Cotton price change and welfare in Togo

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Abstract: This paper uses the evaluation of net benefit ratios applied to survey data on households to appreciate the effects of international price of cotton on the welfare of producers in Togo. It needs first to trace the difference between international prices and those paid to domestic producers. Furthermore, given that households are producers of these goods, we use a revenue function that depends on the remuneration of labor, other earnings and profit that in turn depends on the price paid to producers and land ownership. For estimates, the effect of welfare, which is captured by the compensating variation, is the result of the share of the average cotton income in average total income multiplied by the change in the price of cotton. Our results with QUIBB[1] 2006 and 2011 survey data reveal that the impact of a price change on the compensating variation gives a welfare change relatively higher for poor households. However, this effect remains low, considering whether a change in producer prices or in international price. A simulation of a potential effect of the change in the producer price of 50% of the differential of the two prices, and the positive impact on social welfare that results appears stronger. This positive change in welfare is reversely associated to the wealth of households**.** Consequently, any pricing mecanism that aims at increasing the producer price so as to minimize its gap with the international price will improve the welfare in the cotton sector.

Keywords: welfare, price change, cotton.

Introduction

Since Togo's independence, cotton production has had a significant share in the country's agricultural output. Like other cash crops, such as coffee and cocoa, cotton contributes to an important part of export incomes. Cotton accounted for up to 20% of export earnings before 2004, the year its output started experiencing a downward trend. Cotton cultivation occupies a large proportion of the rural population in all

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[1] Questionnaire d'Indicateurs de Base et de Bien-être.

regions of the country, sometimes reaching up to 70%[2]. As a result, the sector remains very sensitive to external shocks. Moreover, inefficient management the cotton sector has led to notorious effects on rural households' income.

However, since 2005, the national cotton output has dropped by one third, from 65 400 tons in 2005 to 48 800 tons in 2008, while it had followed an upward trend between 1988 and 1998, when it rose from 56 429 tons to 187 600 tons (DSID[3], 2000). This decline appears secondary to problems of governance characterized by late payments to producers and is aggravated by the decline in international cotton prices in 2009. The situation is worsened by the cessation of cotton production and the closure of the *Société Togolaise de Coton* (SOTOCO) which was previously in charge of cotton commercialization in Togo. To restore and revitalize the cotton sector, a new commercialization agency has been put in place, the *Nouvelle Société de Coton du Togo* (NSCT).

Cotton production accounts for 5 to 10 percent of GDP in Benin, Burkina Faso, Mali, Chad and Togo[4]. However, according to statistics from the *DSID* (2007)[5], the contribution of cotton to the national wealth is 4.2% and it represents on average 88% of resources generated by cash crops between 1991 and 2006. The other two most important crops, coffee and cocoa, contributed respectively 8 and 4% of crop export revenue during the same period.

Compared to Togo's other export products such as phosphate, clinker and cement, cotton's share in total exports[6] Figure 2) has increased from 2.35% in 1980 to about 20% since 1990. The relative rise in cotton exports is mainly characterized by the abundance and dependence on phosphate until the late 1980s.

Table 1 - Evolution of the value of cotton exports relative to GDP in Togo.

Year	1995	2000	2004	2006	2007	2010	2011	2012
Export of cotton in thousand dollar	111211	78502	90272	67650	34368	82349	135589	106874
PIB en million de dollar	1444.4	1294.1	1936.9	2218.7	2530.6	3172.6	3694.6	3645.6
*Share of cotton Exports in GDP (%)	7.70	6.07	4.66	3.05	1.36	2.60	3.67	2.93

* Our calculations based on UNCTAD statistics.

[2] DSID, 2000. Etude statistique de la libéralisation du secteur cotonnier au Togo, Lomé, 157p. & QUIBB 2006 et 2011
[3] Direction de la Statistique agricole, de l'Information et de la Documentation (DSID).
[4] Appui de la FAO aux négociations de l'OMC, Produits importants dans le commerce international: le coton.
[5] That's the dataset.
[6] Mensah, 2014, 'Evaluation de l'impact des exportations de phosphate sur le développement économique au Togo' study funded by CNUCED, *ROASEG* 7: 34-54.
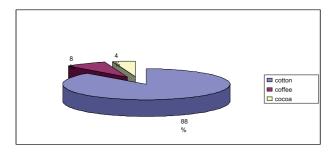
Figure 1 - Average share of exports of cash crops in Togo from 1991 to 2006.
Source : Direction des Enquêtes et Statistiques Agricoles.
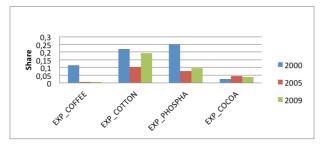

Figure 2 - Composition of total exports of Togo from 2000 to 2009.

