tool at their disposal.

The case for revisiting reform strategies

Faced with these constraints, a number of WCA countries began reassessing the structure of their cotton industries. With financial and technical assistance from the donor community, especially the IMF and the World Bank, policy reforms were contemplated in order to bring the cotton sector back to a sustainable development path and, ultimately, increase the welfare of cotton growers. However, because the reforms were portrayed as ideologically driven, they were viewed with suspicion and, not surprisingly, were subjected to considerable opposition from the countries themselves as well as bilateral donors.[8]

In a survey of the cotton sectors of Mali, Burkina Faso, and Benin, Bourdet (2004, p. 41) described the reasons for such opposition as follows: "There are two reasons behind this limited ownership [of reforms] of home government. The first is the strong opposition on a part of the urban elite and some farmer associations in cotton-producing countries to the privatization of the state-owned ginning enterprises, which are at the center of the network of institutions and actors composing the cotton sector. The second is the opposition of some bilateral donors, in particular France as the main bilateral donor, to the deregulation of the sector. No doubt this 'lack of enthusiasm' on the part of the home government of cotton-producing countries and some bilateral donors has contributed to the slow pace and mixed outcome of reforms." Note that the unwillingness to engage in a serious reform effort during the mid-1990s—especially after the CFAf devaluation—reflected the fact that cotton prices were high and hence the cotton companies did not face any financial stress while the respective governments were benefiting from the taxation.

[8] When policy reforms were reconsidered in the mid-1990s, cotton prices were high so the resistance should not come as a surprise. It was after the collapse of cotton prices that reforms were seriously discussed. For a lively debate between the French and the World Bank on WCA cotton reforms see ICAC (1998a and 1998b). The World Bank's views can also be found in Baffes (2001).

Following the price decline that began in 1997, however, it became increasingly evident that reforming the cotton industry and allowing the private sector undertake some of the industry's activities was, perhaps, the only feasible alternative.[9] This view was slowly accepted, to various degrees, by bilateral donors as well as the countries themselves. For example, Edwards (2000, p. 2) concluded that "It is encouraging to note that the sometimes acrimonious nature of the recent debate with regard to the future of cotton in the Francophone producing countries appears to be giving way to a more constructive dialogue, even if consensus on all issues remains elusive."

Despite the understanding and "constructive dialogue" policy reforms have been limited, while the paths to reforms are quite diverse, as the following summary of the eight countries indicates. Reforms in Benin, which were undertaken 'by function', consist of three key elements: (i) separation of the various links in the cotton supply chain according to the different functions (input provision and distribution, seed cotton production, transport, ginning, and trading); (ii) division of the responsibility for handling these functions among a large number of actors—except for research and extension, which was considered a semi-public good that needed to be jointly funded by the private and public sectors; and (iii) organization of the key decision making process (including issues such as the price setting mechanism and cotton delivery time) into horizontally organized entities, which must all agree before any sector-wide decision is made.

The reform process in Burkina Faso was undertaken 'by region', in a sense reflecting the view that free riding risks of the cotton sector are high, especially with regards to the provision of inputs (and hence credit recovery) as well as research and extension services. The market is currently structured into three regional monopsonies—a dominant state-owned company accounting for about 90 percent of cotton purchases and two private companies, accounting for the rest.

Cameroon has not undertaken any reforms. The cotton company is still the key player of all aspects of the industry. However, during the past few years, producers through their umbrella organization have been in a position to influence considerably the decision making process, especially price determination. Privatization of the cotton company was considered in 1994 and again in 2003 but it didn't progress beyond the discussion stage.

In Chad, reforms can be characterized, perhaps, as non-existent. Although the government of Chad announced that it would disengage from the cotton sector in 1999, with

[9] Reform strategies in WCA have been discussed in various contexts. See, for example, Pursell (1998), Badiane et al. (2002), Goreux (2004), and Baghdadli (2006).

the single exception of the privatization of the cotton oil company, so far it has failed to act accordingly. Factors behind the unwillingness to reform include the fiscal difficulties of the cotton company (and hence limited interest by the private sector), the lack of ownership of reform by the government, and more recently the windfall revenue from crude oil which has practically absorbed all capacity and energy by officials who, otherwise, would have been in charge of the reform process.

Côte d'Ivoire undertook reforms in 1998 when the cotton company was broken into five entities, four privatively, and one publicly owned. Perhaps, cotton reforms in Côte d'Ivoire were the deepest in WCA. However, the performance of the sector has been constrained by the civil war. The Northern part of the country where most cotton is produced has been practically cut off from the South, the point of export. Not surprisingly, substantial quantities of cotton go unrecorded to neighboring Burkina Faso and Mali where producers receive a higher price compared to what the companies in Côte d'Ivoire pay.

Mali, which has contemplated reforms for quite some time, reconsidered its reform commitment in July 2004 and decided to proceed cautiously by carefully assessing the pros and cons of the reform process in other WCA countries. In November 2005, the government increased its share in the capital of the cotton company (from 60 to 70 percent) and publicly announced that reforms would be delayed for several years.

Senegal's cotton sector went through reforms in 2003, when 51 percent of the cotton parastatal's shares were transferred to DAGRIS while an additional 30 percent was given to producers. Although it is too early to assess these limited reform efforts, its cotton output during the past few years has been the highest in its history (albeit by a small margin); also the prices received by growers have been the second highest (after Benin) during 1998-2005.

In Togo, which has not undertaken any comprehensive reforms, the structure of its cotton sector is less rigid compared to the other countries. Half of Togo's cotton is privately ginned on behalf of the publicly-held cotton company (the remaining is ginned by the cotton company). As is the case with Cameroon, the government does not interfere much with the sector in the sense that it neither directly taxes it nor supports it in periods of low prices. Discussions for reforms have been held recently but no specific action plan has been proposed.

Details of each country's policies

One can safely argue that cotton reforms in WCA countries are far less advanced compared to reforms undertaken by cotton producing countries in Eastern and Southern Africa. This section summarizes the structure of the cotton sectors along with the key elements and reform processes of the eight countries under consideration.

Benin: 30 years experimentation with reforms and still lots of problems

During 2001-03 cotton contributed 37 percent to total merchandize exports and almost 5 percent to GDP for Benin. An estimated 325,000 households depend on cotton cultivation, implying that the livelihoods of nearly 2 million people are directly linked to the industry's performance. The average cotton plot in Benin is about one hectare while the typical household produces 450 kilograms of cotton lint, generating roughly $330 in gross income. Cotton in Benin is a rainfed crop. Two thirds of cotton growers prepare their land manually and some fertilizer and chemicals are used.

Although Benin has a long tradition in cotton cultivation, which started well before the colonial period, it became a commercial crop in 1952 when CFDT introduced a high-yielding cotton variety. Following independence in 1960, CFDT expanded its operations in Northern Benin while another French state-owned company SATEC (*Société d'Aide Technique et de Coopération*) introduced cotton in Central Benin. Towards the end of the 1960s, numerous Village Associations (*Groupments Villageois*) were formed specializing in input distribution, credit provision, and marketing.

Under the leftist regime of the 1970s, a new parastatal was created and took over all activities of the sector. In 1975 six rural development agencies were created—corresponding to the six provinces—with the responsibility of handling input supply and extension services. On the other hand, responsibility for ginning operations was given to another company. Despite the changes, the sector performed dismally. During 1976-81 cotton output averaged 7,000 tons, 8,000 tons less than the corresponding average during 1970-75 (see Table B1 in Appendix B). Following renewed interest by the government, all cotton-related activities were transferred to the new parastatal SONAPRA (*Société Nationale pour la Promotion Agricole)* in 1984, while numerous cotton development projects were introduced. In the meantime, the relationship with CFDT improved with the acceptance of limited technical assistance.

Reforms were first contemplated in the early 1990s mainly in response to an earlier crisis. Following an exceptionally good crop, cotton output increased form 34,000 tons in

1985 to 48,000 tons in 1986. However, the existing ginning operations were unable to process all cotton. Moreover, the decline in the world price of cotton (from $1.52/kg in 1985 to $1.08/kg in 1986) coupled with the appreciation of the CFAf (from 378 CFAf/$ to 316 CFAf/$) combined with unchanged producer prices of 110 CFAf/kg of seed cotton, caused SONAPRA to incur considerable financial losses. Under the Structural Adjustment Program of 1991, the government issued a Letter of Rural Development Policy that envisaged the transfer of the management of the sector to an interprofessional body based on the principles of a common guaranteed panterritorial price to producers, panterritorial prices for inputs, obligation for producers to sell their cotton to specific ginners, and obligation for ginners to buy all cotton from producers.

As a result of this policy shift the equivalent of 20 percent of input supply activities were privatized in 1993 on a pilot basis, increasing to 80 percent in 1995. SONAPRA eventually withdrew from the input supply market in 2000. A second step included issuing licenses to three new private ginning operations in 1995, followed by several more in 1998. That added 225,000 tons of seed cotton ginning capacity to an existing 335,000 tons by SONAPRA. Yet, the new structure caused numerous conflicts resulting in frequent political interference.

In response, the government created a number of entities which assumed responsibilities of various aspects of the cotton industry. They include a cooperative belonging to the Regional Producers Unions, GAGIA (*Coopérative d'Approvisionnement et de Gestion des Intrants Agricoles*), formed in 1998. A second entity, APEB (*l'Association Professionnelle des Egreineurs du Bénin*), was created in 1999 with key responsibility to coordinate activities among ginneries. Another organization was established in 1999, AIC (*l'Association interprofessionnelle du coton*) in order manage supply chain-related functions. Finally, CSPR (*Centrale de Sécurisation des paiements et de Recouvrement*) was formed in 2000 with the mandate to recover debts from growers, collect and deliver cotton to ginners, and make payments to producers.

Despite the creation of all these organizations and associations, it appears that the performance of the sector has not improved. During the 2003/04 season, one quarter of seed cotton was bought by private traders, which meant that those farmers who sold to the independent traders escaped the credit recovery scheme set up by CSPR. Consequently, tensions among different actors have escalated. The difficulties faced by the sector can be gauged by the sharp decline in cotton production from 171,000 tons of lint in 2004/05 to 82,000 tons in 2005/06.

Burkina Faso: The implosion of a star performer

Cotton is the most important cash crop in Burkina Faso, accounting for almost two thirds of total merchandise exports and contributing 5 percent to the country's GDP in 2001-03. The sector provides income to an estimated 210,000 households, implying that the as many as 1.5 million people are affected by the industry. The average cotton plot in Burkina Faso is a little less than 2 hectares.

Cotton was introduced in Burkina Faso towards the end of the colonial period. The development of the sector was the responsibility of CFDT, which remained in charge until 1975 when it was replaced first by a joint venture between the government and CFDT and in 1979 by the new cotton company, SOFITEX (*La Société Burkinabè des Fibres et Textiles*).

Reforms were first considered in 1991 when, under a Structural Adjustment Program, it was decided that management responsibilities of the cotton sector would be transferred to growers and the cotton company. In 1998 the government reduced its stake in the cotton company by transferring 30 percent of its shares to a producer organization, UNPCB (*Union Nationale des Producteurs de Coton du Burkina Faso*), and 34 percent to DAGRIS (*Développement des Agro-Industries du Sud*). As a second step, a 12-member committee was formed in 1999 in order to coordinate the functions of SOFITEX and UNPCB for activities such as determination of the farmgate and input prices and management of the research program. The committee's representation consists of seven producers, three SOFITEX representatives, and two government representatives. The third step involved the introduction of two private companies in 2004 with exclusivity zones for 8 years, representing about 15 percent of cotton production—the two companies are SOCOMA (*Société Cotonnière du Gourma*) and FASE COTON. In 2006 an umbrella organization was created to coordinate the actions of all three cotton companies.

Until very recently, the reform process in Burkina Faso was considered a success case compared to other WCA cotton-producing countries. In fact, AFD produced a report entitled "Cotton Cultivation in Burkina Faso: A 30-Year Success Story" (AFD 2004), which noted (p. 1) "Burkina Faso developed its cotton sector in an original homegrown way. Now one of the world's most competitive cotton industries, it has modern tools and institutions to sustain its development." Indeed, between 1995 and 2005, cotton output in Burkina Faso increased five-fold, from 64,000 to almost 300,000 tons (see Table B2 in Appendix B). Furthermore,

Burkina Faso is the only country in Sub-Sahara Africa (apart from South Africa) which is in the process of introducing GM cotton.

Yet, the expansion of the sector along with the drying up of the cotton stabilization fund as well the recently revealed € 110 million 3-year cumulative deficit, may call into question the sector's long term sustainability. Furthermore, it appears that despite the entrance of private ginneries as well as the restructuring of the ownership of SOFITEX, the government is still the key decision maker in the sector. To address the crisis, a new pricing formula has been agreed by the cotton companies and the producers as of March 2006. The pricing formula is part of a newly established smoothing fund (*fonds de lissage*)—to be distinguished from the earlier stabilization fund (*fonds de soutien*). The smoothing fund is expected to be professionally managed on agreed and easily monitored parameters (such as world price and exchange rate). However, as is the case with all stabilization funds, there is always the risk of running large deficits if adverse prices and/or exchange rate conditions persist for long.

Cameroon: A well-managed sector—so far, so good[10]

Cotton was introduced in Cameroon in the early 1950s under the aegis of CFDT. Initially, it was cultivated with only limited use of inputs. Following two decades of stagnation, the government promoted the use of inputs, in turn boosting yields from 200 kgs per hectare during the mid-1970s to 500 kgs per hectare during the mid-1980s. Since then, cotton production increased consistently to reach 100,000 tons of lint by 2000 (see Table B3).

Cameroon's cotton sector is managed by SODECOTON *(Société de Développement du Coton du Cameroun)*, the cotton parastatal in charge of most aspects of marketing and trade. SOEDCOTON, which was established in 1974, is owned by the government (59 percent), DAGRIS (30 percent), and a private local company (11 percent). Following the expansion of cotton during the 1980s, numerous village associations were formed and in 1994 they became organized cooperatives following an ADF-financed technical assistance project. In 2000, with the assistance of SODECOTON, these groups created an umbrella organization, OPCC (*Organisation des Producteurs de Coton du Cameroun)* whose role is to represent the interests of cotton producers, especially in the price determination mechanism,

[10] For more on distortions to cotton and other products in Cameroon, see Baumou and Masters (2007).

and as of 2005, the procurement of inputs. In addition to the marketing of lint, SODECOTON manages a cotton oil factory, which is a profitable part of the company.

The privatization of SODECOTON was first discussed by the government in 1994 within the framework of a structural adjustment program. However, the attempt did not materialize in part because of the poor financial shape of the company and in part due to some legal dispute regarding the terms of the sale. The issue of privatization was revisited in 2003 but did not go beyond the discussion stage. It appears, however, that there is not much political interference in the sector.

Chad: Windfall oil revenue puts the cotton reform agenda on the shelf

Chad's cotton sector is a major part of the economy, contributing 20 percent to total merchandize exports and 2.4 percent to GDP in 2001-03. The sector is the key source of income to some 200,000 households (or as many as 350,000 according to some sources); with an average household size of 5-6 persons, this amounts to 1.2-1.4 million people. The average cotton plot is about 1.5 hectares. Chad's cotton yields are very low, even by WCA standards (about half the yields in Benin or Burkina Faso).

Cotton cultivation was introduced in 1928 under forced labor conditions—Chad was the first WCA country to cultivate cotton. Production grew steadily to 40,000 tons during the early 1960s, making Chad the leading cotton producer in WCA. During 1970-75, Chad's cotton output averaged 46,000 of cotton lint, almost twice as much as Mali's average of 25,000 tons and three times as much as Benin's and Burkina Faso's average of 15,000 tons.

The cotton company of Chad—Cotonchad—was created in 1971, replacing the earlier parastatal, Cotonfran. The government is the majority shareholder (75 percent), followed by DAGRIS (19 percent), and the local private banking sector (6 percent). The key missions of Cotonchad were (and still are) to distribute inputs, purchase and gin seed cotton, and trade cotton through its commercial offices in Paris. Cotonchad faced serious difficulties during the price decline of 1985, which was further exacerbated by a drought during that year. Production declined from 60,000 in 1983/84 to 36,000 tons in 1984/85. It took the sector five years to return to earlier levels of output.

However, financial stress of Cotonchad, the heavy taxation from the government, along with civil war and the war with Libya, imposed a heavy burden on the sector (Azam and Djimtoingar 2002). For example, prices paid to cotton growers fluctuated at the low level of CFAf 80 to 100 between 1983 and 1993 (see Table B4 in Appendix B). The 1994

devaluation provided temporary relief to the sector, as prices paid to growers increased gradually from CFAf 90 in 1993 to CFAf 195 in 1997 (when cotton output exceeded 100,000 tons that year). However, the boom was short-lived, as world price declines along with mismanagement of the sector and heavy taxation forced Cotonchad to reduce the grower price to CFAf 160.

In response to these developments, the government set up a Cotton Sector Reform Committee in 1999 to evaluate likely reform strategies. The primary concern of the Committee was improving the incomes of cotton farmers through liberalizing the sector along with improving the performance of producer organizations. In 2002, the oil-soap factory was privatized, but that was the only policy reform. The government, together with Cotonchad, organized a workshop in April 2004 in Ndjamena in order to find ways to improve the financial situation of Cotonchad and boost cotton production. However, undertaking deeper reforms was not placed high on the agenda.

The momentum for reforms, which was not strong to begin with, has weakened even further following the country's windfall revenue from crude oil; not surprisingly, the cotton reform agenda has been affected in two interrelated ways. First, crude oil has displaced cotton as the key source of income for the government. Consider, for example, that during 2007 the export earnings from cotton are expected to be less than US$ 70 million, just a fraction of oil revenue which is expected to reach $1.2 billion—$930 million from taxes and $250 million from royalty fees. Second, the increased activity in the crude oil sector has practically absorbed all capacity and energy by officials who would (and could) have been in charge of reforms in the cotton sector.

