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The Sikasso Paradoxe : Cotton and Poverty in Mali

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THE SIKASSO PARADOXE: COTTON AND POVERTY IN MALI¹

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Abstract

In Mali, the situation of cotton growing households has traditionally been considered as more favorable than that of food crop producers. However, official statistics on poverty suggest that the cotton growing region of Sikasso is among the poorest regions of the country and that cotton producers are on average poorer than all other farmers. This article offers a detailed analysis of this paradox, the so-called Sikasso paradox. The official statistics on poverty are set out and data and methodological issues are exposed. The reworking of the data led to the conclusion that cotton producers have an “advantage” over other farmers. This analysis underlines the need for open debate concerning data – an oft neglected step in the analysis of development policy.

Key words : Africa; Mali; Poverty; Cotton

Résumé

Au Mali, il est entendu que la situation des producteurs de coton est meilleure que celle des producteurs de produits viviers. Cependant, les statistiques officielles de la pauvreté suggèrent que la région de Sikasso - région dans laquelle le coton est essentiellement cultivé fait partie des régions les plus pauvres du pays et que les producteurs de coton sont en moyenne plus pauvres que les autres agriculteurs. Cet article examine en détail ce paradoxe, souvent nommé le paradoxe de Sikasso, ainsi que ses enjeux en termes d'économie politique du « chiffre ». Nous analysons en détail les statistiques officielles et les problèmes méthodologiques qu'elles posent. Nous montrons que finalement les producteurs de coton connaissent de meilleures conditions de vie que les autres agriculteurs. La conclusion d'un tel cas d'étude n'est évidemment pas de se détourner de la mesure des conditions de vie des populations. L'exemple de Sikasso plaide au contraire pour que les évaluateurs et concepteurs de politiques publiques accordent une importance première à la fabrication des données, et que ces dernières fassent l'objet d'un débat contradictoire. Dans tous les instruments de pilotage, de conception et d'évaluation des politiques publiques, la collecte et le traitement des données devraient sans doute recueillir une attention au moins aussi importante que leur analyse, et susciter tout autant la contradiction.

Mots clés : Afrique ; Mali ; Pauvreté ; Coton

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0. Introduction

The Sikasso region of Mali, in the Sahel, is the country's most fertile and most rain-rich. Due to this, the region thrives in terms of agricultural production and its food surpluses are distributed throughout the country. But above all, this region is the region in which Mali's chief agro-industrial resource is produced, so-called 'white gold'. For decades, the cotton-producing zone has received the support of both the country's public authorities and its international donors, who have constructed a public vertically integrated sector. Along with the rice-producing area of the Office du Niger, the cotton zone unquestionably channels the largest part of the country's agricultural development efforts.

However, national and international statistics have reported several times over a period of a dozen or so years that this region of Sikasso is the country's poorest rural region and that cotton producers are on average poorer than all other farmers in the country.

Such is the discrepancy highlighted by this information between existing potential and resources invested, on one hand, and results in fighting poverty on the other, that this information could appear astounding.

Notwithstanding this the data produced on this unexplained poverty – sometimes referred to as the Sikasso paradox – has been put to use far more than it has been questioned. Thus it is used to support denouncements of Malian farmers' dependence on fluctuating world prices, and also of the inequality engendered by industry subsidies in Western countries. Equally, the data has bolstered arguments for radical reform of the industry by underlining the poor results that the current system obtains. While these uses might be considered opportunistic, beyond them it is clear that this data deserves greater attention.

This article offers a detailed analysis of the Sikasso paradox. Following a short outline of the cotton industry, the official statistics on poverty in Mali that gave rise to our paradox are set out and then resituated in context.

The two following sections outline our results. In the first, the existing data are analysed, then following this the data on household standards of living are reworked using specific questions and hypotheses so that the question of the poverty of cotton producers compared with the rest of the rural inhabitants of Mali is better appraised.

While the development community considers impact assessment and results-based management as key tools for improving poverty-reduction policies, a deeper analysis of the Sikasso paradox could prove instructive. It will certainly reveal a few of the drawbacks of these development management tools, underlining the need for open debate concerning data – an oft-neglected step in the analysis of development policy.

This article contains some disagreements with previous work regarding the validity of certain data. The aim in so doing is absolutely not to turn a censorious eye to the highly qualified and undervalued work of those who produce data. Quite the opposite, we seek here to demonstrate that in order to be useful for the analysis and implementation of development policies data production should receive greater attention.