The figure 3 shows a stagnation of producer prices over the time span 2000-2012. While there is a weak rise in world prices, a stabilization system has been set up by the cotton company to encourage production. Investigating on years 2006 and 2011, it is possible to capture changes in producer prices between 2005 and 2006 and between 2010 and 2011. An alternative approach would consider the difference between the producer price and the sale price of cotton. This second approach remains the main mechanism used in this study to unveil the potential welfare gains for producers following the adoption of a price system closer to the international price.
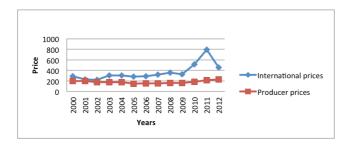

Figure 3 - Evolution of international prices and producer prices.

The government aims, in the context of revival of the agricultural sector, at an annual production of about 100,000 tons in 2013, after restructuring the company management and discharge of the debt to the cotton producers. The objective of this study is to contribute to the economic literature by analyzing the possibilities to improve the welfare of rural households in the agricultural sector given that poverty, in all its dimensions, affects more rural than urban households. To lay down a
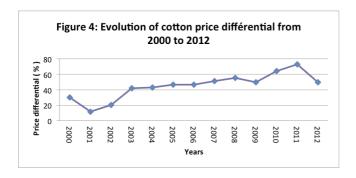
Figure 4: Evolution of cotton price différential from 2000 to 2012

Figure 4 - Evolution of cotton price différential from 2000 to 2012.

sustainable cotton production plan in Togo in order to improve the welfare of cotton producers, it is important to analyze the effect of international cotton prices on producers' welfare. This will respond to the fundamental question of : what are the effects of international cotton prices on welfare of cotton producers' households in Togo?

Background on the cotton issue and pricing mechanism in Togo

Overview of the cotton issue

The issue about the production and marketing of cotton in Africa lies around three main axes: the setup of international prices, the fixing of national prices and the issue of cotton productivity improvement in Africa. All these issues are linked and the development of the cotton sector in Africa requires that actors work seriously on each of these three aspects of the issue to achieve significant improvements of producers of cotton livelihood.

The debate on international price fixing has been recently dominated by the United States and the European Union subsidies to their cotton producers. Authors who have worked on these issues (Woodward, 2007; Alston et *al.* 2007) mainly focused on U.S. cotton subsidies. They uncover that that a removal or even a reduction in the subsidy would not only improve the well-being of African producers, but also free up resources for other social sectors in the United States. These studies also reveal that a removal of U.S. subsidies may increase world prices by 6 to 14 percent and thus improve well-being in several countries in West Africa provided measures to significantly increase the international prices are passed on to domestic prices. More specifically, the work by Alston et *al.* (2007) asserts that a cotton price transmission of 80% of might increase the per kg price from 14 to 34 CFA francs , while a 50 percent transmission might increase the per kg price from 9 to 21 CFA francs.

Regrettably, the transmission of international prices has been revealed very weak in African cotton producing countries. Prices received by African producers were very

low while international prices were high. For example, Baffes (2007) reports that in the 1980's West African producers received a price between 60 and 70 CFA francs per kilogramme of cotton when international prices lied between 200 and 250 CFA francs per kilogramme. This difficulty of transmission of international prices to domestic producers is worsened by the fixed exchange rate between the CFA franc and the euro, which penalizes African producers. This situation made crucial the reform of the parity of the CFA franc to the euro. The system of administered prices in usage until the 1990's was abandoned throughout Africa. Indeed, in Togo, this system has led to unsustainable situations caused by a drop in price and the inability of SOTOCO to pay for its purchases despite a surge in international prices. The negotiated price system between the stakeholders is a bit unfair because it is dependent upon the relative strengths of buyers and producers. The arranged price system appears less acceptable considering the risk of political interference in the negotiations. The determination of producer price with respect to agricultural production costs has been let down since it appeared unworkable since it is uneasy to assess extremely variable costs. It is economically unsustainable because it is the market that has to adjust to the performance of producers. The setting of producer price with regards to international prices tends to generalized. It requires a payment in two stages except in rare cases where the purchase price varies f daily depending on market conditions.