Côte d'Ivoire: Courageous reform effort hampered by civil war[11]

Cotton, the third most important export crop after cocoa and coffee, accounted for about 3 percent of Côte d'Ivoire's agricultural exports in 2001-03. There are close to 300,000 cotton growers in Côte d'Ivoire, each cultivating an average cotton plot of a little more than a hectare. Most of Côte d'Ivoire's cotton production is concentrated in the North of the country, an area under great stress due to the civil conflict.

Cotton cultivation in Côte d'Ivoire was introduced in 1962 in the northern and central savannah regions of the country as means to diversify out of coffee and cocoa, the two key

[11] For more on distortions to cotton and other products in Cote d'Ivoire, see Abbott (2007).

export crops at the time. During the first decade, CFDT was handling all aspects of the cotton sector; the performance of the sector, however, was not that impressive as it only managed to reach around 20,000 tons of lint. In 1973 all aspects of the sector were turned over to the newly created parastatal, CIDT (*Compagnie Ivoirienne de Développement des Textiles)*, in which CFDT was a shareholder. The cotton sector grew considerably and by the mid-1990s it exceeded 150,000 tons of lint. Despite such growth, fueled mostly by the CFAf devaluation and high prices (which was common to all CFAf countries), it became apparent that the sector was characterized by numerous inefficiencies, especially at the ginning level.

In October 1998, the government undertook an important policy reform decision to privatize most of the cotton industry. Specifically, CIDT was broken into five smaller companies, each operating in a designated zone (i.e., the companies were geographical monopsonies). The first company, CIDT *Nouvelle*, is active in the South of the country and is owned entirely by the government; it owns four ginneries with installed annual capacity of 120,000 tons of seed cotton. The company recently expressed interest in selling 80 percent of its shares to cotton growers but the producer's association has not been able to raise the necessary capital to purchase the company. The second company, *Ivoire Coton*, which operates in the North-West of the country, is a joint venture between the *Aga-Khan* group and the Swiss-based cotton merchant, *Reinhart*; it owns three ginning operations equal in capacity to that of CIDT *Nouvelle*. The third company, the LCCI (*Compagnie Cotonnière Ivoirienne*) is a subsidiary of the Swiss-based *Aiglon* group and is active in the North-East of the country; it owns four ginning operations (including a new one, reportedly the largest ginning operation in WCA) with capacity of 230,000 tons of cotton seed. The other two companies SICOSA and DOPA own one ginning operation each with capacity of 60,000 and 30,000 tons of seed cotton, respectively.

In addition to the privatization of ginning, two new entities were introduced in the sector. First, the *Autorité de régulation du coton et de l'anacarde (ARECA)*, which is a government-owned enterprise in charge of regulating the cotton and cashewnut industries. Second, the *Interprofession de la filière coton* (*INTERCOTON*), is an association with the mandate to bring together all cotton-related professional organizations. However, it appears that the division of roles between ARECA and INTERCOTON is not well defined. Finally, the ginners have formed the *Association Professionnelle des sociétés cotonnières* (*APROCOT)* whose role is to promote cooperation among ginners.

The privatization efforts of Côte d'Ivoire's cotton sector has been the most advanced in the sense that four new private companies were allowed to enter the sector while the

government only kept a portion of the ginning capacity with the intention of liquidating it. The performance of the sector, however, has been thwarted by the civil conflict, which practically isolated most of the cotton producing areas of the North. Problems include theft and destruction of property, difficulties in transporting cotton to the port of Abidjan, lack of banking system to facilitate transactions, and frequent interruptions to ginning due to lack of parts and power outages (Signo 2007).

There are reports that substantial quantities of cotton marketed through neighboring Burkina Faso and Mali. It is unclear how much of the crop goes through these countries. While the average production of the last three seasons has been about two thirds of what it was during the second half of the 1990s, some of this reduction is due to the civil conflict. It is believed that more than 10 percent of the crop may be marketed through these countries (see Table B5) some estimates put the unrecorded exports up to one third of the crop, but this appears to be logistically impossible. Some diversion, however, certainly takes place since prices received by Ivorian cotton growers during the last two seasons have been the lowest among all WCA countries. For example, cotton growers in Burkina Faso received CFAf 210/kg in 2004/05 and CFAf 175/kg in 2005/06. Similarily, in Mali they received and CFAf 210/kg in 2004/05 and CFAf 168/kg in 2005/06. The corresponding prices for Côte d'Ivoire were CFAf 185/kg and CFAf 140/kg.

Mali: Not willing to engage in reforms until …

Cotton is Mali's most important cash crop. During 2001-03 it contributed 30 percent to total merchandise exports and more than 6 percent to the country's GDP. An estimated 300,000 households depend on the crop, which implies that as much as one-third of Mali's population is affected by the sector's performance. The average cotton plot in Mali is 2.6 hectares. As is the case with other WCA countries, cotton is a rainfed crop and most of the land is prepared manually. Cotton is typically rotated with food crops such as millet, sorghum, maize, and groundnuts.

Cotton was introduced in Mali during the late 1940s by CFDT, which continued its involvement even after independence in 1960. A national cotton company, CMDT (*Compagnie Malienne pour le Développement du Textile*), was formed in 1974 as a joint venture between the government (60 percent) and CFDT (40 percent). CMDT has played a key role in the ownership, management, and control of the various components in the supply chain, including the cotton oil-processing sector. It has also assumed responsibility for rural

development, particularly road maintenance and some extension services in the major cotton-growing areas. In addition to CMDT, another organization, OHVN (*Office de la Haute Vallee du Niger*) has been involved in the cotton sector since 1970. OHVN was allocated a specific part of the country to operate and has responsibility for the promotion of all crops. It is involved in all cotton production activities but not in ginning. CMDT which currently owns and operates two ginneries in the OHVN zone is paid by the latter to carry out ginning.

The first comprehensive review of the cotton sector was undertaken in 1989 and to a large degree the sector's current institutional setting reflects that review.[12] The key steps taken in 1989, which were supported by the donor community, included financial autonomy of CMDT, introduction of minimum producer price, and establishment of a stabilization fund. CMDT's weak management along with the 1999 decline of cotton prices resulted in a financial crisis. In response, CMDT set a low price for the 2000/01 season causing many growers to abandon cotton cultivation. Cotton output declined from 197,000 tons in 1999/2000 to 102,000 tons in 2000/01 (see Table B6 in Appendix B). Faced with these difficulties, the government prepared a comprehensive restructuring plan (*Lettre de Politique de Développement du Secteur Coton*), which envisaged reforming CMDT's institutional arrangements in order to restore the competitiveness of the sector and ultimately foster broad-based growth. The poor financial shape of CMDT, however, has persisted. Between 1997 and 2004, it generated profits only twice while the losses in 2005 alone amounted to some CFAf 48 billion ($91 million). Yet, the government has publicly announced that it will not engage in any reform effort until 2008.

Senegal: Cotton is too small to matter[13]

Senegal's cotton sector is very small compared to other sectors of the economy. It is also the smallest WCA cotton producer (excluding Central Africa Republic, Guinea, and Niger.) During 2001-03, the sector contributed 2 percent to merchandize exports and 0.3 percent to the country's GDP. Cotton export earnings during this period averaged a little over $20 million. An estimated 70,000 households are involved in cotton production, cultivating an average cotton plot of less than a hectare.

[12] Developments in the Malian cotton sector were also influenced by an uprising by cotton farmers in the early 1990s (Bingen 1998).
[13] For more on distortions to cotton and other products in Senegal, see Masters (2007).

Cotton was introduced in Senegal after independence. Production increased to 15,000 tons of lint during the mid-1970s and has remained at that level since then. All marketing and trade aspects of the sector were handled by SODEFITEX (*Société de Dèveloppement des Fibres Textiles*), a government-owned parastatal. In November 2003, DAGRIS became the majority shareholder of SOEDFITEX (51 percent). Cotton producers acquired 30 percent of the shares, while the government retained 10 percent. Local spinners received the remaining shares.

Cotton is ginned at SODEFITEX's five operations. Although it is too early to assess the reforms, it is noteworthy to note that during the past 4 seasons, Senegal's cotton output averaged 19,000 tons of lint, the highest average of any 4-year period since 1970 (see Table B7). Senegal also managed to pay cotton growers the second highest average real price (after Benin) during 1998-2005.

Togo: A lot of problems lately …

Cotton is Togo's second largest primary commodity export after phosphate fertilizer. It contributed 16 percent to export earnings and 4.2 percent to GDP in 2001-03. Togo's cotton production is in the same range as that of Chad; during 2001-03 it averaged 68,000 tons. Its yields, however, are much higher than in Chad but lower than in Benin, Burkina Faso, and Mali.

Cotton was introduced in Togo relatively recently. For example, during the early 1970s, cotton production averaged only 2,000 to 3,000 tons. In 1974, the state-owned company SOTOCO (*Société Togolaise de Coton*) begun its operations by handling most of the input supply and marketing activities as well as research, extension and maintenance of the road network (World Bank 1988). Production increased significantly after the 1980s, and exceeded 50,000 tons following the 1994 devaluation (see Table B8 in Appendix B).

Togo's cotton sector differs from the other WCA countries in that following the purchase of cotton half of the crop is sold to three private ginneries at a price equal to the price paid to the producers plus marketing and transportation costs. The share of cotton delivered to each ginnery is fixed, set as a proportion to its respective ginning capacity. While Togo's cotton sector was affected by the late-1990s decline in prices, SOTOCO responded quickly by cutting down operating costs and reducing the prices paid to growers. This was the only feasible alternative since there is no stabilization fund in place to cover losses, nor the government's tight financial situation allowed any budgetary support (IMF 2003). However,

the recent price declines appear to have derailed the sector's performance. During 2005/06, cotton production dropped to 28,000 tons, less than half of the decade's average.

Estimating the distortions to cotton sector incentives

The task of quantifying the distortions to cotton sector incentives contains elements of both simplicity and complexity. The simple part reflects the fact that there is a well-defined world price indicator, the A Index, one component of which is WCA cotton (see Appendix A). Since the price of WCA cotton tracks the A Index very closely, one can use it as the world price benchmark.[14] Second, all cotton companies pay panterritorial and panseasonal prices, thus making it is easy to calculate the gap between the world price and prices received by growers. Third, almost all cotton is exported and hence there is no need to deal with domestic marketing distortion issues. Fourth, most of the value of cotton comes from cotton lint, so calculating the distortion to cotton lint, to a large extent, captures the distortions in the entire cotton market. Lastly, the rate of conversion (i.e., the ginning ratio) between the farm product (seed cotton) and the internationally traded commodity (cotton lint) is a well-known parameter and very similar across countries and years.

However, there are a number of reasons that make quantification of the distortions a complex task. First, in addition to explicit taxation, the governments would 'use' the profits from the cotton companies for a number of other activities with the financial transactions not being explicitly documented. Second, in periods of low prices when the national cotton companies incurred losses, the governments would rescue them through budgetary transfers. Third, and most importantly, there are numerous inefficiencies inherent in the value chain—especially ginning—making it difficult to distinguish between inefficiencies and taxation. Fourth, often the cotton companies would transfer resources to producers through the provision of public services, such construction and maintenance of rural roads, again very difficult to quantify.

The rest of this section examines distortions to incentives from two different perspectives. First, with the use of an econometric model it estimates the degree to which world price movements influence the domestic price determination mechanism. Second, it

[14] In a study that examined the comovement of the various components of the A Index as well as the comovement between the A Index and its components, Baffes and Ajwad (2001) found that the WCA cotton prices tracked the A Index very closely.

calculates the Nominal Rate of Assistance (NRA) for all countries and years by taking into account international and domestic transportation costs as well as ginning costs.

Virtual absence of world price signal pass-through …

In order to estimate the degree to which the cotton pricing mechanism of the eight countries took into consideration world price movements, a standard OLS regression was estimated—for discussion in a similar context see Mundlak and Larson (1992) and Baffes and Gardner (2003).

$$\log(P_t^d/I_t) = \mu + \beta_1 \log(P_t^w R_t/I_t) + \beta_2 t + \varepsilon_t. \quad (1)$$

P_t^d denotes the price received by cotton growers (in nominal terms), I_t denotes the GDP deflator (a measure of inflation), P_t^w is the nominal world price of cotton (in dollar terms), R_t is the bilateral CFAf/$ nominal exchange rate, and t denotes time trend; μ, β_1, and β_2 are parameters to be estrimated while ε_t is the error term. A coefficient of β_1 close to unity would imply full transmission of world price movements to domestic prices while a coefficient equal to zero will imply no comovement at all. If β_2 is significantly different from zero, it whould imply that, accounting for world price movements, domestic prices have followed an increasing ($\beta_2>0$) or declining ($\beta_2<0$) trend.

Stationarity results for all variables in included in (1) as well as two additional specifications described below are reported in Table 4.[15] The first two columns report Augmented Dickey-Fuller unit root test results without and with trend (Dickey and Fuller 1979) while the last two columns report the corresponding Phillips-Perron statistics (Phillips and Perron 1988). With the exception of the nominal A Index when expressed in US$, $\log(P_t^w)$, and on a few occasions the deflated A Index expressed in CFAf, $\log(P_t^w R_t/I_t)$, all variables are non-stationary according to all four unit root statistics. One key policy conclusion from the results of Table 4 is that the non-stationarity of the nominal A Index expressed in CFAf implies that its first and second moments of its distribution do not exist. Because this is the variable policy makers are attempting to stabilize, its non-stationarity

[15] Note that apart from the exchange rate, which is the same in all countries and appears in only Benin, stationarity statistics for the A Index are reported for all countries because the GDP deflators and the ginning ratios employed to convert the A Index from lint to seed equivalent are different in each country.

implies any stabilization effort will fail since the variable will always tend to drift apart for long periods away from any perceived mean.

Results of (1) for each country are reported in the upper panel of Table 4. The results indicate that in only two countries the pricing mechanism took into account world price conditions and this is quite limited: Cameroon, with a price transmission elasticity of 0.24 (significant at the 5 percent level) and Senegal, with an elasticity of 0.14 (significant at the 10 percent level). However, given that the unit root test for Senegal reject stationarity of the error term, only the Cameroon elasticity can be viewed as different from zero.

Alternatively, (1) can be reparameterized by relaxing the homogeneity assumption for inflation as follows:

$$\log(P_t^d) = \mu + \beta_1 \log(P_t^w R_t) + \beta_2 \log(I_t) + \beta_3 t + \varepsilon_t. \quad (2)$$

Note that if $\beta_1 = \beta_2 - 1$, (2) collapses to (1). Results from (2) are reported in the middle panels of Table 5. These results differ from equation (1) in that in addition to Cameroon and Senegal, which still retain the significant price effect, Côte d'Ivoire has a price coefficient of 0.21, which is significant at 10 percent level. As expected, in all cases the inflation measure is significant at the 1 percent level. The size of the coefficient, however, varies from a low of 0.41 in Burkina Faso to a high of 1.34 in Cameroon.

Further reparameterizing (2) by relaxing the homogeneity assumption between world price and exchange rate gives:

$$\log(P_t^d) = \mu + \beta_1 \log(P_t^w) + \beta_2 \log(R_t) + \beta_3 \log(I_t) + \beta_4 t + \varepsilon_t. \quad (3)$$

Again, (3) collapses to (1) when $\beta_1 = \beta_2 = \beta_3 - 1$. Under the price/exchange rate homogeneity assumption, world price changes and exchange rate movements are expected to have identical affect on prices received by cotton growers. That is, a CFAf/$ depreciation or a decline in the world price of cotton would have the same effect on P_t^d. The lower panel of Table 5 reports results consistent with regression (3). In terms of the price effect, the results suggest that apart from the marginally significant parameter estimate of Cameroon (at the 10 percent level) none of the other parameters were significantly different from zero, indicating that

inflation has been the driving force in the few cases of the marginally significant price coefficients found earlier.

Not surprisingly, the inflation parameter estimate was significantly different from zero in all cases with the respective estimate ranging from a low of 0.49 in Burkina Faso to a high of 1.38 in Cameroon—the estimates of Benin and Côte d'Ivoire were remarkably close to unity. The time trend coefficient was significantly different from zero (at the 5 percent level) in four cases, in three of which it was positive (Burkina Faso, Mali, and Senegal) and one negative (Cameroon). The results on time trend were consistent throughout the three specifications.

The econometric evidence suggests that the price-setting mechanisms have largely ignored world market signals. It is also noteworthy to mention that in the cases where the domestic/world price linkage was somewhat significant (Cameroon, Côte d'Ivoire, and Senegal), cotton is of lesser importance to the economies compared to the remaining five countries. Hence, one may even conclude that in the five countries with zero transmission elasticities cotton is too important to be left to market forces.

In addition to the pass-through, the price variability of the prices that the farmers received and the prices that they would have faced was also calculated as follows:

$$Z = [\Sigma_t(P_t - P_{t-1})^2/(n - 1)]^{1/2}, \quad (4)$$

where P_t and P_{t-1} denote current and lagged price level while n (= 35) is the number of observations. The choice of the specific measure of price variability reflected the fact that prices are non-stationary and hence measures such as standard deviation may give misleading results.

Results of Z-statistic are given in the fourth panel of Table 6. Note that although there is a single world price, the different values among the eight countries reflect the adjustment by the domestic GDP deflator. As argued earlier (and consistent with the virtual absence of comovement between domestic and world price) the results indicate that the pricing mechanisms in all countries have reduced world price variability by factors between five and seven, i.e., world prices have been, on average, six times more volatile than domestic prices.

… with a high degree of taxation

The main focus of the present study's methodology (Anderson et al. 2008) is on government-imposed distortions that create a gap between domestic prices and what they would be under free markets. More specifically, this study computes an NRA for farmers including an adjustment for direct interventions on tradable inputs (border protection on fertilizers) and on non-tradable inputs (credit subsidies to farmers).

Quantifying the distortions requires three calculations and subsequent adjustments to the world price of cotton. First, the fob-cif costs are calculated, which are common to all WCA countries. Second, the inland transportation costs are calculated, which are different for each country (higher for land-locked countries and lower for countries with sea-port access). Third, the ginning costs (including farm-to-ginning transport costs) are calculated.