1. From Golden Age to Crisis: A Context of Uncertainty

Since the 1960s,¹ cotton has been right at the heart of agricultural development activities in the Mali-South zone.

Both the Malian government and its development partners hugely supported the industry's growth. The sector is vertically integrated under the Compagnie Malienne de Développement des Textiles (Malian Textile Development Company, CMDT), a 90 percent state-owned public-private company. The CMDT supplies inputs and advice to farmers, purchases cottonseed at a guaranteed price announced at the start of the cropping season, and transforms and markets cotton lint.

Through aggressive policy, cotton production grew steadily from the 1960s through to the 1980s. The 1990s were a true golden age for cotton in Mali. Following the devaluation of the CFA franc (XOF) in 1994, production grew from 240 000 to 500 000 tonnes in 2000, then to a historic high of 620 000 tonnes in 2003-04. At this time, the sector was comprised of 160 000 farms and 3 million Malians. Cotton accounted for 3 percent of GDP and 38 percent of exports in 2004. The cotton industry was thus considered a remarkable success story within the Sahelian context.

However, since the start of the noughties there have been signs of crisis. The CMDT has been confronted with an extremely sharp financial crisis, brought on by the fall in world cotton prices (which began to fall in 1998). Because of the crisis the company's management shortcomings, skyrocketing general charges, absence of monitoring and cost control and inappropriate investments have all been revealed. In 2000-01, the announcement of an even lower farmer price than usual and the exposure of these inconsistencies drove more than 50 percent of farmers to forgo planting cotton, thus halving production and exacerbating the sector's financial and economic crisis.

In 2001 as a result, the reform of the cotton sector was launched by the Malian government with the support of the World Bank and the Agence Française de Développement and with the Dutch co-operation. The first step in this was to refocus the CMDT on its activities in the cotton industry (dropping its other mission of regional development). In a second phase, institutional reform should enable both farmers and the private sector to participate more in the management of the industry, leading finally, to the complete liberalisation of the cotton sector. This should free the State from continually bailing out the company. To support the industry, the State participated in the recapitalisation of the CMDT and gave it cash flow injections in 2005, 2006 and 2007.

However, in 2004 with the agreement of the foreign partners, these second and third steps were postponed by the Malian government (until 2008) in order to give farmers time to prepare for increased responsibilities in the industry. Since 2005 though, the system of fixing farmer prices was modified in order to link it to world prices and reduce the industry's deficits. This step towards liberalisation had an immediate negative effect on the producer price, causing it to fall from 210 XOF/kg in 2004-05 to 160 XOF in 2005-06. The Bretton-Woods Institutions deemed that henceforth: "African cotton producers should rise to the major challenge of adapting to lower world prices on their own."² The introduction of a price stabilisation fund in 2006 further completes this new system and guarantees the payment of a minimum of 160 XOF/kg to farmers.

¹ And, in another sense, since the beginning of the century.

² Rodrigo de Rato, Managing Director of the IMF in an interview with *Figaro*, 24 June 2005.

While international markets have been gradually improving since 2007, as long as the CMDT remains unstable, the sector in Mali seems unable to benefit. The producer price has suffered further with the appreciation of the euro over the dollar. Faced with falling nominal prices since 2005, a third of farmers have abandoned cotton and the area under cultivation has been reduced by almost 50 percent. This situation will probably be exacerbated by the very large cash flow difficulties experienced by the CMDT, which prevented it from paying producers for all of the cottonseed of the 2007-08 harvest.

The only recent advance was that the privatisation of the company was voted in the National Assembly in August 2008, despite opposition from both civil society and unions.

The state of the cotton industry thus appears highly uncertain. Indeed, it is unclear what can be made of a sector universally considered a great success ten years ago and now considered close to bankruptcy. If this poses an intellectual challenge, the real challenge lies in the threatened future of Mali's leading agro-industry, its most emblematic company and worse, the revenue of millions of Malians.

Against this background, the question of the results of cotton farming, particularly in terms of the fight against poverty, deserve specific attention. The following section outlines a debate that is as obscured as enlightened by the existing statistics.