Finally, the issue of low productivity of cotton in West Africa reveals an unsustainable management situation of the cotton sector by national monopsonies. These national monopsonies which aim to stabilize prices paid to producers have not been able to invest in research to adequately increase productivity in the sector. There has been a significant increase in cotton productivity in China and India because of the introduction of genetically modified cotton species more resistant to insects. In Africa, the introduction of new species is a debate that needs to be conducted to consider the benefits and potential adverse environmental effects. According to Baffes (2007) the beneficial effects of the use of biotechnology may even be superior to any elimination of subsidies in developed countries.

Cotton pricing mechanisms in Togo

The pricing regime for cotton producers in Togo has evolved over time. Prior to 2009, the price was set by a government committee, ignoring the evolution of international prices. Then the difference between the international price and the producer price was managed by the cotton agency with a monopoly of marketing. This resulted in huge financial difficulties arising from a less-transparent management of resources from the purchase of cotton producers. This had led to overdue payments to producers. Since the activities of cotton production became unprofitable, cotton growers turn to other crops abandoning cotton production; this had led to the

liquidation of the former cotton agency, SOTOCO, and its replacement by, NSCT, which initiated a restructuration and defined a new producer pricing mechanism in accordance with the group of producers.

Subsequently, in 2009 a document setting producer prices with regards to the level of international prices has been approved by the different actors involved. The r price of cotton seeds is determined so as to encourage a sustainable recovery of the Togolese cotton sector. The mechanism respects the balance of the different actors, gives incentives to improve their performance, and limits fiscal risks for the state. The final price paid is calculated on the basis of an apportionment of the international price of the fibre between the producers and the cotton company. It follows that producers Support Fund could possibly be created in addition to the mechanism to mitigate the impact of fluctuations in international prices on producer prices. In addition to this the second tool designed to improve performances, it should be acknowledged that the sale of cotton on the international market through intermediaries is crucial. The new pricing regime for producers brought together the new cotton company and producers.

Materials and Methods

Methodological approach

The methodology used to achieve the objectives of this study is that developed by Benjamin and Deaton (1993) in their work, related to the evaluation of net benefit ratios applied to survey data on households. First, it traces the difference between international prices and those paid to domestic producers. Moreover, given that households are producers of these goods, we use a revenue function Y (equation 1 below) that depends on the remuneration of labor, earnings, and profit that in turn depends on the price paid to producers and land ownership. This will trace the effects of distributions of income due to changes in the price of cotton.

$$Y = \pi(p; A) + E + \mu \qquad (1)$$

Where Y is household income,
$\pi(p; A)$ represents the profit that depends on price p and land ownership A
E is the remuneration of labor
μ represents other earnings

Assuming a price variation (dp) of goods, the change in income of producers of the goods in question is obtained by the multiplication of the price differential dp by farmers' production q. The proportional change in consumer expenditures that could be kept out of the price change is given by the following equation:
where x represents consumer spending.

$$dlnx = \frac{qdp}{x} = \frac{pq}{x} dlnp \qquad\qquad (2)$$

Thus, the elasticity of the potential consumption of farm families is "the ratio of gain." Households with a high ratio are those that derive much of their income from cotton production and are therefore more exposed to changes in prices. This gain ratio is an indicator adjusted with regards to the gain (or cost) of a price change for each producer household. The distribution of this ratio with respect to the per capita expenditure (pcx) households can help capture the distributional impact of a price change in order determine winners and losers after a price decrease.

Constitution of the datasets

The dataset used for this research comes from the QUIBB surveys. These surveys cover elements such as production, consumption, income and ownership of property. Each section contains relevant indicators. From there, our approach is to extract each base indicator relevant to the study and then merge them into a single dataset for the years 2006 and 2011 respectively.

The proportion of cotton growers is determined and calculated by first isolating all producer households with at least one cash crop and all agricultural producers. Then the number of cotton producers deduced is reported to all households producing crops and all farmers to measure their respective proportions. The QUIBB surveys with respectively 7,500 households and 5,491 households in 2006 and 2011, are made in different sections, Section N (Agricultural Production) Section O (durables), Section P (Internal consumption), Section Q (current expenditure) section R (retrospective Expenses), Section S (household income).

Our research data come from the various sections related to production, income, and expenses.
- The indicator on the average total expenditure is the total expenditure incurred by the household in the year.
- The total income is the total sales by the household and thus the average total income is derived with respect to household size.
- Cotton income is simply deducted from sales of agricultural products by specifying that the product is in this case cotton. The average cotton income is determined by considering the size of the household.

For estimates, the welfare effect is captured by the compensating variation is the result of the share of the mean cotton income in average total income by the change in the price of cotton. For total revenues lesser than expenditures, total revenues are approximated by total expenditures [7].