The A Index adjustment by the cif-to-fob costs consists of two components: international freight rates, i.e., costs from the export port to the final destination port, and marketing charges. Both of these cost components are common to all countries since international freight rates are very similar regardless of the port of origin (see Table B9, Appendix B). The second component of cif-to-fob costs is marketing charges. These are standard charges across the industry, representing 3 percent of the A Index until 2002/03 and 2.6 percent since then. These two costs account for an average of 8 percent of the A Index (see last column of Table B9).

Domestic transport costs for all eight countries are reported in Table B10. As expected, there are substantial differences between landlocked countries and countries with access to sea ports. Consider, for example, that in 2005/06 the costs of transporting one kilogram of cotton lint from Chad to the port of Duala (Cameroon) was CFAf 100; it was less than half of that for Benin, Senegal, and Togo, which have easier access to sea ports.

Ginning costs are reported in Table B9 (third column). They are averages of all eight countries and they range between CFAf 50/kg of cotton lint in the early 1970s to more than CFAf 200/kg after the mid-1990s. These figures represent the costs as they are reported in the financial statements of the cotton companies and consequently do not reflect the true costs of ginning, since the ginning operations are characterized by numerous inefficiencies. In order to obtain the true costs of ginning they must be adjusted downwards. Analysis performed during 2005, found that the actual ginning costs during that year were 18 percent lower than what the cotton companies reported.[16] However, it is believed that in earlier years, the true

[16] Personal communication with Gerald Estùr (March 16, 2007).

ginning costs were much lower, since the companies would finance activities of public-good (e.g., road maintenance). Hence, the adjustment factor used to estimate the actual ginning costs was 25 percent (i.e. it is assumed that ginning costs are 25 percent lower than what it is reported in the third column of Table B9).

Specifically, the NRA for period *t* was calculated as follows:

$$NRA_t = P_t^D/[(P_t^W - C_t^F)R_t - C_t^I - C_t^G], \quad (5)$$

where P_t^D denotes the price received by cotton growers as before, P_t^W denotes the A Index; C_t^F denotes freight rates and marketing charges; R_t denotes the CFAf/$ bilateral exchange rate (as before), March to July average, consistent with the WCA cotton marketing season; C_t^I denotes inland transport costs; and C_t^G denotes actual ginning costs (including farm-to-ginnery transport costs).

To illustrate, the calculation of the NRA for Benin (1970/71 season) is given in what follows (also outlined in the Table 6). The March-July (marketing period) 1971 average of the A Index was $ 0.69/kg of cotton lint (Table B9, first column). Freight rates and marketing costs were 8.1 percent of the A Index (Table B9, last column) hence the fob value of the A Index was $ 0.63/kg of lint (i.e. 91.9 percent of $ 0.69). At an exchange rate of 276 CFAf/$ (Table B9, second column), the fob price of cotton lint becomes CFAf 174/kg. Inland transport costs for lint were CFAf 8/kg (Table B10, first column), so the ex-gin price of lint becomes CFAf 166/kg. Ginning and farm-to-ginnery transport costs for lint were CFAf 38/kg (Table B9, third column), so the farmgate price of cotton lint becomes CFAf 128/kg. Applying the 38.1percent ginning outturn ratio (Table B1, fourth column) gives a farmgate cotton seed price of CFAf 49/kg. Comparing that to the CFAf 34/kg paid to cotton growers (Table B1, fourth column), gives a share of 70 percent or, equivalently, an NRA of -30 percent. Calculating these values for 1970/71 to 1974/75 and averaging them gives the -44 percent reported in the upper left cell of Table 8.

The calculation of the NRA presented here is consistent with the distortion taking place at farmgate level (i.e., production tax), a specification chosen on the basis that the cotton companies become the owners of seed cotton at farmgate level. Alternatively, one could have worked backwards, i.e. from farmgate to fob as follows: Adjust the CFAf 34/kg by the ginning ratio which gives CFAf 89/kg of lint. To that add ginning costs (CFAf 38/kg) and domestic transport costs (CFAf 8/kg), which gives an adjusted fob prices of CFAf 135/kg

of lint. That is equivalent to an NRA of -25 percent, calculated as 100*(135/179-1). This calculation would be consistent with an export tax (or subsidy if it were positive).

Results of distortions to incentives for all eight countries are reported in Table 6. Specifically, the first three panels give the period averages for all eight countries on the domestic value of the A Index, price received by producers (both in constant 2000 terms), and producer's share. The results confirm the earlier assertion that producers' share has been low during the first (1970-84) and third (1994-97) periods and much higher during the second (1985-93) and fourth (1998-2005) period.

The lower two panels of Table 6 report the NRA when all costs are taken into consideration (i.e., freight rates and inland transport costs as well as ginning costs).[17] Specifically, the penultimate panel reports NRAs based on the reported ginning costs while the lower panel reports NRAs based on the assumed actual (i.e., "discounted") ginning costs. A value of 100 indicates no taxation or subsidization while values of less (more) than 100 indicate taxation (subsidization). In a sense, the differences between the values reported in the penultimate and bottom panels of Table 5 may be viewed as the "inefficiency" factor.

Based on the discounted ginning costs, the WCA cotton growers have been taxed, on average, by 47 percent during 1970-84 and 42 percent during 1994-97. However, they have incurred a small tax of eight and five percent during 1985-93 and 1998-2005, respectively. The heaviest taxation has taken place in Mali, where during the first and third period farmers were taxed at 57 and 48 percent, respectively. On the contrary, the lowest taxation has taken place in Cameroon with rates of 39 and 34 percent during these two periods. It is also noteworthy to mention that the high taxation during the first and third periods was consistent across all eight countries as was the case with the low taxation in the third and fourth periods, with the exception of Cameroon, which was subsidized in the second period.

Lastly, Table 8 reports results based on the same NRAs with the value of zero (instead of 100) indicating no taxation or subsidization (these results are also based on 5-year averages). The region averages are also depicted in Figure 12.

Concluding remarks and limitations

[17] During the second and fourth period where the average NRA appears to be small, there have been years of both taxation and subsidization so the period average NRA underestimates the degree of distortions.

This paper reviewed the cotton sector policies and examined the nature and degree of distortions to incentives in eight WCA countries, namely, Benin, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Mali, Senegal and Togo. These countries account for almost all WCA cotton output, roughly equivalent to 3.5 percent of global production. The period under consideration spans 1970 to 2005.

A number of conclusions emerge from the analysis of this paper. The pricing schemes of the cotton companies have induced remarkable price stability. However, regressions of the price received by cotton growers on the world price of cotton indicated that there is virtually no comovement between these two prices, meaning that the price decision making process did not take into account world price signals.

This paper assumed that during 1970-2005, there have been four sub-periods regarding incentives to cotton growers with similar but also distinct characteristics. First, during 1970-84 the cotton sectors were heavily taxed at an average rate of 47 percent (the highest rate of taxation was in Mali, 57 percent while the lowest was in Cote d'Ivoire, 37 percent). During the second period, there was a low taxation incident, on average eight percent (which also includes subsidization in Cameroon). During this period the cotton companies faced severe financial difficulties and they had to be rescued repeatedly through budgetary support measures. In the third period, which begins with the devaluation of the CFAf in 1994 and ends with the beginning of the price decline in 1997, the sectors were taxed, on average, by 42 percent. During the last period, 1998 to present (which in many ways is a mirror image of the 1985-93 period), cotton growers were taxed, on average, at five percent. Note that the last period was characterized by low world prices, the CFAf being (most likely) overvalued, and most cotton companies facing financial difficulties.

One of the limitations of this paper is that it did not address exchange rate misalignment. Indeed, as was the case during the early 1990s, it appears that the CFAf is currently overvalued imposing an implicit taxation to the cotton sector. The reason the issue was not covered here reflects the lack of consistent overvaluation indices. Of the three choices at hand, none appeared to be satisfactory. First, the IMF real effective exchange rate index covers only three countries while it has indexed it to 2000, effectively implying that misalignment in that year was zero. Second, using the PPP approach would require assumption about a year in which the misalignment would have been zero. Third, some recent World Bank WCA misalignment estimates were not deemed adequate to address the overvaluation issues for all eight countries.

References

Abbott, P. (2007), "Distortions to Agricultural Incentives in Cote d'Ivoire", Agricultural Distortions Working Paper 46, World Bank, Washington DC, December.

AFD (Agence Française Dèveloppement) (2004), "Cotton Cultivation in Burkina Faso—A 30-Year Success Story", Case study presented at the conference "Scaling Up Poverty Reduction", Shanghai, May 25-27. <http://info.worldbank.org/etools/reducingpoverty/index.html>

Anderson, K., M. Kurzweil, W. Martin, D. Sandri and E. Valenzuela (2008), "Methodology for Measuring Distortions to Agricultural Incentives," Agricultural Distortions Working Paper 02, World Bank, Washington DC, revised January.

Anderson, K., E. Valenzuela and L.A. Jackson (2008), "Recent and Prospective Adoption of Genetically Modified Cotton: A Global CGE Analysis of Economic Impacts", *Economic Development and Cultural Change* 56(2): 265-96, January.

Anderson, K. and E. Valenzuela (2007), "The WTO's Doha Cotton Initiative: A Tale of Two Issues", *The World Economy* 30(8): 1281-1304, August.

Azam, J.-P. and N. Djimtoingar (2004), "Cotton, War, and Growth in Chad (1960-2000)", Growth Working Paper no. 6, Africa Economic Research Consortium, Nairobi.

Badiane, O., D. Ghura, L. Goreux and P. Masson (2002), "Cotton Sector Strategies in West and Central Africa", *Policy Research Working Paper* 2867, World Bank, Washington DC.

Baffes, J. (2005), "The 'Cotton Problem'", *World Bank Research Observer* 20: 109-44.

Baffes, J. and B. Gardner (2003), "The Transmission of World Commodity Prices to Domestic Markets under Policy Reforms in Developing Countries", *Journal of Policy Reform* 6(3): 159-180, September.

Baffes, J. (2001), "Policy Reforms in the Cotton Market", in *Commodity Market Reforms: Lessons from Two Decades*, ed. T. Akiyama, J. Baffes, D. Larson and P. Varangis, Regional and Sectoral Studies, World Bank, Washington DC.

Baffes, J. and M. Ajwad (2001), "Identifying Price Linkages: A Review of the Literature and an Application to the World Market of Cotton", *Applied Economics* 33: 1927-41.

Baffes, J., I.A. Elbadawi and S.A. O'Connell (1999), "Single-Equation Estimation of the Equilibrium Real Exchange Rate", in *Exchange Rate Misalignment: Concepts and*

Measurements for Developing Countries, ed. L.E. Hinkle and P.J. Montiel, New York: Oxford University Press.

Baghdadli, I. (2006), "Strategies for Cotton in West and Central Africa: Enhancing Competitiveness in the 'Cotton-4'—Benin, Burkina Faso, Chad, and Mali", mimeo, African Region, World Bank, Washington DC.

Bamou, E. and W. Masters (2007), "Distortions to Agricultural Incentives in Cameroon," Agricultural Distortions Working Paper 42, World Bank, Washington DC, December.

Bingen, J. (1998), "Cotton, Democracy, and Development in Mali", *Journal of Modern African Studies* 36(2): 265-85.

Bourdet, Y. (2004), *A Tale of Three Countries—Structure, Reform and Performance of the Cotton Sector in Mali, Burkina Faso and Benin*, Country Economic Report no. 2004:2, Stockholm: Swedish International Development Cooperative Agency (SIDA).

Devarajan, S. (1999), "Estimates of Real Exchange Rate Misalignment with a Simple General-Equilibrium Model", in *Exchange Rate Misalignment: Concepts and Measurements for Developing Countries*, ed. L.E. Hinkle and P.J. Montiel. New York: Oxford University Press.

Dickey, D. and W.A. Fuller (1979), "Distribution of the Estimators for Time Series Regressions with Unit Roots", *Journal of the American Statistical Association* 74: 427-431.

Edwards, M. (2000), "Cotton in the Franc Zone", *Cotton Outlook, Special Issue*, Liverpool UK.

Gilbert, C. (1996), "International Commodity Agreements: An Obituary Notice", *World Development* 24: 1-19.

Goreux, L. (2004), "Reforming the Cotton Sector in Sub-Saharan Africa", Africa Region Working Paper 47, World Bank, Washington DC.

International Cotton Advisory Committee (1998a), "Statement of France", *Statements of the International Cotton Advisory Committee*, pp. 45-50, Washington DC: ICAC.

International Cotton Advisory Committee (1998b), "Statement of the World Bank", *Statements of the International Cotton Advisory Committee*, pp. 50-52, Washington DC: ICAC.

International Monetary Fund (2003), *Article IV Consultation and Review of the Staff-Monitored Program*, Country Report 03/383, Washington DC: IMF.

Hinkle, L.E. and P.J. Montiel (1999), *Exchange Rate Misalignment:Concepts and Measurements for Developing Countries*, New York: Oxford University Press.

Lele, U., N. Van de Walle and M. Gbetobouo (1989), "Cotton in Africa: An Analysis of Differences in Performance", Managing Agricultural Development in Africa Discussion Paper 7, The World Bank, Washington DC.

Masters, W. (2007), "Distortions to Agricultural Incentives in Senegal", Agricultural Distortions Working Paper 41, World Bank, Washington DC, December.

Mundlak, Y. and D.F. Larson (1992), "On the Transmission of World Agricultural Prices", *The World Bank Economic Review,* 6: 399-422.

OXFAM (2007), "Pricing Farmers out of Cotton: The Costs of World Bank Reforms in Mali", Briefing Paper no. 99, Oxford.

Phillips, P.C.B. and P. Perron (1988), "Testing for a Unit Root in Time Series Regression", *Biometrica*, 65: 335-346.

Pursell, G. (1998), "Cotton Policies in Francophone Africa", mimeo, International Economics Department, World Bank, Washington DC.

Ravry, C., J.-J. Pesquet, N. Gergely, G. Estur and F. Bioche (2006), "Feasibility Study of Joint Price Smoothing and Hedging Strategies for Cotton Sectors in West and Central Africa", mimeo, Agence Française Dèveloppement (AFD), Paris.

Schiff, M. and A. Valdes (1992), *The Political Economy of Agricultural Pricing Policy, Volume 4: A Synthesis of the Economics in Developing Countries,* Baltimore: Johns Hopkins University Press for the World Bank.

Schnepf, R. (2004), *U.S.-Brazil WTO Cotton Subsidy Issue*, Congressional Research Service Report, Washington DC.

Signo, K. (2007), "The Crisis in Côte d'Ivoire's Cotton Industry", *Cotton: Review of the World Situation*, 60: 12-27.

Sumner, D. (2006), "Reducing Cotton Subsidies: The DDA Cotton Initiative", in *Agricultural Trade Reforms and the Doha Development Agenda*, ed. K. Anderson and W. Martin, London: Palgrave Macmillan and Washington DC: World Bank.

World Bank (1988), *Togo: Cotton Sector Development Project*, Staff Appraisal Report no. 7170-TO, Agriculture Operations, Occidental and Central Africa Department, Washington DC: World Bank.

World Bank (2006), *West Africa Regional Biosafety Project*, Project Information Document, Africa Region, Washington DC: World Bank.

World Bank (2007 and earlier), *Commodity Price Data,* Washington DC: World Bank.

Box 1: The CFA Franc and Cotton in WCA

The CFA Franc (CFAf) is the common currency of 14 West and Central African countries comprising two groups, members of the Franc Zone. One group includes Benin, Burkina Faso, Côte d'Ivoire, Guinea Bissau, Mali, Niger, Senegal, and Togo which form the West African Economic and Monetary Union (WAEMU) and whose common central bank is the Central Bank of West African States (BCEAO). The other group includes Cameroon, Central African Republic, Congo, Gabon, Equatorial Guinea, and Chad which form the Central Africa Economic and Monetary Community (CEMAC) and whose common central bank is the Bank of Central African States (BEAC).

The CFAf was created in 1945, when France ratified the Bretton Woods agreement. At that time, the CFAf was the acronym for Franc of the French Colonies of Africa (*Franc des Colonies Françaises d'Afrique*). In 1958, it became Franc of the French Community of Africa (*Franc de la Communauté Française d'Afrique*). Today it means Franc of the African Financial Community (*Franc de la Communauté Financière d'Afrique*) for WAEMU members and Franc of Financial Cooperation in Central Africa (*Franc de la Coopération Financière en Afrique Centrale*) for CEMAC members. Initially, convertibility with the French Franc (FF) was set at 0.59 CFAf/FF, becoming 0.50 CFAf/FF after the 1948 devaluation of the French Franc. In 1958 two zeros were added to the existing denomination, making it 50 CFAf/FF.

During the early 1990s, it had become increasingly apparent that the CFAf was overvalued. The degree of overvaluation, however, differed markedly among WCA countries. Baffes, Elbadawi, and O'Connell (1999, p. 450-51), for example, based on a single equation framework estimated that during the early 1990s, the CFAf was overvalued more than 30 percent in Côte d'Ivoire while it was roughly in equilibrium in Burkina Faso. Devarajan (1999, p. 370), based on a simple general equilibrium model, concluded that the CFAf overvaluation in 1993 (one year prior to the devaluation) was: Cameroon (78 percent), Togo (52 percent), Mali (39 percent), Côte d'Ivoire (36 percent), Senegal (22 percent), Burkina Faso (9 percent), Benin (3 percent), and Chad (-19 percent, i.e., undervalued). For an extensive discussion of issues surrounding the CFAf overvaluation see Hinkle and Montiel (1999). In January 1994 the CFAf was re-pegged to the French Franc at 100 CFAf/FF and in 1999 it was linked to the euro at 656 CFAf/€, keeping its former parity with the FF.

The 1994 adjustment to the CFAf, which (temporarily) restored the currency equilibrium in most WCA countries, coupled with the cotton price increases of the mid-1990s induced considerable supply response in the cotton sectors of most WCA countries. For example, regional cotton production increased from 573,000 tons in 1993/94 (the year prior to devaluation) to 921,000 tons in just four years. For the nine years that followed, however, cotton output remained, for the most part, stagnant at 900,000 tons. Such stagnation along with the financial difficulties of the cotton companies may have to do, in part, with the (likely) overvalued CFAf. This should not be surprising. During 2005/06 the US$ A Index average was roughly the same as in 2000/01. However, during the same period the CFAf appreciated from 731 CFAf/$ to 535 CFAf/$, effectively reducing the world price of cotton in CFAf terms by 37 percent.