2. The Sikasso Paradox: Locating the Poor

In Mali, the discord that appeared between a widely held perception of relative prosperity in the cotton-producing zones and the results of quantitative studies of poverty is at times referred to as the Sikasso Paradox. This paradox was highlighted following the publication of the results of the EMEP poverty assessment survey of 2001 (Department for National Statistics and Information, DNSI, 2004)³: Sikasso was ranked second to last in terms of poverty in 2001 (see Table 1). The retrospective treatment of 1994 data further supported this finding.⁴ Finally, in September 2007, the publication of the findings of the 2006 ELIM survey (DNSI, 2007) confirmed this ranking established on the basis of the 1994 and 2001 data: the Sikasso region was once again ranked last (Table 1).

[Insert table 1 about here]

A World Bank draft working paper distributed in Mali in 2006 "Cotton and Poverty" (Wodon *et al.*, 2006) that would never be completed,⁵ also reiterated this contradiction between the perception of these cotton zones (based on qualitative work or on concrete experience) and the quantitative indicators of statistical studies. It noted: "*Despite the fact that cotton production is at the core of Mali's economy, and despite qualitative evidence suggesting that producers get at least some benefits from the production of the crop, poverty and other indicators of well-being in cotton producing areas remain very weak according to nationally representative household surveys.*" (p. 34)

³ Three national representative household surveys are used to analyse poverty in Mali: EMCES 1994, EMEP 2001 and ELIM 2006. These surveys are briefly summarised in Annex A.

⁴ DNSI (2004, 2007), ODHD (2006), and Günther, Marouani and Raffinot (2007).

⁵ We will return to several points of this report later as it illustrates the debates current at the time. However, the report was subsequently withdrawn from the World Bank website and thus, does not represent the point of view of this institution.

When these findings were published, the industry's crisis was still new and the golden age of cotton production still within memory. Cotton's declared 'success story' then is rooted in the exponential growth in production at the end of the 1990s and the peak of 2003-04. The French strategy to support African cotton industries (2004) recalled thus that: "*over the past 30 years, the cotton sectors in Francophone Africa have experienced remarkable growth, which has had a significant impact on the economies of the countries involved and on the reduction of rural poverty, while enabling the start of intensive farming in cotton zones*" (cited by Devèze et Halley Des Fontaines 2005, p.50). The 2001 development policy note for the cotton sector in Mali reassigned two priority objectives to the sector: combating poverty and improving living conditions of the population.

Once the survey results were published, the paradox thus appeared complete. The relevance of the statistical data is questionable however. Effectively, because the DNSI surveys had been carried out in 1994 before the positive effects of the devaluation of the CFA franc materialised, and in 2001 (the year of a cotton producers strike), it seemed debatable for a number of analysts to conclude from these studies that a link between cotton and poverty existed. Furthermore, the 2001 survey identified geographic location only and not cotton producing households. According to its findings then, the households of Sikasso appeared amongst the poorest, but without us knowing if this is was attributable to cotton.

At the time, the World Bank report "Cotton and Poverty" considered however that geographic location was a plausible albeit rough link between poverty levels and cotton. "*However, information on poverty is available according to geographic location, which can be used as a proxy for economic activity, since much of the cotton production is concentrated in the Sikasso area* (p. 35)."

The ELIM 2006 national survey introduced new elements to the debate by allowing the case of cotton producers to be considered specifically.⁶ The results, published in 2007 confirmed the particular situation of the Sikasso region and made a connection between poverty and cotton farming. Thus the authors of the DNSI (2007) report noted (p. III): "*The poorest household group is that headed by farmers, notably cotton farmers in the Sikasso region*". This finding is illustrated by data in the table below (Table 2): poverty rates are by far highest among cotton farmers at 77.8 percent compared to 53 percent for other farmers and 47.4 percent nationally.

However, from 2005, the paradox faded as the crisis of the Malian cotton sector became entrenched and production began to drop reflecting the disaffection of farmers themselves with the crop. The depressed international market, changes in the price fixation system and the problems in restructuring the industry appeared natural explanations for the difficulties encountered by farmers. For the majority of researchers, cotton was no longer a means for enriching farmers but a crop upon which the poorest segments of society would continue to depend in the absence of an alternative.

[Insert Table 2 about here]

This analysis is also formulated in a World Bank note by Tsimpo and Wodon (2007) addressing poverty amongst cotton producers in central and West Africa and proposing to simulate the effect of price fluctuations on the revenues of cotton farmers.

⁶ It should be noted that researchers at the DNSI received technical assistance from the World Bank to carry out the survey and to analyze the data.