[7] Since our unit of analysis is the farm households, we assume that household income derived from sales of agricultural products. However, farm households also derive their income from livestock sales, rents, sales and rental of agricultural land. If it happens sometimes that the expenditure incurred by agricultural households exceeds their farm incomes then the incomes of some households are approximated by expenditures.

The variables of the study

The variables of interest are the average household expenditure, total sales as proxy for household income, gender of household heads, and their areas of residence. However, the welfare variable, the compensating variation, is obtained by multiplying the ratio cotton income to the total household income by the price change. We also should notice that dealing with households and not individuals the income of a household is the sum of the incomes of different members. Therefore, we assume that the expenditure incurred by a household is comparable to the income from the sale of cotton.

Results

Distribution of the average expenditure of households producing cotton

Figure 5 – Distribution of average expenditure by different groups of households in 2006.

For 2006, figure 5 shows that expenditures level between 9 and 12 there is a weak concentration of cotton producers compared to other farmers and non-agricultural households; however, beyond 12, there is a stronger concentration of cotton producers around high incomes compared to other farmers and households. Accordingly, cotton producers are less likely to spend lesser than 12 and above. Conversely, in 2011 (Figure 6), there is a reverse distribution of average expenditures while considering the expenditure threshold of 12. The second phase reveals that for higher expenditures levels, reaching 14, there is a weaker concentration of cotton producers, relatively to other farmers and other households.

Change in producer prices and change in welfare households producing cotton

With a 3.2% increase in the producer price of cotton raised in 2006, the positive change in welfare (Figure 7) resulting decreases with changes in average spending until level 12; compensating variation is thus 20% to 16% and then rise to 17% when the average expenditure exceeds 12.
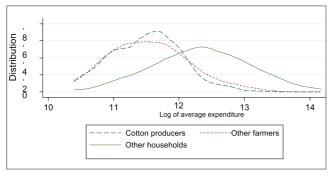
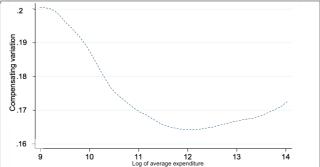*Figure 6 - Distribution of average expenditure by different groups of households in 2011.*

Figure 7 - Effect of change in the producer price on the welfare of cotton farmers' households in 2006.
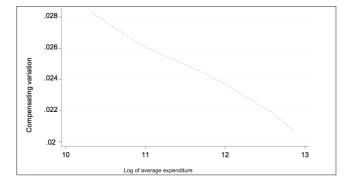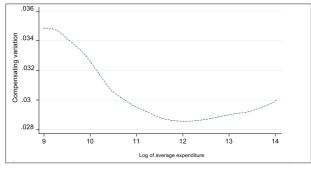

Figure 8 - Effect of change in the producer price on the welfare of cotton farmers' households in 2011.

In 2011, following a change in the producer price of about 14%, the welfare of cotton farmers is significantly higher for low income than for high income households (Figure 8): the compensating variation goes from 2.8% to 2% when the level of wealth is from 10 to 13; this change in welfare is less favorable to the richest. Accordingly, if cotton producing households are relatively poor in 2011, we note that the positive change in welfare resulting benefits is relatively low.

Figure 9 - Effect of change in the international price on the welfare of cotton farmers households in 2006.
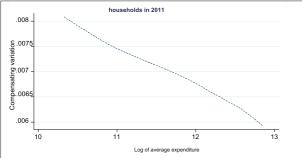

Figure 10 - Effect of change in the international price on the welfare of cotton farmers households in 2011.

Effect of change in international prices on the welfare of households producing cotton

The potential effect of changes in the international price of 4% for 2006 shows an increase of the compensating variation ranging from 3.6 to 2.8% following income to evolve from 10 to 14 (Figure 9). For 2011, with an increase in the international price of 34% the welfare change is lower, reaching only 0.8% for low-income and 0.6% for higher (Figure 10). We deduce that the variation of international prices as the domestic price is less beneficial to rich. But the level of welfare is significantly lower in the case of changes in the international price compared to that of domestic prices.

Effect of price differential on the welfare of households producing cotton

With a price differential estimated at 88% based on the producer prices in 2006, the evolution of the compensating variation based on average costs (Figure 11) increased from 20 to 16%; increased welfare and spending move in opposite direction with a slight reversal for higher expenses.