Table 1. Key institutions involved in the cotton industries of WCA countries

Institution/Entity	Status	Main Functions And Responsibilities
FRANCE		
DAGRIS (*Développement des Agro-Industries du Sud*)	Government	Known as CFDT (*Compagnie Française de Développement des Fibres Textiles*) prior to 2001, it pioneered the cotton sectors in most WCA countries.
COPACO (*Compagnie Cotonnière*)	Subsidiary of DAGRIS	Used to trade most of WCA cotton; it currently trades about 5 percent of WCA cotton.
CIRAD (*Centre de Cooperation Internationale en Recherche Agronomique pour le Développement*)	Government	French Agricultural Research Institute with numerous research programs including activities responsible for the development of cotton varieties and input packages for WCA countries.
AFD (*Agence Française de Développement)*	Government	Development Agency of France financing projects in Francophone countries.
BENIN		
SONAPRA (*Société Nationale pour la Promotion Agricole)*	Parastatal	The cotton company of Benin; it used to be responsible for all aspects of the industry. Now it has relinquished control of most of its activities to other entities (see below).
GAGIA (*Coopérative d'Approvision-nement et de Gestion des Intrants Agricoles*)	Private	It was formed in 1998, a cooperative belonging to the Regional Producers unions. It represents the interests of the cotton companies.
APEB (*l'Association Professionnelle des Egreineurs du Bénin*)	Private	It was created in 1999 with the key responsibility to coordinate activities among ginneries.
AIC (*l'Association Interprofessionnelle du Coton*)	Private	It was established in 1999 in order manage supply chain-related functions.
CSPR (*Centrale de Sécurisation des paiements et de Recouvrement*)	Private	Created in 2000 with the mandate to recover debts from grower, deliver cotton to ginners, and make payments to growers.
BURKINA FASO		
SOFITEX (*La Société Burkinabè des Fibres et Textiles*)	Parastatal	The cotton company of Burkina Faso, with ownership, 36 percent by the government, 30 percent by UNPCB (see below) and 34 percent DAGRIS.
UNPCB (*Union Nationale des Producteurs de Coton du Burkina Faso*)	Private	Producer organization, which has a strong say on SOFITEX's decisions such as prices received by growers, selling prices of inputs, and management of the research program.
FASO COTON	Private	A private cotton company introduced in 2004, with an 8-year exclusivity right in the Central cotton zone.
SOCOMA (*Société Cotonnière du Gourma*)	Private	A private cotton company introduced in 2004, with an 8-year exclusivity right in the Eastern cotton zone.
AIC *(Association interprofessionnelle du cotton)*	Private	An APEX organization whose key mission is to enforce industry-level agreements regarding the management of the supply chain such as price setting and to coordinate and supervise common functions such as input supply.

Continued

Table 1 cont. Key institutions involved in the cotton industries of WCA countries

Institution/Entity	Status	Main Functions And Responsibilities
CAMEROON		
SODECOTON *(Société de Développement du Coton du Cameroun)*	Parastatal	The cotton company of Cameroon; it is owned by the government (59 percent), DAGRIS (30 percent), and a private local company (11 percent).
OPCC (*Organisation des Producteurs de Coton du Cameroun)*	Private	Umbrella organization of cotton producer groups, established in 2000.
CHAD		
Cotonchad	Parastatal	The cotton company of Chad, in charge all marketing and trade aspects of the industry, including managing direct sales through its Paris-based office.
CÔTE D'IVOIRE		
CIDT (*La Compagnie Ivoirienne de Développement des Textiles)*	Parastatal	The cotton company of Côte d'Ivoire that handled all marketing and trade aspects of the industry; it is called CIDT *Nouvelle* since 1998 (owns four ginneries).
Ivoire Coton	Private	It is a joint venture between the *Aga-Khan* group and the Swiss-based merchant, *Reinhart*, operates in the North-West of the country (owns three ginneries).
LCCI (*La Compagnie Cotonnière Ivoirienne*)	Private	A subsidiary of the Swiss-based *Aiglon* group that operates in the North-East of the country (owns four ginneries).
SICOSA (*Société Industrielle Cotonnière des Savanes*)	Private	Owned by a producer's association; it operates one ginnery.
DOPA (*Département des Opérations Agro-industrielles*)	Private	A partnership among a group of spinners; it operates one ginnery.
APROCOT (Association professionnelle des sociétés cotonnières)	Private	An association whose role is to promote cooperation among ginners.
ARECA (*Autorité de régulation du coton et de l'anacarde)*,	Government	In charge of regulating the cotton and cashewnut industries.
INTERCOTON (Interprofession de la filière coton),	Government	Its mandate is to bring together all cotton-related professional organizations.
MALI		
CMDT (*Compagnie Malienne pour le Développement du Textile*)	Parastatal	The cotton company of Mali, handling almost all marketing and trade aspects of the cotton industry.
OHVN (*Office de la Haute Vallee du Niger*)		Company involved in the promotion of many crops, including cotton. It is involved in cotton production (not ginning) in a specific part of the country.
SENEGAL		
SODEFITEX (*Société de Dèveloppement des Fibres Textiles*)	Parastatal	The cotton company of Senegal, which used to handle all aspects of marketing and trade until 2002, when majority shareholding was transferred to DAGRIS.
TOGO		
SOTOCO (*Société Togolaise de Coton*)	Parastatal	The cotton company of Togo, handling all production and marketing activities of the industry, except ginning half of the cotton crop, which is done in three private ginneries.

Source: Various country sources.

	Benin	*Faso*	*Cameroon*	*Chad*	*d'Ivoire*	*Mali*
COUNTRY-LEVEL STATISTICS						
Per capita GDP (constant 2000 $)	322	241	709	192	593	231
Per capita GNI (current PPP $)	1,023	1,087	1,913	987	1,435	893
Population (million)	7.7	12.0	15.5	8.8	17.3	6.2
Rural population (% of total)	56	83	49	75	56	68
Merchandise exports ($ million)	454	263	1,932	325	5,000	842
COTTON-RELATED STATISTICS						
Value of cotton exports ($ million)	168	201	111	64	146	253
Cotton's export share (%)	36.9	76.6	5.7	19.7	2.9	30.0
Cotton's contribution to GDP (%)	4.9	5.0	0.8	2.6	1.0	6.2
Cotton production (000 tons, lint)	152	177	99	59	139	225
Cotton area (000 hectares)	331	408	200	277	253	510
Cotton yields (kg/hectare, lint)	459	435	498	213	532	439
Grower price (CFAf/kg, seed cotton)	202	190	186	162	190	193
Average cotton plot (hectares)	1.0	1.9	0.7	1.4	1.3	2.6
Households in cotton production (000)	325	210	300	200	200	300

Source: Food and Agriculture Organization (FAOSTAT), World Bank (World Development Indicators), IMF (International Financial Statistics), various country sources, and author's calculations.

Table 3. Production, area and yield growth decomposition, WCA countries, 1980 to 2005

	μ	β	ρ	$Adj\text{-}R^2$	*DW*	*ADF*	*PP*
BENIN							
Production	0.22	0.12***	12.7%	0.78	0.46	-1.77	-1.72
	(0.52)	(9.21)					
Area	1.51***	0.11***	11.3%	0.82	0.43	-0.68	-0.81
	(4.40)	(10.4)					
Yield	5.62***	0.01*	1.4%	0.10	1.11	-4.97***	-4.98***
	(26.1)	(1.96)					
BURKINA FASO							
Production	1.45***	0.09***	9.2%	0.90	0.72	-2.09	-2.09
	(7.59)	(15.2)					
Area	2.58***	0.08***	8.5%	0.92	0.84	-3.05**	-2.50
	(16.0)	(16.8)					
Yield	5.87***	0.01*	0.7%	0.11	1.43	-3.87***	-3.79***
	(49.1)	(2.00)					
CAMEROON							
Production	2.41***	0.05***	5.3%	0.88	1.75	-4.15***	-4.15***
	(19.0)	(13.5)					
Area	3.00***	0.06***	5.7%	0.91	1.00	-2.74*	-2.89*
	(26.6)	(16.3)					
Yield	6.32***	-0.00	-0.4%	0.06	2.14	-5.28***	-5.29***
	(85.4)	(1.64)					
CHAD							
Production	2.96***	0.03***	3.2%	0.47	1.59	-3.95***	-3.94***
	(13.4)	(4.78)					
Area	4.22***	0.03***	3.6%	0.70	1.37	-3.83***	-3.82***
	(28.1)	(7.76)					
Yield	5.65***	-0.00	-0.4%	0.00	1.37	-4.25***	-4.25***
	(38.1)	(0.74)					
CÔTE D'IVOIRE							
Production				0.48	1.48	-3.77***	-3.73***
	3.62***	0.03***	3.2%				
	(17.3)	(4.95)					
Area				0.82	1.05	-2.65*	-2.86*
	4.27***	0.03***	3.2%				
	(42.8)	(10.6)					
Yield				0.00	1.78	-4.47***	-4.49***
	6.25***	-0.00	0.0%				
	(43.7)	(0.05)					

Continued next page

Table 3 cont. Production, area and yield growth decomposition, WCA countries, 1980 to 2005

	μ	β	ρ	$Adj\text{-}R^2$	*DW*	*ADF*	*PP*
MALI							
Production				0.87	1.66	-4.07***	-4.09***
	2.38***	0.07***	7.6%				
	(12.7)	(13.0)					
Area				0.89	1.82	-4.49***	-4.49***
	3.04***	0.08***	7.9%				
	(17.4)	(14.5)					
Yield	6.27***	-0.01	-0.3%	0.05	0.63	-1.05	-3.67**
	(71.8)	(1.48)					
SENEGAL							
Production	2.51***	0.00	0.3%	0.00	1.17	-3.46***	-3.46***
	(7.59)	(0.33)					
Area	3.45***	0.00	0.5%	0.00	1.35	-3.42**	-3.42**
	(13.9)	(0.62)					
Yield	5.98***	-0.00	-0.2%	0.00	1.62	-4.31***	-4.32***
	(20.6)	(0.16)					
TOGO							
Production				0.67	0.68	-1.41	-1.26
	1.23***	0.07***	7.4%				
	(3.73)	(7.22)					
Area				0.85	0.83	-1.63	-1.62
	1.97***	0.08***	7.8%				
	(9.24)	(16.5)					
Yield	6.17***	-0.00	-0.4%	0.00	0.80	-2.50	-2.40
	(34.1)	(0.65)					
WCA							
Production	4.25***	0.06***	6.5%	0.92	0.95	-2.71*	-2.63*
	(34.8)	(17.1)					
Area	5.15***	0.06***	6.3%	0.95	1.19	-3.05**	-3.04**
	(55.5)	(22.5)					
Yield	6.01***	0.00	0.2%	0.00	0.99	-3.87***	-4.62***
	(81.1)	(0.67)					
WORLD							
Production				0.69	1.64	-2.31	-4.11***
	9.28***	0.02***	1.7%				
	(126.1)	(7.55)					
Area	10.4***	0.00	0.1%	0.00	1.55	-5.00***	-4.27***
	(226.3)	(0.42)					
Yield				0.81	1.00	-2.02	-3.37***
	5.80***	0.02***	1.6%				
	(113.1)	(10.5)					

Notes**:** The growth rate has been calculated as $\rho = \exp(\beta)-1$ from the following regressions: $\log(X_t) = \mu + \beta t + \varepsilon_t$, where X_t refers to production, area, or yield, t is time trend, while ε_t denotes the error term (absolute *t-ratios* in parentheses); μ and β denote parameters to be estimated. DW, ADF, and PP denote the Durbin-Watson, Augmented Dickey-Fuller, and Phillips-Perron statistics, which complement the conventional statistics in assessing the performance of the models. Asterisks correspond to significance levels of 1% (***), 5% (**), and 10% (*).

Source: Authors calculations

Table 4. Stationarity statistics, WCA countries

	ADF		*PP*	
	w/o trend	***w/ trend***	***w/o trend***	***w/ trend***
BENIN				
$\log(P_t^d/I_t)$	-2.43	-2.50	-2.43	-2.52
$\log(P_t^w R_t/I_t)$	-2.32	-4.09**	-2.12	-4.11**
$\log(P_t^d)$	-1.50	-3.19	-1.50	-1.59
$\log(P_t^w R_t)$	-2.40	-3.11	-2.40	-3.13
$\log(I_t)$	-1.70	-3.11	-1.49	-1.67
$\log(P_t^w)$	-3.98***	-3.67**	-4.04***	-3.66**
$\log(R_t)$	-1.05	-2.36	-1.16	-2.50
BURKINA FASO				
$\log(P_t^d/I_t)$	-2.57	-2.88	-2.55	-2.87
$\log(P_t^w R_t/I_t)$	-3.06**	-3.75**	-3.01**	-3.71**
$\log(P_t^d)$	-1.26	-2.08	-1.27	-2.18
$\log(P_t^w R_t)$	-2.38	-2.83	-2.38	-3.03
$\log(I_t)$	-2.41	-1.22	-2.14	-1.36
$\log(P_t^w)$	-3.95***	-3.59**	-4.05***	-3.58**
CHAD				
$\log(P_t^d/I_t)$	-2.81*	-2.54	-2.25	-2.22
$\log(P_t^w R_t/I_t)$	-3.28***	-3.81**	-3.23**	-3.83**
$\log(P_t^d)$	-2.04	-2.39	-1.76	-1.51
$\log(P_t^w R_t)$	-2.40	-2.89	-2.40	-3.08
$\log(I_t)$	-1.26	-2.30	-1.31	-2.37
$\log(P_t^w)$	-4.13***	-3.81**	-4.22***	-3.83**
CÔTE D'IVOIRE				
$\log(P_t^d/I_t)$	-2.19	-2.88	-2.20	-2.83
$\log(P_t^w R_t/I_t)$	-1.97	-4.10**	-1.66	-4.08**
$\log(P_t^d)$	-2.27	-3.29*	-2.05	-1.51
$\log(P_t^w R_t)$	-2.46	-2.83	-2.44	-2.94
$\log(I_t)$	-1.72	-2.53	-1.89	-2.35
$\log(P_t^w)$	-3.81***	-3.51*	-3.84***	-3.52*

Continued next page

Table 4 cont. Stationarity statistics, WCA countries

	ADF		*PP*	
	w/o trend	***w/ trend***	***w/o trend***	***w/ trend***
CAMEROON				
$\log(P_t^d/I_t)$	-2.19	-2.88	-2.20	-2.83
$\log(P_t^w R_t/I_t)$	-2.34	-3.41*	-2.33	-3.45*
$\log(P_t^d)$	-2.23	-1.50	-2.23	-1.54
$\log(P_t^w R_t)$	-2.43	-2.96	-2.49	-3.02
$\log(I_t)$	-1.72	-2.52	-1.89	-2.35
$\log(P_t^w)$	-3.88***	-3.58**	-3.95***	-3.59**
MALI				
$\log(P_t^d/I_t)$	-2.01	-1.88	-4.73***	-4.75***
$\log(P_t^w R_t/I_t)$	-2.02	-3.72**	-1.96	-3.73**
$\log(P_t^d)$	-1.55	-2.09	-1.63	-1.82
$\log(P_t^w R_t)$	-2.38	-2.89	-2.38	-3.00
$\log(I_t)$	-2.00	-1.75	-1.86	-1.19
$\log(P_t^w)$	-3.83***	-3.52*	-3.84***	-3.47**
SENEGAL				
$\log(P_t^d/I_t)$	-2.23	-2.24	-2.19	-2.20
$\log(P_t^w R_t/I_t)$	-2.54	-3.43*	-2.49	-3.48*
$\log(P_t^d)$	-1.65	-2.12	-2.07	-2.18
$\log(P_t^w R_t)$	-2.40	-2.90	-2.39	-2.97
$\log(I_t)$	-2.52	-0.38	-2.49	-0.39
$\log(P_t^w)$	-4.06***	-3.68**	-4.17***	-3.67**
TOGO				
$\log(P_t^d/I_t)$	-2.67*	-2.77	-2.68*	-2.80
$\log(P_t^w R_t/I_t)$	-2.88*	-4.31***	-2.84*	-4.32***
$\log(P_t^d)$	-1.10	-3.08	-1.53	-1.47
$\log(P_t^w R_t)$	-2.44	-2.96	-2.44	-2.99
$\log(I_t)$	-1.72	-2.53	-1.89	-2.35
$\log(P_t^w)$	-3.85***	-3.56**	-3.89***	-3.54**

Notes**:** Asterisks correspond to significance levels of 1% (***), 5% (**), and 10% (*).
Source: Authors calculations