3. Re-examining the Data: Paradoxes and Statistical Artefacts

The three nationally representative surveys on household living conditions from which poverty statistics are produced, are undertaken on large samples (between 4 500 and 9 500 households, which represents between 40 000 and 80 000 individuals surveyed). Several indicators of well being, monetary and non-monetary, can be calculated from the 1994, 2001 and 2006 surveys: consumption, level of education of each member of the household, children's health, acquisition of durable goods and possession of agricultural tools, housing accommodation, type of energy and water supply. The large sample size combined with the survey design (random and representative at national and regional levels) makes it possible to analyse the data beyond category and regional average comparisons. The data is also suitable for examining differences in standards of living throughout the entire spectrum of revenue distribution. The 1994 and 2006 surveys make it possible to compare cotton producers with other population groups. The surveys being available over a long period of time (12 years), an analysis of the dynamics of standards of living and short-term shocks on cotton producers is also possible.

Unfortunately, these data have a number of drawbacks: (i) lack of temporal coherence⁷; and, (ii) regional prices are not correctly measured. Concerning the estimation of monetary poverty, this has two consequences: on one hand it makes difficult, or even impossible, any evaluation of the development of living conditions and poverty over time (for cotton producers as for the rest of the population) and, on the other hand, it could affect relative regional and category differentials.

Discussion of the Sikasso paradox requires particular attention to be paid to the question of interregional comparability of consumption aggregates. Whereas the first analysis of poverty in Mali based on the 1994 and 2001 surveys did not control for interregional differences, aware of this issue, the latest DNSI publication (DNSI, 2007) adopted a new method for calculating poverty indicators. By calculating food and non-food consumption at nominal regional prices, and poverty lines by region and area (urban and rural), attempts were made to control for interregional price differences.⁸ While we expect this method (referred to as method 2 in Table 3) to provide a refined overview of the geographic distribution of poverty, instead it shockingly highlights the Sikasso paradox: the poverty rate is found to be 80 percent in 2001 and almost 81 percent in 2006 (Table 3).

[Insert Table 3 about here]

As soon as we examine the DNSI poverty lines (reported in Figure 1), the reason for the very high level of relative poverty measured in the rural area of Sikasso becomes immediately apparent: the region's overall poverty line is the highest irrespective of all other regions.

⁷ The surveys' methodological differences and their effects on time-based analysis of poverty are set out in detail in Annex A.

⁸ This cost-of-basic-needs method consists of calculating a level of food poverty through the cost of consuming a number of kilocalories (2 450 per day) obtained from the 20 most frequently consumed foods in Mali. The non-food component of the poverty line is calculated as the non-food expenditure of households whose food expenditure is close to the food poverty threshold (households falling 5 percent above or below the food poverty line). The sum of the two lines, food and non-food, gives the overall poverty line. This method has been applied for each region and area in 2001 and 2006: 18 poverty lines have thus been defined. In principle, this method is capable of controlling for regional price differences and for differences in regional household consumption baskets of poor populations. An alternative method adopted (referred to as Method 1 in Table 3) is the food-energy intake method. Without going into the details of this (see Ravallion, 1998), the poverty line calculated by the DNSI using this method is the same for all of Mali and it is quite high. The authors of the DNSI report (2007) as some of their predecessors (Tsimpo and Wodon, 2007) show a preference for the second method, aware that the first could pose problems of consistency over time and space.

[Insert Figure 1 about here]

It also appears that the high level of overall poverty in Sikasso is not linked to the food poverty line but rather to a very high level of non-food expenditure in Sikasso (Figure 1 and Table 4). In monetary terms, this component is more than 60 000 XOF per person per year in rural Sikasso compared with 23 000 XOF in Koulikoro or 14 000 XOF in Kayes. This appears to indicate that the non-food share accounts for 42.1 percent of the overall poverty line in Sikasso, far greater than the average non-food share of regional rural consumption (28.3 percent). Compare this too, to 14.3 percent in Koulikoro and 19.3 percent in Kayes.

[Insert Table 4 about here]

At this stage, two explanations for the Sikasso paradox could be possible.

The first rests on the regional characteristics of prices: if the price of non-food consumables was particularly high in Sikasso compared to other regions, then the same level of real non-food consumption would result in a higher level of non-food current consumption. This explanation remains unconvincing however, for two reasons: for one, in order for the assessed levels to be true, it would be necessary for non-food goods to be almost three times as expensive in Sikasso than in Koulikoro. This is unlikely. Secondly, interregional variations should also appear in the regional average non-food shares of household expenditure, which is not the case. Indeed, as it happens, they are very close (28.3 percent in rural Sikasso against 30.2 percent in Koulikoro).