In 2011 (Figure 12), the compensating variation and the level of wealth approximated by the mean expenditure also move in opposite directions, 55 to 40% for the compensating variation and 10 to 13 for expenditures. In general, the increase in welfare is higher in 2011 than in 2006 as expenses increase, with a higher difference in welfare in 2011 than in 2006.
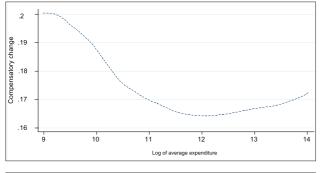
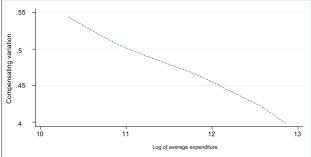*Figure 11 - Differential of price effect on the welfare of cotton farmers in 2006.*

Figure 12 - Differential of price effect on the welfare of cotton farmers

Prospective analysis relating to a change of 50% of the price differential

Simulating a 50% increase in the differential amounts to increasing the gap between producer prices and international prices; in other words, all things being equal, that is to reduce the producer price or increase the international cotton prices. If the simulation relates to the first alternative, a decrease of 44% and 135%, resulting in a deteriorating trend welfare of cotton farmers in 2006 and 2011 respectively (Figures 13 and 14), the deterioration is more pronounced with cotton farmers whose incomes are relatively low compared to the richest. In case of increase in the
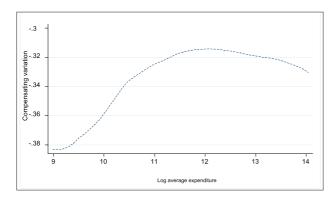

Figure 13 - Effect of 50% increase in the price differential on the welfare of cotton farmers in 2006.
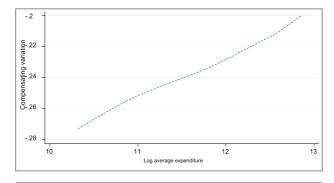
Figure 14 - Effect of 50% increase in the price differential on the welfare of cotton farmers in 2011.
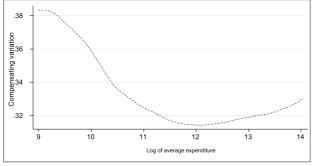

Figure 15 - Effect of 50% decrease in the price differential on the welfare of cotton farmers in 2006.
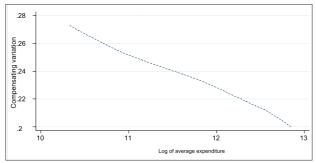

Figure 16 - Effect of 50% decrease in the price differential on the welfare of cotton farmers in 2011.

international price differential, all other things being kept constant, the initial state of welfare of households will not be affected.

In case of 50% reduction of the price differential, there is a narrowing of the gap between producer prices and international prices; i.e. the producer price increases by 44% and 135% respectively in 2006 and 2011, or that the international price decreases correspondingly. The option of a shrinking gap by the process of the first alternative positively impacts welfare according to the curves 15 and 16. It has to be noticed that in both cases there is an upward trend for the compensatory variation but its magnitude decreases with spending levels for cotton producers.

But if the gap is reduced by the drop in international prices, the impact on welfare hardly changes the initial situation for both survey years included in the study.

Discussion and conclusion

The purpose of this study is to assess the impact of international cotton prices on the welfare of cotton farmers' households. Statistical analysis shows that cotton producer households are poorer than other farmers' households. They are largely low-income households. Moreover, the stagnation observed in the producer prices is not subject to a stagnation of international prices. This stagnation is due to a stabilization system set up by the cotton agency with a monopsony power. However, it appears that a change in producer price occurs in both survey years enabling us to assess its impact on the welfare of cotton producer households. After the restructuration of the cotton agency and the adoption of a new pricing mechanism, the need of another QUIBB household data survey appears to be necessary in order to thoroughly assess the impact of the pricing mechanism on the welfare of cotton producers households.

By using an analysis of net benefit ratios applied to QUIBB 2006 and 2011 household's survey data, it follows that the impact of a price change on the compensating variation gives a welfare change relatively higher for poor households. However, this effect remains low, considering whether a change occurs in producer prices or in international price. We conducted a simulation of the potential effect of the change in the producer price of 50% of the differential of the two prices, and the positive impact on social welfare that results appears stronger. This positive change in welfare is reversely associated to the wealth of households. So any policy of price increase would benefit the poor and would be effectively poverty reducing in the cotton sector.

In terms of practical policy recommendation, any policy that acts on increasing the producer price such that its difference with the international price is minimized will be welfare improving for rural households in the cotton sector.

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