Table 5. Regression results for price pass-through, WCA countries, 1970 to 2005

	Benin	*Burkina Faso*	*Cameroon*	*Chad*
$\log(P_t^d/I_t) = \mu + \beta_1\log(P_t^w R_t/I_t) + \beta_2 t + \varepsilon_t$				
μ	4.76***	4.38***	3.87***	4.17***
	(9.04)	(7.65)	(6.74)	(5.42)
β_1	0.09	0.09	0.24**	0.12
	(1.09)	(0.99)	(2.60)	(0.95)
β_2	-0.00	0.01***	-0.00	0.01***
	(0.23)	(2.75)	(0.90)	(3.14)
Adj-R^2	0.03	0.14	0.30	0.18
DW	0.86	0.88	1.08	0.60
ADF	-2.87*	-3.17**	-3.38**	-2.76*
PP	-2.88*	-3.18**	-3.42**	-2.58
$\log(P_t^d) = \mu + \beta_1\log(P_t^w R_t) + \beta_2\log(I_t) + \beta_3 t + \varepsilon_t$				
μ	4.92***	3.59***	4.78***	4.45***
	(8.16)	(6.86)	(5.88)	(5.08)
β_1	0.08	0.10	0.26**	0.11
	(0.98)	(1.27)	(2.33)	(0.84)
β_2	0.98***	0.41**	1.34***	1.04***
	(6.30)	(2.65)	(5.38)	(3.87)
β_3	-0.00	0.03***	-0.04***	0.00
	(0.59)	(4.59)	(2.82)	(0.92)
Adj-R^2	0.97	0.96	0.93	0.92
DW	0.86	1.09	1.36	0.65
ADF	-2.90*	-3.43***	-4.05***	-2.37
PP	-2.91*	-3.48***	-4.04***	-2.60
$\log(P_t^d) = \mu + \beta_1\log(P_t^w) + \beta_2\log(R_t) + \beta_3\log(I_t) + \beta_4 t + \varepsilon_t$				
μ	3.97***	2.85***	4.37***	5.75***
	(6.70)	(5.07)	(4.79)	(5.18)
β_1	0.01	-0.07	0.20*	0.18
	(0.10)	(0.08)	(1.62)	(1.40)
β_2	0.24**	0.25**	0.34**	-0.10
	(2.56)	(2.60)	(2.47)	(0.58)
β_3	0.95***	0.49***	1.38***	1.15***
	(6.2)73	(3.35)	(5.46)	(4.32)
β_4	-0.01	0.02***	-0.04***	0.00
	(1.11)	(3.34)	(3.00)	(0.30)
Adj-R^2	0.98	0.97	0.93	0.93
DW	1.10	1.12	1.42	0.79
ADF	-3.40**	-3.38**	-4.20***	-4.19***
PP	-3.28**	-3.37**	-4.18***	-2.97*

Continued next page

Table 5 cont. Regression results for price pass-through, WCA countries, 1970 to 2005

	Côte d'Ivoire	*Mali*	*Senegal*	*Togo*
$\log(P_t^d/I_t) = \mu + \beta_1 \log(P_t^w R_t/I_t) + \beta_2 t + \varepsilon_t$				
μ	4.50***	4.79***	4.27***	4.69***
	(5.92)	(10.26)	(10.01)	(9.18)
β_1	0.13	0.05	0.14*	0.09
	(1.14)	(0.76)	(2.02)	(1.14)
β_2	-0.00	-0.00	0.00*	-0.00
	(0.90)	(0.16)	(1.95)	(0.78)
Adj-R^2	0.18	0.00	0.08	0.08
DW	0.89	1.68	0.85	0.74
ADF	-2.98*	-1.87	-2.97**	-2.76*
PP	-3.01**	-5.16***	-2.91*	-2.76*
$\log(P_t^d) = \mu + \beta_1 \log(P_t^w R_t) + \beta_2 \log(I_t) + \beta_3 t + \varepsilon_t$				
μ	4.47***	4.25***	3.76***	4.37***
	(6.45)	(9.35)	(9.00)	(6.94)
β_1	0.21**	0.05	0.14*	0.11
	(2.26)	(0.84)	(2.18)	(1.28)
β_2	0.93***	0.64***	0.55***	0.75***
	(4.48)	(5.60)	(4.41)	(3.87)
β_3	-0.02	0.02***	0.02***	0.01
	(1.67)	(2.86)	(3.37)	(0.67)
Adj-R^2	0.94	0.98	0.98	0.96
DW	0.86	2.01	1.16	0.70
ADF	-2.78*	-5.81***	-3.67***	-2.48
PP	-2.84*	-5.82***	-3.68***	-2.47
$\log(P_t^d) = \mu + \beta_1 \log(P_t^w) + \beta_2 \log(R_t) + \beta_3 \log(I_t) + \beta_4 t + \varepsilon_t$				
μ	4.02***	4.19***	3.59***	3.68***
	(5.35)	(7.84)	(7.55)	(5.76)
β_1	0.14	0.05	0.10	-0.00
	(1.41)	(0.66)	(1.32)	(0.01)
β_2	0.30**	0.07	0.17**	0.25**
	(2.68)	(0.79)	(2.20)	(2.65)
β_3	0.98***	0.65***	0.58***	0.84***
	(4.72)	(5.51)	(4.41)	(4.62)
β_4	-0.02*	0.02**	0.02**	-0.00
	(2.09)	(2.60)	(2.52)	(0.26)
Adj-R^2	0.94	0.98	0.98	0.97
DW	0.91	2.00	1.12	0.85
ADF	-3.63**	-5.77***	-3.63**	-2.67*
PP	-2.85*	-5.78***	-3.67***	-2.83*

Notes**:** P_t^d denotes the price received by growers (nominal CFAf, seed cotton); P_t^w denotes the A Index (nominal US$, converted to seed cotton equivalent by using the ginning outturn ratio); R_t denotes the CFAf/US$ exchange rate (period average); I_t denotes the GDP deflator; t denotes time trend; μ, β_1, β_2, β_3, and β_4 denote parameters to be estimated (absolute *t-ratios* in parentheses). For other definitions see Table 5.

Source: Authors calculations

Table 6. Calculating the NRA for Benin, 1970/71 to 1974/75

Description	*Cost Adjustment*	*Cotton price (kg)/NRA*
World price, lint per kg (P_t^W)		$ 0.69
International freight costs (C_t^F)	$ 0.06/kg, lint	$ 0.63
Exchange rate (R_t)	CFAf 276/$	CFAf 174
Inland transport costs (C_t^I)	CFAf 8/kg, lint	CFAf 166
Ginning costs (C_t^G)	CFAf 38/kg, lint	CFAf 128
Ginning outturn ratio	seed = 38.1% of lint	CFAf 49
Grower's price	CFAf 34/kg, seed	CFAf 34
$NRA_{1970/71}$	100*(34/49-1)	-30%
$NRA_{1971/72}$	100*(35/59-1)	-41%
$NRA_{1972/73}$	100*(35/59-1)	-41%
$NRA_{1973/74}$	100*(37/123-1)	-70%
$NRA_{1974/75}$	100*(45/73-1)	-38%
$NRA_{1970/71\text{-}1974/75}$ (5-period average)		**-44%**

Source: Authors calculations

Table 7. Price statistics and distortions to incentives, WCA countries, 1970 to 2005

	Benin	*Burkina Faso*	*Cameroon*	*Chad*	*Côte d'Ivoire*	*Mali*	*Senegal*	*Togo*
A INDEX (constant 2000, CFAf/kg of seed cotton)								
1970-84	532	438	508	405	639	585	506	532
1985-93	380	290	284	326	392	329	289	345
1994-97	503	466	445	468	497	465	467	478
1998-2005	309	304	322	291	312	298	316	303
PRICES RECEIVED BY COTTON GROWERS (constant 2000, CFAf/kg of seed cotton)								
1970-84	195	146	208	134	282	172	171	188
1985-93	209	148	178	170	204	156	156	179
1994-97	218	176	198	183	204	168	199	204
1998-2005	190	177	176	161	178	170	183	177
PRODUCER'S SHARE OF THE A INDEX (percent)								
1970-84	38	35	42	34	45	30	35	37
1985-93	56	52	64	53	53	49	55	53
1994-97	45	39	44	40	42	37	43	43
1998-2005	62	59	59	56	57	59	59	59
PRICE VARIABILITY (*Z-Statistic*)[a]								
A Index	124	116	111	96	150	130	115	135
Domestic	18	19	24	18	26	22	13	19
Ratio	7	6	5	5	6	6	9	7
NAC[b] (percent, 100 implies no assistance, < 100 implies taxation)—based on reported ginning costs								
1970-84	57	55	66	56	69	47	53	56
1985-93	104	102	133	115	99	96	102	96
1994-97	64	58	72	63	62	56	62	63
1998-2005	109	113	110	114	105	113	104	103
NAC[b] (percent, 100 implies no assistance, < 100 implies taxation)—based on assumed actual ginning costs								
1970-84	53	50	61	51	63	43	48	51
1985-93	91	89	114	98	87	83	89	85
1994-97	60	54	66	58	58	52	58	58
1998-2005	96	99	96	99	92	99	92	91

[a] The row titled "Ratio" is the ratio of the Z-statistic of the "A Index" to that of the "Domestic" price, where the Z-statistic is the square root of the average squared deviation of the price from its value lagged one period (or the first difference in the price – see Schiff and Valdes 1992, Appendix 3-2). For example, for Benin the year-to-year variability of the world price has been 7 times higher than the year-to-year variability of the price received by cotton growers (both prices having been expressed in domestic currency and in real terms using the GDP deflator).

[b] NAC is the nominal assistance coefficient, expressing the grower return as a percentage of the international price adjusted for freight rates and inland transport costs as well as ginning costs and the "inefficiency" factor.

Source: Author's calculations using data from various national publications.

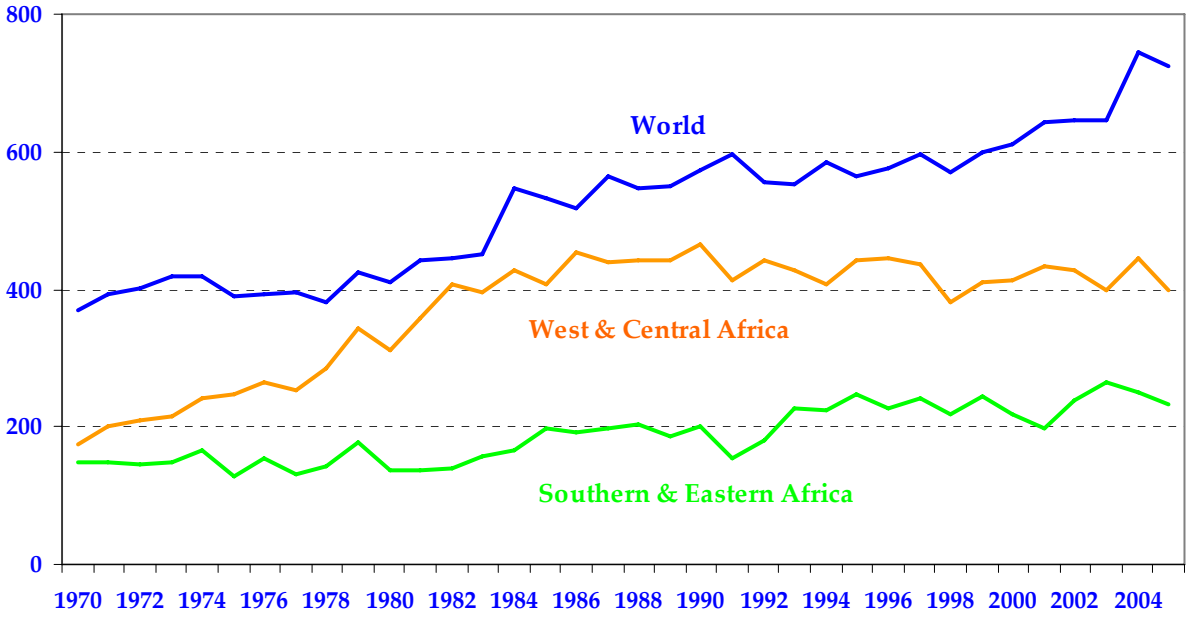
Table 8. Nominal Rate of Assistance, WCA countries, 1970 to 2005 (percent)

	1970-74	*1975-79*	*1980-84*	*1985-89*	*1990-94*	*1995-99*	*2000-05*
Benin	-44	-49	-49	-5	-24	-22	-6
Burkina Faso	-44	-48	-58	-8	-26	-28	1
Cameroon	-41	-40	-37	33	-18	-22	3
Chad	-47	-48	-52	6	-21	-21	-3
Côte d'Ivoire	-32	-28	-50	-5	-30	-27	-5
Mali	-56	-55	-59	-17	-25	-33	3
Senegal	-46	-50	-59	-10	-19	-29	-11
Togo	-41	-46	-60	-14	-25	-24	-13
Average	-45	-44	-52	-3	-25	-26	-4

Notes: The underlying figures are the same as the ones used for the lower panel of Table 5, with two differences: (i) 0 (instead of 100) implies no assistance while <0 (>0) implies taxation (subsidization) and (ii) they represent 5-year averages.

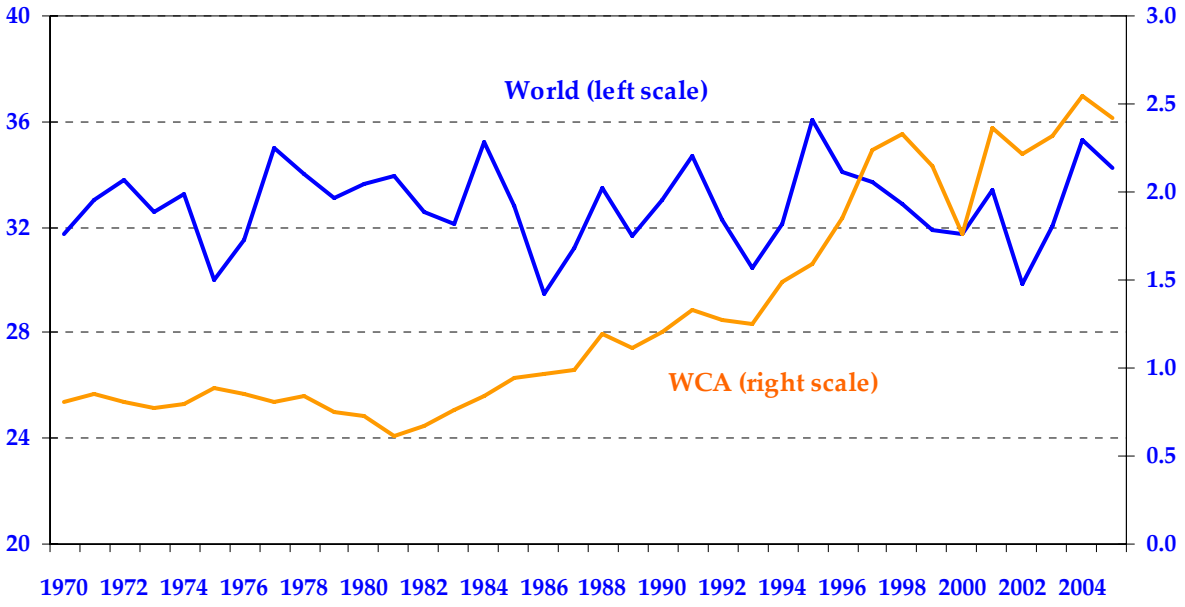
Source: Authors calculations

FIGURE 1: Cotton Yields (kgs of lint per hectare)



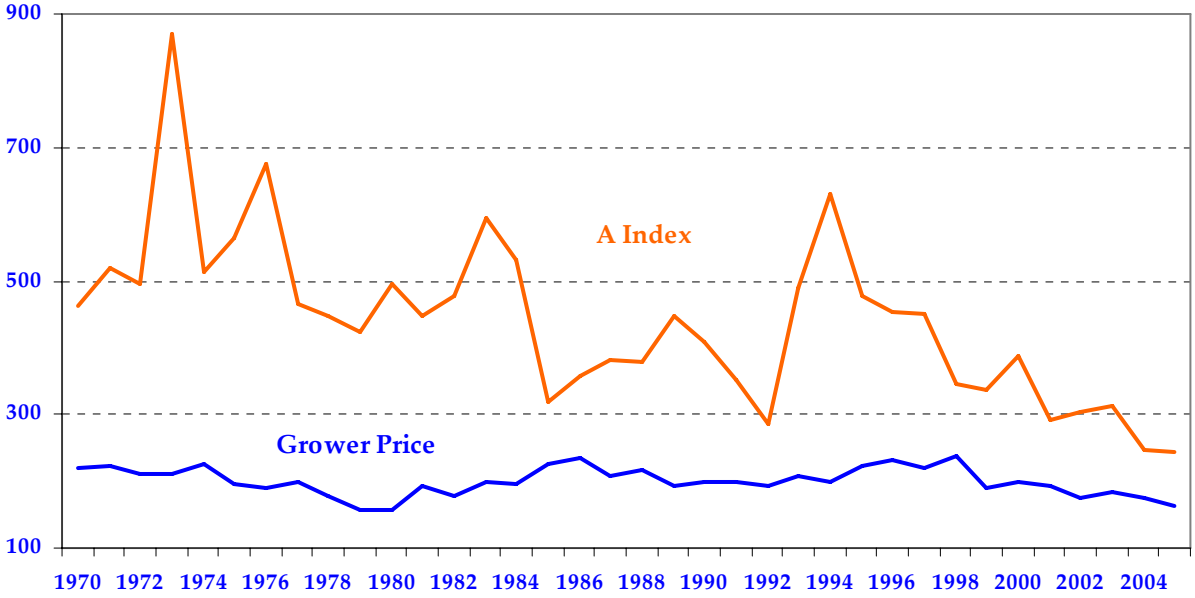
Source: International Cotton Advisory Committee

FIGURE 2: Cotton Area (million hectares)



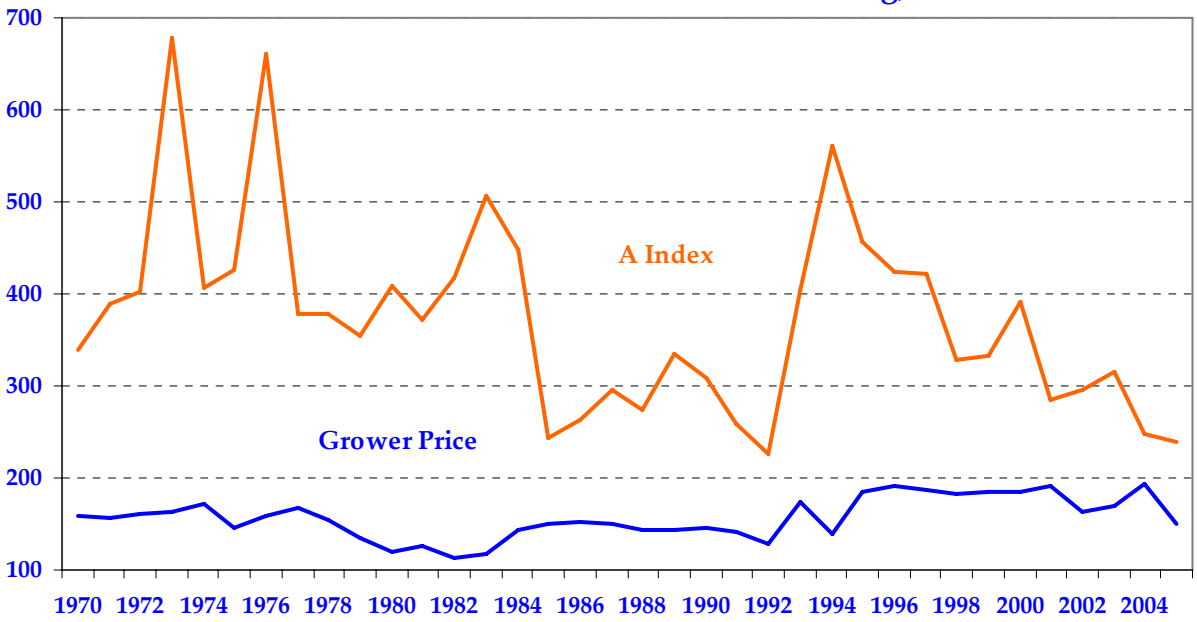
Source: International Cotton Advisory Committee