The second explanation is that the high level of the non-food component is the result of a statistical artefact. As mentioned previously (footnote n°8), it was calculated based on an assessment of the non-food needs of a sample of households close to the poverty line. This relatively standard method could all the same pose a problem if the sample of households in the cohort (5 percent above or below the poverty line) is too small. An examination of the available data suggests that this is, in effect, the case as the assessment of the non-food component was carried out on a sample of 29 households in Sikasso compared with 44 households in Kayes, or 61 households in Koulikoro. The poverty line calculated for Sikasso appears in consequence, aberrant.

In 2006, the 2001 poverty line was updated based on the inflation rate measured in Bamako between 2001 and 2006. This method is valid only if inflation rates in different regions and social groups followed the same trend as Bamako. Beyond this, this updated the aberrant data of the Sikasso poverty line and reproduced the artefact of high poverty in the region.⁹

4. Findings from Data on Cotton Producer Poverty

4.1 Data and Methodological Issues

The question remains whether it is possible to use the existing data to extract valid information on the comparative standards of living and poverty in the region of Sikasso, and more precisely amongst cotton producers.

⁹ The regional poverty indices in 1994 were probably also biased to the extent that the aggregate standard of living is an aggregate of expenditure rather than of total consumption. The failure to take account of self-consumption overestimates poverty. It is possible that this is particularly the case in the cotton-producing region where higher levels of self-consumption can be observed in the 2006 data than amongst other farmers: in 2006, self-consumption accounted for 71 percent of food consumption of cotton farmers compared with just 54 percent for other agricultural workers and 41 percent for other rural dwellers.

The first issue is whether these surveys are representative of the target population of cotton farmers, particularly in comparison with the CMDT statistics.¹⁰ According to the EMCES 1994 and ELIM 2006 surveys, the number of cotton households in the CMDT zones increased from 106 298 to 166 651. For its part, the CMDT declared that it had managed 163 455 smallholders during the 2006/07 harvest (CMDT, 2008). While these figures are not entirely comparable, due to variations in the observation unit,¹¹ it is possible nonetheless to see that the numbers are very close. This makes it fairly credible that the ELIM 2006 sample is representative, at least in terms of the number of cotton households in the CMDT zones.

The 1994 and 2006 surveys furthermore enable us to gather information on production and/or revenue obtained from cotton production.¹² The figures in Table B.1 in the Annex B thus show that production doubled between the two years, a far greater increase than the number of cotton producers. Output per household thus rose 22.1 percent between 1994 and 2006.

According to the ELIM 2006 data, 386 659 tonnes of cotton were produced in the CMDT zones in 2006. This is significantly less than the amount announced by the CMDT for the 2006/07 harvest: 430 000 tonnes, or 11 percent higher. Similarly, the CMDT estimates of production per household are higher than those obtained from the ELIM 2006 data for producing households: for the 2006/07 harvest, the CMDT estimated production of 2 631 kg per farm, against 2 320 kg per household for ELIM 2006, a 13 percent difference.

To conclude, in terms of the number of cotton-producing households the sample of households in the EMCES 1994 and ELIM 2006 surveys appear relatively satisfactory and representative. On the other hand, production per household appears underestimated compared to the figures given by the CMDT.

The next step is to choose an alternative method than that chosen by the DNSI for comparing poverty rates by population group. The analysis of the constraints and limitations of information, carried out in the preceding section, we opt for a less ambitious methodological choice and one that is perhaps less standard than those commonly adopted in examinations of monetary poverty in developing countries. As regional prices of non-food products are not available and the non-food component of the poverty line is impossible to calculate correctly, we estimated food consumption poverty rates. Food quantities consumed by each household were valued at Bamako prices. Thus, one kilogram of rice in Kayes would be valued the same as one kilo of rice in Mopti. The poverty line is calculated by the cost-of-basic-needs method.

¹⁰ The CMDT produces the only available data on agricultural holdings through its system of monitoring and evaluation, created in 1981. This monitoring and evaluation consists of an ongoing (annual) agricultural survey on all farms in 52 villages in the cotton zone (the sample of 52 villages is renewed every 5 years). The information is detailed only for cotton production. For other crops, the survey includes profit figures for about half of farms, and a measurement of compass subdivisions for a further sample of farms. As a result these data do not allow us to calculate the global revenue per farm, particularly as monitoring of non-cotton prices was abandoned in 1985. The exception was in 2000 when comprehensive farm accounts were carried out on the basis of average annual prices.