FIGURE 3: Cotton Prices in Benin (CFAf/kg, real 2000)



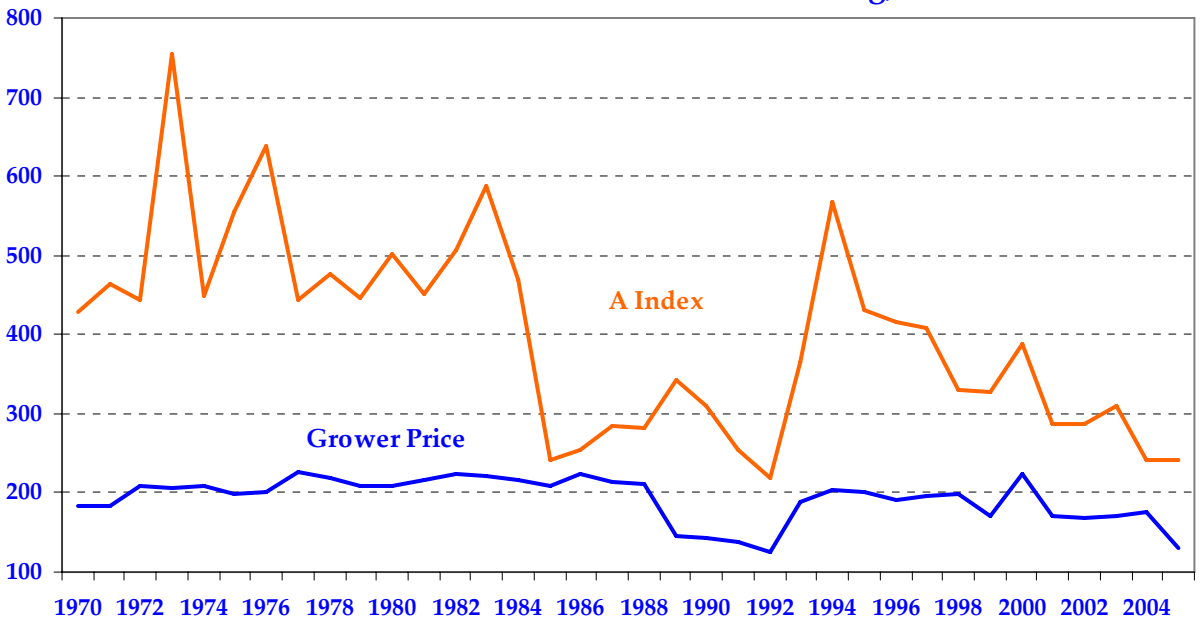
Source: SONAPRA and World Bank (commodity price data)

FIGURE 4: Cotton Prices in Burkina Faso (CFAf/kg, real 2000)



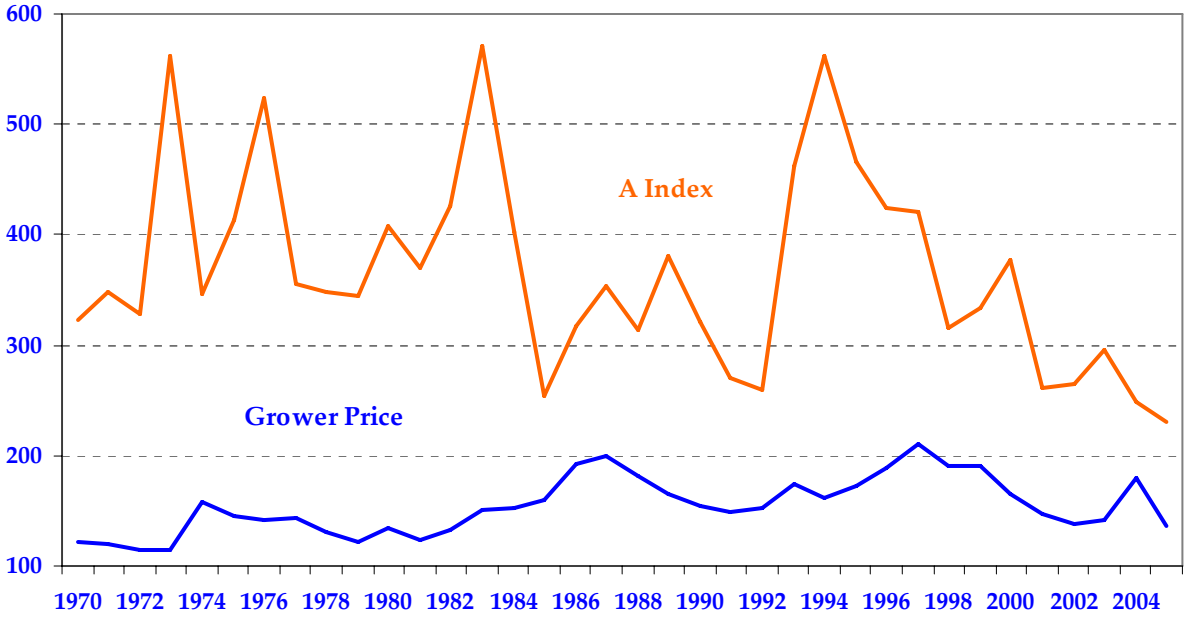
Source: SOFITEX and World Bank (commodity price data)

FIGURE 5: Cotton Prices in Cameroon (CFAf/kg, real 2000)



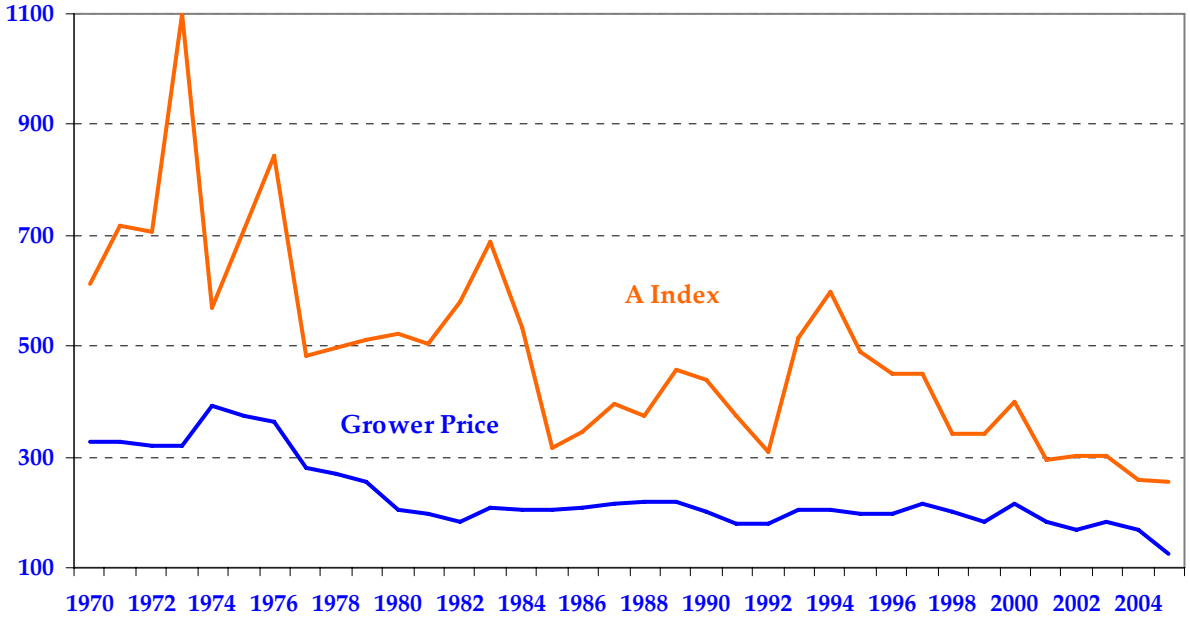
Source: SODECOTON and World Bank (commodity price data)

FIGURE 6: Cotton Prices in Chad (CFAf/kg, real 2000)



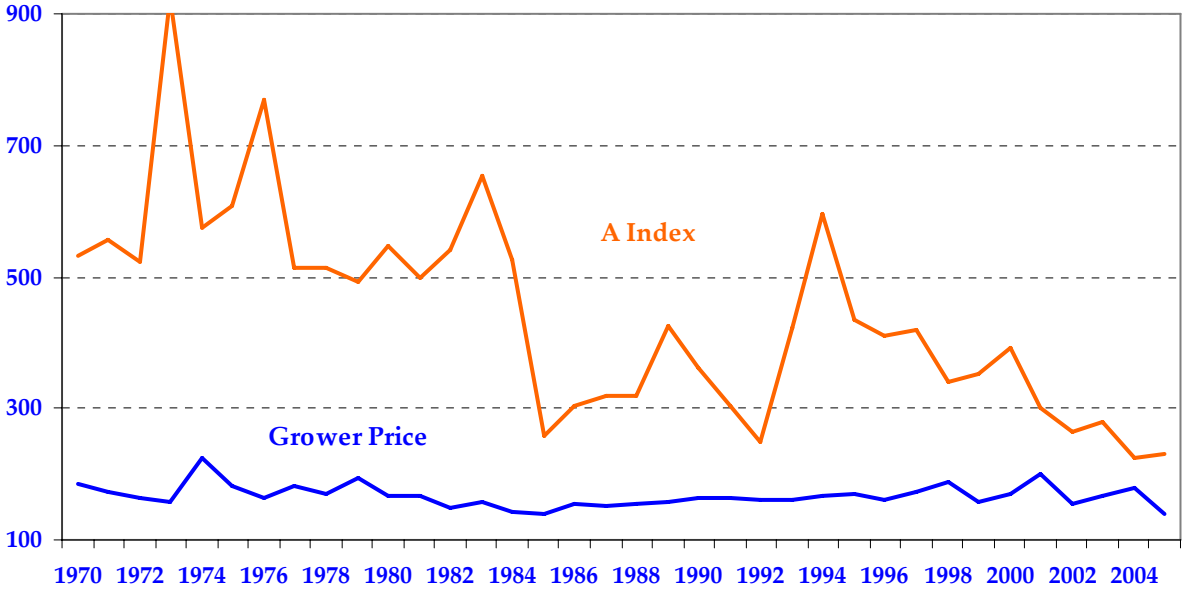
Source: Cotonchad and World Bank (commodity price data)

FIGURE 7: Cotton Prices in Côte d'Ivoire (CFAf/kg, real 2000)



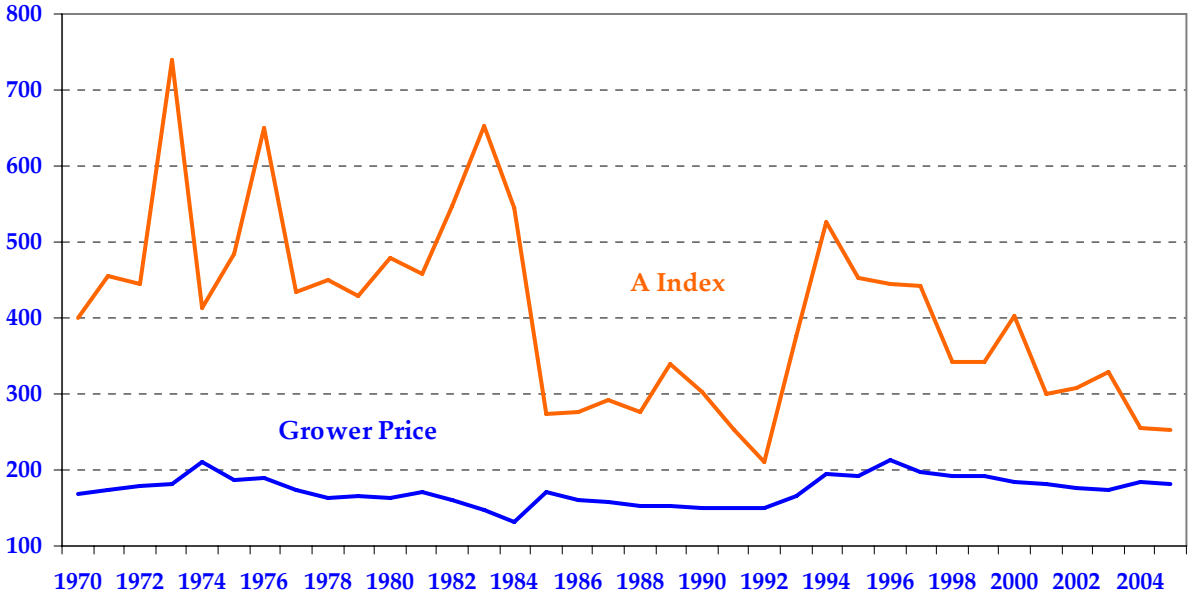
Source: CIDT and World Bank (commodity price data)

FIGURE 8: Cotton Prices in Mali (CFAf/kg, real 2000)



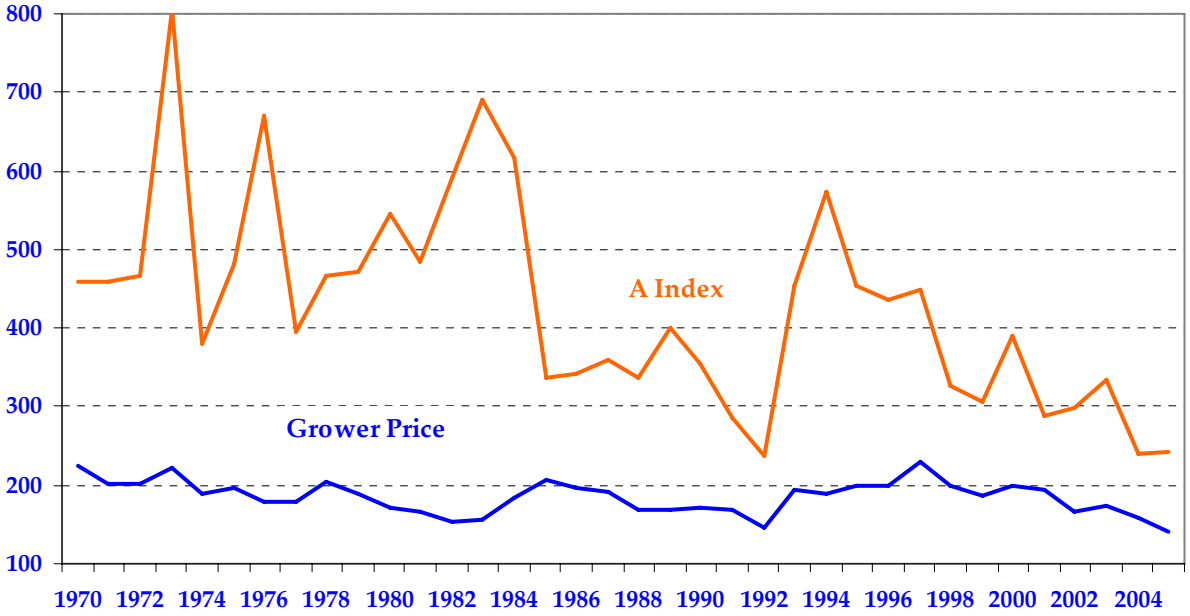
Source: CMDT and World Bank (commodity price data)

FIGURE 9: Cotton Prices in Senegal (CFAf/kg, real 2000)



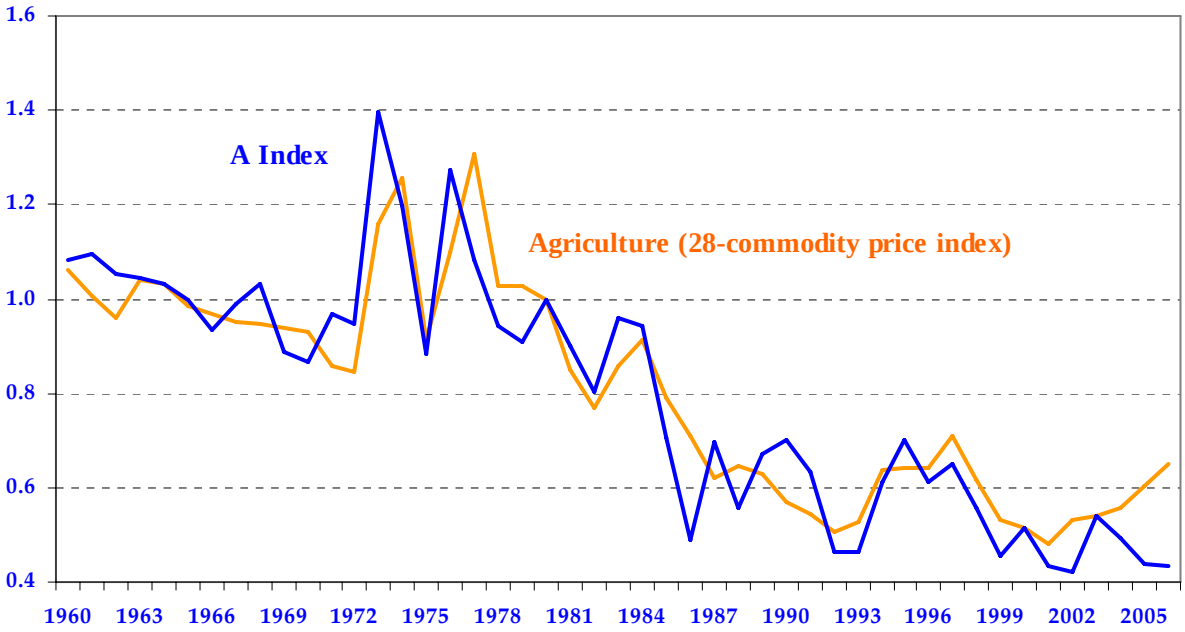
Source: SODEFITEX and World Bank (commodity price data)

FIGURE 10: Cotton Prices in Togo (CFAf/kg, real 2000)



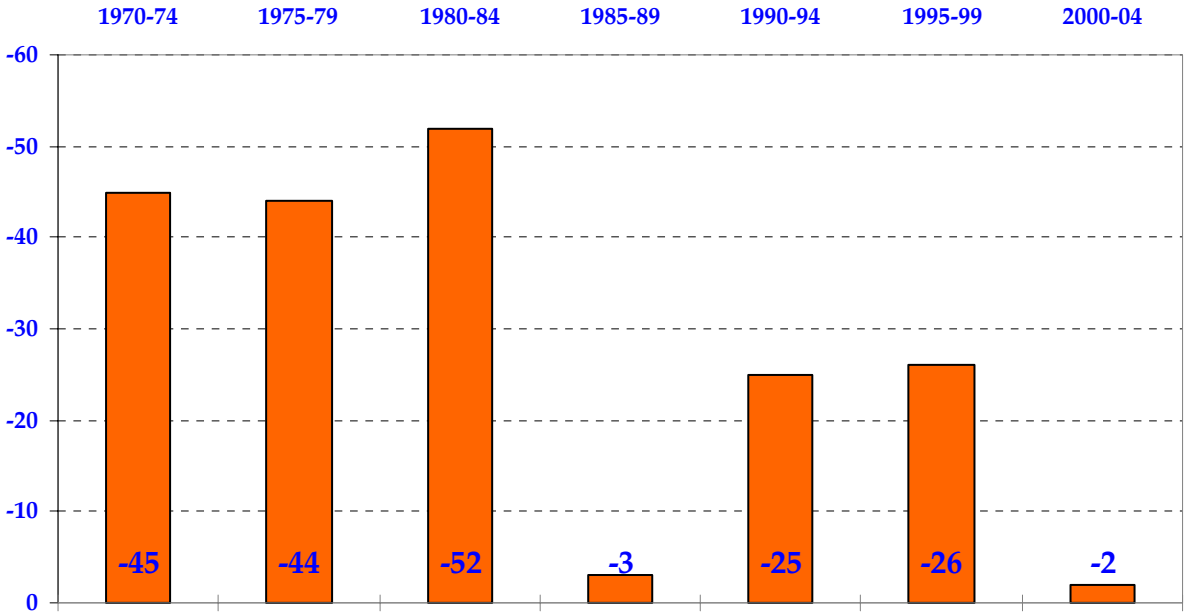
Source: SOTOCO and World Bank (commodity price data)

FIGURE 11: Price Indices (Real, 1980=1.0)



Source: World Bank (commodity price data)

FIGURE 12: Nominal Rate of Assistance (percent, average)



Source: Author's calculations

Appendix A: The Cotlook A Index

The most commonly used world cotton price indicator is the Cotlook A Index. It is an index compiled daily by *Cotton Outlook,* a private company located in Liverpool, UK. Every day, the editorial staff of *Cotton Outlook*, who have no trading involvement in cotton "*establish what they consider to be the representative level of competitive offering rates prevailing in the market for each of the eligible growths*." The A Index is the average of the 5 lowest quotations of 18 styles of cotton (Middling 1-3/32''), C/F Far Eastern values, from the following origins: Australia, Benin, Brazil, Burkina Faso, China, Greece, India, Côte d'Ivoire, Mali, Pakistan, Paraguay, Syria, Tanzania, Turkey, US (3 types), and Uzbekistan. Quotations from numerous other origins are also reported but do not participate in the A Index.

The index is calculated as the average of the five least expensive quotations to account for the fact that quotations reflect offering prices, not the level at which business has been arranged—a buyer is normally expected to succeed with bids that are lower than quoted. The quotations represent nearby delivery, normally between two and four months. Table A1 depicts the composition of the A Index for 2 and 16 March, 2006.

Table A1. Composition of the A Index

(US cents per pound)

Origin	March 02, 2006	March 16, 2006	Shipment
01. Australia	NQ	NQ	
02. Benin	59.50*	58.75*	March/April
03. Brazil	62.50	61.00	August/September
04. Burkina Faso	60.25	59.50	March/April
05. China	NQ	NQ	
06. Greece	60.25	59.50	March/April
07. India	55.00*	55.50*	March/April
08. Côte d'Ivoire	60.25	58.75	March/April
09. Mali	59.75*	58.50*	March/April
10. Pakistan	NQ	NQ	
11. Paraguay	61.75	60.75	April/May
12. Syria	60.50	59.50	March/April
13. Tanzania	NQ	NQ	
14. Turkey	NQ	NQ	
15. US (California/Arizona)	66.00	65.25	March/April
16. US (Memphis/Eastern)	60.75	60.00	April/May
17. US (Memphis/Orleans)	59.25*	58.50*	April/May
18. Uzbekistan	59.75*	58.75*	March/April
A INDEX	**58.65**	**58.00**	

Notes**:** NQ indicates no quotation. (*) indicates that the quotation is one of the 5 least expensive and thus eligible for the A Index.

Source**:** *Cotton Outlook*, March 03, and March 17, 2006 issues.

Appendix B: Definitons and sources of data

This appendix describes the data which cover the 1970-2005 period. The next eight tables (B1-B8) report country-specific data, Table B9 reports cif-to-fob costs figures. Table B11 reports data on cotton production, area, and yields for the WCA and the world. All quantity statistics and prices received by producers refer to crop years while GDP deflators are in calendar years. Seed cotton was converted to cotton lint by using the ginning outturn ratio reported in Tables B1-B8.

All price data refer to 1st grade cotton lint. Production refers to cotton lint. Yields are expressed in terms of cotton lint per hectare. Prices received by growers, expressed in terms of CFAf per kg of seed cotton, include bonuses. Data for Benin are from SONAPRA; prices received by growers include bonus (after 1990/91) as well as government subsidies between 2001/02 and 2005/06. Data for Burkina Faso are from SOFITEX; following 1995/96, prices received by growers include bonus. Data for Cameroon are from SODECOTON; following 1994/95, prices include bonus. Data for Chad are from Cotonchad; bonus has been paid in only 4 years. Data for Côte d'Ivoire are from CIDT; prices include bonus after 1995/96. Data for Mali are from CMDT; price include bonus after 1990/91. Data for Senegal are from SODEFITEX; bonus is included in only three years. Data for Togo are from SOTOCO; prices do not include any bonus.

The A Index (reported in Table B9, see Appendix A for a description) is taken from the World Bank's Commodity Price database (the original source is *Cotton Outlook*) and has been expressed as March-July average to reflect the marketing season in WCA countries. The CFAf/US$ exchange rate (March-July average) is taken from the IMF (International Financial Statistics). The Manufacture Unit Value (MUV), used as an inflation proxy for the US$-based A Index, represents the unit value index in dollar terms of manufactures exported from the G-5—France, Germany, Japan, UK, and the US—weighted in proportion to the countries' exports to developing countries. It is prepared by the World Bank's Development Prospects Group. The GDP deflators for all countries are taken from the IMF (International Financial Statistics) and supplemented by the World Bank's Development Prospects Group estimates prior to 1980.

The sea transport costs, expressed as $/ton (Table B9) are the same for all countries since freight rates between the WCA sea ports and the ports of North Europe or South-East Asia are roughly the same. In nominal terms, sea freight costs have fluctuated between a high

of $120/ton in 1984/85 and a low of $35/ton in 1970/71. Marketing costs, also reported in Table B9 are typically expressed as percent of the A Index (3 percent until 2002/03 and 2.6 percent afterwards); they have been expressed as $/ton. The last two column of the table expresses the fob-to-cif costs as a percentage of the A Index. Ginning costs are also reported in Table B9; they represent average ginning costs for the entire WCA as they are reported in the financial statements of the cotton companies. Lastly, domestic transportation costs are reported in Table B10 (CFAf/kg of cotton lint, nominal terms). As expected, they vary greatly across countries, with land-locked countries having the highest costs (e.g., Chad) while countries with access to ports having the lowest (e.g., Benin, Senegal, and Togo).

Table B1. Cotton statistics for Benin, 1970 to 2006

Year	*Production (000 tons)*	*Area (000 hectares)*	*Yield (kgs/hectare)*	*Ginning Ratio (%)*	*Grower price (CFAf/kg seed)*	*GDP Deflator (2000=1.0)*
1970/71	14	39	351	38.1	34	0.16
1971/72	18	55	333	38.4	35	0.16
1972/73	19	48	396	37.9	35	0.17
1973/74	17	53	329	38.6	37	0.17
1974/75	13	49	256	40.5	45	0.20
1975/76	8	32	248	39.5	45	0.23
1976/77	7	26	260	38.7	50	0.26
1977/78	5	21	249	37.7	55	0.27
1978/79	7	26	275	38.2	55	0.31
1979/80	10	26	372	37.6	55	0.35
1980/81	5	30	167	37.8	60	0.38
1981/82	5	24	228	37.9	80	0.41
1982/83	12	24	490	37.9	85	0.48
1983/84	17	40	430	37.4	100	0.50
1984/85	33	56	597	37.8	100	0.51
1985/86	34	100	338	38.0	110	0.49
1986/87	48	103	464	39.0	110	0.47
1987/88	27	72	380	38.9	100	0.48
1988/89	44	97	456	40.5	105	0.48
1989/90	43	111	383	40.7	95	0.49
1990/91	59	123	482	41.2	100	0.50
1991/92	75	144	518	42.2	100	0.50
1992/93	69	139	493	42.5	100	0.52
1993/94	103	235	439	41.9	110	0.53
1994/95	98	230	426	41.9	140	0.70
1995/96	141	294	481	40.5	180	0.81
1996/97	143	292	491	41.2	200	0.86
1997/98	150	386	389	41.8	200	0.91
1998/99	138	394	351	41.3	225	0.95
1999/00	152	372	409	41.9	185	0.97
2000/01	141	337	418	41.5	200	1.00
2001/02	172	357	482	42.1	200	1.03
2002/03	143	313	457	42.4	185	1.05
2003/04	142	323	440	42.5	205	1.11
2004/05	171	325	527	41.8	190	1.08
2005/06	82	200	408	41.8	185	1.14

Source**:** SONAPRA for cotton statistics; IMF (International Financial Statistics) and World Bank estimates for GDP deflator.

Table B2. Cotton statistics for Burkina Faso, 1970 to 2006

Year	*Production (000 tons)*	*Area (000 hectares)*	*Yield (kgs/hectare)*	*Ginning Ratio (%)*	*Grower price (CFAf/kg seed)*	*GDP Deflator (2000=1.0)*
1970/71	8	81	105	35.9	32	0.20
1971/72	10	74	141	37.2	32	0.20
1972/73	12	70	171	36.7	32	0.22
1973/74	10	67	147	36.8	35	0.22
1974/75	11	62	184	37.1	40	0.25
1975/76	18	68	267	35.8	40	0.27
1976/77	20	79	255	36.6	40	0.28
1977/78	14	69	202	36.5	55	0.34
1978/79	22	72	312	37.3	55	0.39
1979/80	29	82	350	37.0	55	0.42
1980/81	23	75	311	37.3	55	0.45
1981/82	22	65	331	37.6	62	0.51
1982/83	29	72	400	38.1	62	0.56
1983/84	30	77	392	37.9	70	0.59
1984/85	34	82	418	39.0	90	0.63
1985/86	46	94	489	39.8	100	0.66
1986/87	66	127	520	39.8	100	0.61
1987/88	59	170	344	39.6	95	0.62
1988/89	59	171	344	40.3	95	0.64
1989/90	62	150	416	41.0	95	0.67
1990/91	77	166	465	40.8	95	0.68
1991/92	69	186	373	41.4	95	0.66
1992/93	69	177	392	42.4	85	0.66
1993/94	51	150	339	43.6	115	0.64
1994/95	63	184	341	43.9	115	0.76
1995/96	64	170	377	42.4	165	0.82
1996/97	90	196	460	42.1	180	0.88
1997/98	140	295	476	41.5	180	0.90
1998/99	119	355	335	41.8	185	0.97
1999/00	109	245	445	42.9	185	0.95
2000/01	116	260	446	42.0	170	1.00
2001/02	158	359	440	41.8	200	1.05
2002/03	170	405	420	42.1	175	1.09
2003/04	204	459	444	42.2	185	1.11
2004/05	264	566	467	41.9	210	1.13
2005/06	298	646	462	41.9	175	1.16

Source**:** SOFITEX for cotton statistics; IMF (International Financial Statistics) and World Bank estimates for GDP deflator.

Table B3. Cotton statistics for Cameroon, 1970 to 2006

Year	*Production (000 tons)*	*Area (000 hectares)*	*Yield (kgs/hectare)*	*Ginning Ratio (%)*	*Grower price (CFAf/kg seed)*	*GDP Deflator (2000=1.0)*
1970/71	14	102	139	36.9	30	0.16
1971/72	16	99	160	36.6	31	0.17
1972/73	17	88	191	37.0	38	0.18
1973/74	10	61	170	37.3	40	0.19
1974/75	15	65	234	37.7	45	0.21
1975/76	19	73	261	38.5	45	0.23
1976/77	18	60	303	38.1	55	0.27
1977/78	15	48	317	37.8	65	0.29
1978/79	23	47	495	39.2	65	0.30
1979/80	31	57	544	38.4	70	0.34
1980/81	32	65	494	38.2	80	0.38
1981/82	31	63	486	38.5	90	0.42
1982/83	29	55	523	39.5	105	0.47
1983/84	37	71	519	39.0	117	0.53
1984/85	38	73	522	39.2	130	0.60
1985/86	46	89	514	39.7	140	0.67
1986/87	48	94	513	39.5	150	0.67
1987/88	45	95	476	39.6	140	0.66
1988/89	69	112	614	41.4	140	0.66
1989/90	43	89	482	41.3	95	0.65
1990/91	47	94	496	41.1	95	0.66
1991/92	47	90	524	41.2	95	0.68
1992/93	53	99	534	41.9	85	0.67
1993/94	52	103	503	40.9	130	0.69
1994/95	63	141	445	41.1	155	0.76
1995/96	79	159	495	40.3	180	0.89
1996/97	90	191	471	41.2	180	0.94
1997/98	73	172	425	40.2	190	0.97
1998/99	78	173	453	40.3	195	0.98
1999/00	78	172	455	40.7	165	0.97
2000/01	96	199	482	41.6	225	1.00
2001/02	103	211	487	41.6	175	1.03
2002/03	95	181	526	41.1	180	1.07
2003/04	100	208	480	41.2	185	1.09
2004/05	125	215	581	40.8	190	1.09
2005/06	87	214	405	41.7	150	1.14

Source**:** SODECOTON for cotton statistics; IMF (International Financial Statistics) and World Bank estimates for GDP deflator.

Table B4. Cotton statistics for Chad, 1970 to 2006

Year	*Production (000 tons)*	*Area (000 hectares)*	*Yield (kgs/hectare)*	*Ginning Ratio (%)*	*Grower price (CFAf/kg seed)*	*GDP Deflator (2000=1.0)*
1970/71	35	303	114	36.4	26	0.21
1971/72	41	302	136	37.8	28	0.23
1972/73	39	276	140	37.2	28	0.25
1973/74	43	269	160	37.6	30	0.26
1974/75	53	272	195	37.0	43	0.27
1975/76	65	336	192	37.1	43	0.29
1976/77	54	319	169	36.6	45	0.32
1977/78	45	284	160	36.2	50	0.35
1978/79	50	267	188	36.6	50	0.38
1979/80	33	180	184	36.3	50	0.41
1980/81	31	166	188	36.4	60	0.45
1981/82	26	134	196	36.7	60	0.49
1982/83	38	138	277	37.3	70	0.53
1983/84	60	176	341	37.8	80	0.53
1984/85	36	142	250	36.9	100	0.66
1985/86	39	148	260	38.7	100	0.62
1986/87	34	124	275	38.2	100	0.52
1987/88	48	149	322	37.5	100	0.50
1988/89	53	199	264	38.2	100	0.55
1989/90	58	185	314	38.3	90	0.54
1990/91	60	206	292	38.0	90	0.59
1991/92	68	283	240	38.9	90	0.60
1992/93	47	199	237	38.9	80	0.53
1993/94	37	158	234	39.1	90	0.52
1994/95	61	203	301	39.6	120	0.74
1995/96	62	208	298	39.4	140	0.81
1996/97	86	285	301	40.4	170	0.90
1997/98	103	336	307	39.8	194	0.93
1998/99	66	298	222	40.5	170	1.02
1999/00	75	300	249	40.6	150	0.95
2000/01	58	240	242	40.6	185	1.00
2001/02	67	312	216	41.0	165	1.12
2002/03	69	281	245	41.0	160	1.17
2003/04	42	238	176	41.2	160	1.14
2004/05	85	310	274	41.0	190	1.06
2005/06	74	315	233	40.5	160	1.17

Source**:** Cotonchad for cotton statistics; IMF (International Financial Statistics) and World Bank estimates for GDP deflator.

Table B5. Cotton statistics for Côte d'Ivoire, 1970 to 2006

Year	*Production (000 tons)*	*Area (000 hectares)*	*Yield (kgs/hectare)*	*Ginning Ratio (%)*	*Grower price (CFAf/kg seed)*	*GDP Deflator (2000=1.0)*
1970/71	12	36	325	39.7	40	0.12
1971/72	20	51	384	40.7	40	0.12
1972/73	21	56	378	40.4	40	0.12
1973/74	23	58	397	39.5	45	0.14
1974/75	24	59	409	39.9	70	0.18
1975/76	26	65	401	40.4	70	0.19
1976/77	31	65	475	40.8	80	0.22
1977/78	41	88	473	40.2	80	0.28
1978/79	47	107	435	40.7	80	0.30
1979/80	59	123	480	41.3	80	0.32
1980/81	56	126	441	40.8	80	0.39
1981/82	56	125	453	41.7	80	0.40
1982/83	66	128	512	41.9	80	0.44
1983/84	58	136	428	41.0	100	0.48
1984/85	88	146	606	41.7	115	0.56
1985/86	82	153	538	43.5	115	0.56
1986/87	93	159	586	44.1	115	0.55
1987/88	114	180	631	44.5	115	0.53
1988/89	128	213	601	44.1	115	0.53
1989/90	107	201	534	44.5	115	0.52
1990/91	116	199	583	44.3	100	0.50
1991/92	87	190	456	44.8	90	0.50
1992/93	106	224	471	44.2	90	0.50
1993/94	116	219	527	44.7	110	0.53
1994/95	93	242	383	44.3	160	0.78
1995/96	96	204	472	44.4	173	0.87
1996/97	114	211	542	43.0	182	0.91
1997/98	147	244	601	43.6	205	0.95
1998/99	157	271	577	42.9	200	1.00
1999/00	177	291	608	44.1	183	1.01
2000/01	123	248	493	42.7	216	1.00
2001/02	171	283	605	43.2	190	1.04
2002/03	172	270	637	43.4	180	1.07
2003/04	78	206	352	40.4	200	1.09
2004/05	140	263	539	44.6	185	1.11
2005/06	113	299	422	43.0	140	1.12

Source**:** CIDT for cotton statistics; IMF (International Financial Statistics) and World Bank estimates for GDP deflator.

Table B6. Cotton statistics for Mali, 1970 to 2006

Year	*Production (000 tons)*	*Area (000 hectares)*	*Yield (kgs/hectare)*	*Ginning Ratio (%)*	*Grower price (CFAf/kg seed)*	*GDP Deflator (2000=1.0)*
1970/71	20	66	303	37.7	25	0.13
1971/72	25	77	327	37.3	25	0.14
1972/73	24	77	315	36.8	25	0.15
1973/74	19	69	273	37.3	25	0.16
1974/75	23	69	332	37.6	38	0.17
1975/76	39	89	438	37.9	38	0.20
1976/77	45	110	412	38.3	38	0.23
1977/78	42	103	411	37.2	45	0.25
1978/79	48	118	407	37.7	45	0.27
1979/80	56	127	441	37.3	58	0.30
1980/81	41	111	367	37.6	58	0.35
1981/82	38	85	448	39.5	65	0.39
1982/83	50	105	474	39.1	65	0.44
1983/84	54	111	487	38.6	75	0.47
1984/85	55	119	464	38.4	75	0.53
1985/86	67	146	460	38.4	85	0.61
1986/87	79	152	518	39.0	85	0.55
1987/88	75	149	504	37.7	85	0.56
1988/89	97	190	511	39.0	85	0.55
1989/90	99	189	521	42.8	85	0.54
1990/91	115	205	558	41.5	93	0.57
1991/92	114	215	531	42.0	95	0.58
1992/93	135	246	547	42.2	95	0.59
1993/94	101	201	500	41.8	98	0.61
1994/95	128	270	475	43.7	130	0.78
1995/96	169	336	504	41.7	155	0.92
1996/97	190	420	451	41.9	155	0.97
1997/98	218	498	437	41.9	170	0.98
1998/99	217	504	431	41.6	185	0.98
1999/00	197	482	409	42.8	150	0.95
2000/01	102	228	447	42.0	170	1.00
2001/02	240	532	451	42.0	200	1.00
2002/03	181	449	402	41.1	180	1.16
2003/04	254	549	464	41.0	200	1.19
2004/05	240	547	439	40.9	210	1.17
2005/06	222	551	403	41.5	168	1.20

Source**:** CMDT for cotton statistics; IMF (International Financial Statistics) and World Bank estimates for GDP deflator.

Table B7. Cotton statistics for Senegal, 1970 to 2006

Year	*Production (000 tons)*	*Area (000 hectares)*	*Yield (kgs/hectare)*	*Ginning Ratio (%)*	*Grower price (CFAf/kg seed)*	*GDP Deflator (2000=1.0)*
1970/71	4	14	306	35.3	28	0.17
1971/72	8	18	422	36.5	30	0.17
1972/73	9	20	418	36.6	32	0.18
1973/74	12	29	415	36.2	35	0.19
1974/75	15	40	387	36.4	47	0.22
1975/76	11	39	291	37.1	47	0.25
1976/77	17	44	382	37.1	49	0.26
1977/78	13	47	284	35.9	49	0.28
1978/79	13	48	262	37.4	49	0.30
1979/80	10	31	313	36.0	55	0.33
1980/81	7	30	242	35.1	60	0.37
1981/82	15	32	477	37.2	68	0.40
1982/83	18	42	438	39.1	70	0.43
1983/84	12	33	352	38.6	70	0.47
1984/85	19	46	409	40.4	70	0.53
1985/86	11	39	280	39.0	100	0.58
1986/87	11	25	421	39.9	100	0.63
1987/88	15	29	531	39.5	100	0.64
1988/89	15	39	402	40.0	100	0.65
1989/90	12	24	503	41.5	100	0.66
1990/91	18	45	407	40.7	100	0.67
1991/92	20	44	459	40.1	100	0.67
1992/93	19	45	429	40.3	100	0.67
1993/94	16	44	361	40.7	110	0.66
1994/95	12	34	356	42.2	166	0.85
1995/96	13	35	378	42.2	170	0.89
1996/97	16	50	322	42.2	170	0.90
1997/98	17	54	316	42.3	185	0.94
1998/99	5	48	99	41.4	185	0.96
1999/00	7	18	373	42.5	185	0.97
2000/01	9	21	416	43.3	185	1.00
2001/02	14	32	447	43.0	185	1.03
2002/03	17	35	478	43.2	185	1.05
2003/04	22	46	479	42.9	185	1.06
2004/05	17	44	387	42.0	195	1.06
2005/06	19	48	395	40.6	195	1.07

Source**:** SODEFITEX for cotton statistics; IMF (International Financial Statistics) and World Bank estimates for GDP deflator.

Table B8. Cotton statistics for Togo, 1970 to 2006

Year	*Production (000 tons)*	*Area (000 hectares)*	*Yield (kgs/hectare)*	*Ginning Ratio (%)*	*Grower price (CFAf/kg seed)*	*GDP Deflator (2000=1.0)*
1970/71	2	4	496	37.6	35	0.16
1971/72	3	9	290	37.4	35	0.17
1972/73	2	7	293	37.3	35	0.17
1973/74	3	10	333	36.7	40	0.18
1974/75	4	15	280	37.9	48	0.25
1975/76	4	19	186	35.8	48	0.24
1976/77	3	9	322	40.9	50	0.28
1977/78	2	7	266	39.0	60	0.34
1978/79	5	16	343	37.9	60	0.29
1979/80	8	26	294	38.0	60	0.32
1980/81	9	29	312	37.9	60	0.35
1981/82	8	23	353	39.0	65	0.39
1982/83	11	27	414	41.1	65	0.42
1983/84	10	30	340	41.6	75	0.48
1984/85	23	44	520	42.1	90	0.49
1985/86	27	69	390	41.8	105	0.51
1986/87	30	61	486	42.3	105	0.54
1987/88	31	68	457	41.6	105	0.55
1988/89	33	81	405	42.0	95	0.56
1989/90	34	76	440	42.0	95	0.56
1990/91	41	80	513	41.8	100	0.58
1991/92	41	78	520	40.6	100	0.60
1992/93	42	80	526	41.9	90	0.62
1993/94	35	65	539	41.8	110	0.57
1994/95	55	93	591	41.8	145	0.77
1995/96	42	96	436	40.4	170	0.85
1996/97	61	108	559	41.3	180	0.90
1997/98	73	135	541	42.0	210	0.92
1998/99	78	159	491	41.1	200	1.01
1999/00	56	154	364	40.0	190	1.02
2000/01	49	135	363	41.9	200	1.00
2001/02	69	173	397	41.6	200	1.03
2002/03	66	194	342	41.5	175	1.05
2003/04	68	187	366	41.5	175	1.01
2004/05	72	199	361	41.5	175	1.11
2005/06	28	105	270	41.7	160	1.14

Source**:** SOTOCO for cotton statistics; IMF (International Financial Statistics) and World Bank estimates for GDP deflator.

Table B9. Ginning and fob-to-cif costs, all WCA countries, 1970 to 2006 (nominal terms)

Year	Nominal A Index ($/kg)	Exchange Rate (CFAf/$)	Ginning Costs (CFAf/kg)	Sea Freight Costs ($/ton)	Marketing Costs ($/ton)	Fob to cif Costs (CFAf/kg of lint)	Fob to cif Costs (% of the A Index)
1970/71	0.69	276	50	35	21	15	8.1
1971/72	0.82	262	50	35	25	15	7.3
1972/73	0.92	237	50	40	28	15	7.4
1973/74	1.69	233	55	50	51	24	6.0
1974/75	1.16	220	60	55	35	19	7.8
1975/76	1.44	228	65	60	43	24	7.2
1976/77	1.84	248	75	60	55	28	6.3
1977/78	1.43	237	80	65	43	25	7.5
1978/79	1.68	216	90	70	50	26	7.2
1979/80	1.88	208	100	75	56	28	7.0
1980/81	2.08	243	110	80	62	37	6.9
1981/82	1.63	301	120	85	49	43	8.2
1982/83	1.69	359	130	90	51	52	8.3
1983/84	1.93	414	140	110	58	72	8.7
1984/85	1.52	472	145	120	46	75	10.9
1985/86	1.08	378	150	110	32	50	13.2
1986/87	1.37	316	150	100	41	43	10.3
1987/88	1.60	295	135	95	48	42	8.9
1988/89	1.46	308	120	95	44	44	9.5
1989/90	1.77	305	125	95	53	42	8.4
1990/91	1.81	273	120	90	54	40	8.0
1991/92	1.50	281	115	90	45	36	9.0
1992/93	1.30	269	120	90	39	36	9.9
1993/94	1.50	411	150	90	45	68	9.0
1994/95	2.02	522	175	90	61	77	7.5
1995/96	1.91	500	190	90	57	75	7.7
1996/97	1.76	538	200	80	53	75	7.5
1997/98	1.64	598	210	75	49	74	7.6
1998/99	1.35	593	225	70	40	67	8.2
1999/00	1.20	649	230	65	36	70	8.4
2000/01	1.27	731	245	60	38	72	7.7
2001/02	0.97	731	225	55	29	60	8.6
2002/03	1.16	648	220	60	35	57	8.2
2003/04	1.47	555	215	55	38	50	6.3
2004/05	1.23	524	220	55	32	46	7.1
2005/06	1.24	535	225	60	32	49	7.4

Notes**:** The A Index (cotton lint) and the CFAf/$ exchange rate have been calculated over as a March to July average to account for the fact that most cotton is marketed during this period. Marketing costs have been calculated as 3% of the A Index up to 2002/03 and 2.6% afterwards. The ginning costs are the ones reported by the cotton companies (averages for the entire WCA) and they are expressed in terms of cotton lint.

Source**:** Country sources (see Tables B1-B8), World Bank and IMF (International Financial Statistics).

Table B10. Domestic transport costs, WCA countries, 1970 to 2006 (CFAf/kg of cotton lint, nominal terms)

	Benin	*Burkina Faso*	*Cameroon*	*Chad*	*Côte d'Ivoire*	*Mali*	*Senegal*	*Togo*
1970/71	8	13	14	20	8	12	7	7
1971/72	8	14	15	22	8	12	7	7
1972/73	9	14	15	22	9	12	7	7
1973/74	9	15	16	23	9	13	8	9
1974/75	11	17	18	26	11	15	9	10
1975/76	12	18	19	27	12	15	10	11
1976/77	13	20	21	30	14	17	11	13
1977/78	15	24	22	31	16	19	11	13
1978/79	17	26	24	33	17	21	12	13
1979/80	18	28	27	36	20	23	14	14
1980/81	20	31	30	40	22	27	15	16
1981/82	22	35	33	42	23	30	16	17
1982/83	25	37	38	48	26	33	18	19
1983/84	26	40	42	52	29	36	20	20
1984/85	25	42	48	60	31	41	22	21
1985/86	24	41	50	60	31	42	24	22
1986/87	24	40	50	60	30	40	25	23
1987/88	24	40	50	60	30	40	25	23
1988/89	24	39	50	60	28	40	25	23
1989/90	24	39	48	58	27	37	25	23
1990/91	24	40	48	58	26	37	25	23
1991/92	25	40	45	55	26	38	25	23
1992/93	25	40	45	55	27	39	25	24
1993/94	28	45	50	60	35	57	28	26
1994/95	30	55	65	75	45	60	32	28
1995/96	30	58	70	80	50	65	33	28
1996/97	31	58	74	84	51	66	34	30
1997/98	32	58	76	86	52	67	35	31
1998/99	33	58	76	86	53	68	36	32
1999/00	34	60	76	86	53	69	37	33
2000/01	35	65	79	89	54	70	38	34
2001/02	36	70	81	92	56	72	39	35
2002/03	37	71	84	95	57	75	39	36
2003/04	38	72	85	96	58	76	39	37
2004/05	39	73	87	97	59	77	40	38
2005/06	40	75	90	100	60	78	40	39

Notes**:** Based on actual costs from 1986-87 through 2005/06; between 1970-71 and 1985-86 extrapolated based on country's GDP deflator.

Source**:** Cotton companies, DAGRIS, and various studies.

Table B11. Cotton production, area and yields, WCA countries compared to the rest of the world, 1970 to 2006

	World			*WCA*		
Year	*Production (000 tons)*	*Area (000 hectares)*	*Yield (kgs/hectare)*	*Production (000 tons)*	*Area (000 hectares)*	*Yield (kgs/hectare)*
1970/71	11,740	31,778	369	109	644	169
1971/72	12,938	33,024	392	141	686	205
1972/73	13,595	33,818	402	143	643	222
1973/74	13,615	32,558	418	138	616	224
1974/75	13,926	33,285	418	158	629	252
1975/76	11,706	30,001	390	190	723	263
1976/77	12,385	31,513	393	195	712	274
1977/78	13,860	34,966	396	179	666	268
1978/79	12,933	34,000	380	216	702	308
1979/80	14,084	33,100	425	235	652	360
1980/81	13,831	33,667	411	204	633	323
1981/82	14,991	33,948	442	202	551	366
1982/83	14,479	32,569	445	253	591	427
1983/84	14,499	32,137	451	279	675	413
1984/85	19,247	35,217	547	327	708	461
1985/86	17,461	32,792	532	351	838	419
1986/87	15,269	29,503	518	409	846	483
1987/88	17,609	31,238	564	414	911	454
1988/89	18,301	33,522	546	498	1,101	452
1989/90	17,365	31,640	549	458	1,026	446
1990/91	18,978	33,050	574	533	1,118	477
1991/92	20,677	34,710	596	521	1,232	423
1992/93	17,943	32,238	557	539	1,209	446
1993/94	16,861	30,430	554	510	1,176	434
1994/95	18,762	32,114	584	573	1,398	410
1995/96	20,330	36,056	564	667	1,502	444
1996/97	19,599	34,111	575	790	1,753	451
1997/98	20,094	33,746	595	921	2,120	435
1998/99	18,705	32,846	569	858	2,202	390
1999/00	19,095	31,929	598	851	2,034	418
2000/01	19,457	31,766	612	693	1,668	415
2001/02	21,500	33,396	644	994	2,258	440
2002/03	19,297	29,872	646	913	2,128	429
2003/04	20,714	32,021	647	906	2,216	409
2004/05	26,290	35,332	744	1,119	2,474	452
2005/06	24,752	34,252	723	923	2,349	393

Source**:** World data are from ICAC and WCA data are from the cotton companies. WCA refers to the sum of the 8 countries studied here.

Table B12. Cotton NRAs, WCA countries, 1970 to 2005

(percent)

	Benin	Burkina Faso	Chad	Mali	Togo	unweighted average
1970	-31	-28	-39	-47	-28	-34
1971	-43	-44	-49	-54	-42	-46
1972	-43	-45	-50	-57	-43	-47
1973	-69	-69	-73	-78	-65	-71
1974	-42	-41	-34	-47	-34	-39
1975	-51	-50	-46	-59	-42	-50
1976	-63	-68	-63	-73	-65	-66
1977	-41	-37	-40	-47	-38	-40
1978	-50	-47	-50	-58	-46	-50
1979	-48	-45	-47	-43	-44	-45
1980	-52	-54	-47	-55	-53	-52
1981	-33	-45	-45	-48	-48	-44
1982	-46	-60	-53	-61	-63	-57
1983	-55	-68	-63	-67	-70	-64
1984	-46	-51	-40	-59	-57	-51
1985	14	6	19	-6	-2	7
1986	5	0	13	-14	-8	-1
1987	-19	-20	-5	-25	-21	-18
1988	-10	-14	3	-20	-22	-13
1989	-42	-41	-37	-49	-44	-43
1990	-30	-30	-25	-33	-31	-30
1991	-15	-13	-7	-15	-12	-12
1992	17	8	21	21	6	15
1993	-19	-14	-21	-21	-19	-19
1994	-61	-68	-62	-64	-59	-63
1995	-37	-43	-46	-45	-41	-42
1996	-28	-34	-32	-42	-35	-34
1997	-32	-36	-25	-40	-29	-32
1998	3	-12	2	-10	-8	-5
1999	-9	-6	3	-22	-2	-7
2000	-23	-27	-29	-32	-24	-27
2001	6	15	2	15	7	9
2002	-16	-14	-15	-9	-19	-15
2003	-17	-20	-26	-11	-28	-20
2004	15	38	37	43	6	28
2005	10	13	15	11	-5	9

Source: Author's calculations using the data in earlier tables