¹¹ The CMDT follows agricultural operations while the DNSI survey studies households.

¹² Nevertheless, information on income is incomplete. For example, net revenue of informal and agricultural activities is poorly measured. Household surveys not being an agricultural survey, data are 'poor' regarding agricultural production. Moreover, while available over several years, these are not panel data; surveys do not follow the same households at various points in time. They contain very little retrospective information concerning the life of households, whether in terms of demographic shocks (migration, death, etc.), or in terms of choice of crops during the preceding years.

It is also clear that this monetary approach must be accompanied by an analysis of other standard of living indicators such as education, health, connection to running water, or electricity...etc.

4.2 Results

Food Poverty

Table 5 shows food poverty rates by region and areas in 2001 and 2006. In 2001, poverty in the Sikasso region is in fact close to that observed in Kayes. In rural areas, poverty levels are even below those of Kayes and Koulikoro. However, the fact remains that in 2001, Sikasso was amongst the three poorest regions in Mali.¹³ In this year thus, the DNSI findings are not entirely aberrant. In 2006, it seems clear that Sikasso does not seem poorer than other regions such as Segou, Mopti or Koulikoro. The poverty rate in rural areas of Sikasso is even lower than the poverty rate in rural Kayes and in rural Mopti.

[Insert Table 5 about here]

As the 2001 EMEP survey did not differentiate between cotton producers and other farmers, it is only possible to comment on the relative standards of living of this population group in 2006. With regards to Figure 2, which shows food consumption curves at Bamako prices in 2006, cotton producers have roughly the same standard of living as the rest of the agricultural population. The figures in Table 6 (Column C) indicate an edge in terms of poverty, the poverty rate being 51.2 percent amongst cotton producers compared with 55.6 percent for other farmers (with the national average being 44.5 percent).

[Insert Figure 2 and Table 6 about here]

These results strongly contrast with the findings of the DNSI and World Bank studies in 2007, essentially because these studies incorporated non-food consumption in a way that distorted the regional poverty line.

Household Demographic Characteristics

The household surveys revealed that cotton-producing households appeared to be larger than others: for example in 2006, the average difference in size was three members. This particularly marked size difference might stem partially from an artefact linked to the definition of a household by the surveyors in large concessions that regroup several homes. But this difference also conceals a real phenomenon that is linked to higher rates of polygamy amongst cotton-producing households, to a greater number of members being hosted, related or not, and/or to the demands of more labour intensive production. The first two factors could even allow one to hypothesize that the better standard of living of cotton producers enables them to undertake a second marriage, to bear more children, and to offer room and board to a greater number of dependents from the extended kin. In any case, the per capita standard of living indicator fails to account for economies of scale linked to the size of households – as it assumes that each additional member absorbs the same proportion of the budget. Likewise, it

¹³ This result is robust to the choice of poverty line. An examination of the cumulated consumption curves shows that the relative position of Sikasso compared to Kayes and Koulikoro varies according to the level of consumption per capita. These three regions stand out as having statistically significant lower per capita levels of food consumption than Segou, Mopti, and Timbuktu-Gao-Kidal.

fails to adjust for the different needs of the household members according to their age. The specific demographic traits of cotton-producing households are thus likely to bias the comparison of standards of living to the detriment of more extended households or those composed of more children, as is the case for cotton producing households.

This issue of the effect of differences of size and structure of household on comparisons of monetary poverty is well known amongst statisticians. In terms of the impact of cotton on poverty in Mali, it merits detailed examination. Bear in mind however, that economic theory has not supplied a satisfactory means for extracting from the data the 'good equivalence scale'. In the case where only aggregate food consumption is retained, the so-called Oxford scale, which takes into account limited economies of scale but significant differences in needs, is probably relatively appropriate. It assumes that children consume half of that of adults, and that adults other than the head of household consume 70 percent of the head. As expected, taking account of economies of scale linked to household size results in a correction of standard of living measures that favour cotton producers but this is not really noticeable: when the poverty rates are recalculated by fixing the poverty line so that the national poverty rate becomes the same as with per capita consumption, we redistribute the locations of poverty between households (and thus between individuals living in these households) as a function of their size and demographic structure. It is thus that for 2006, the poverty rate amongst cotton-producing households falls from 51.2 percent to 49.6 percent, while poverty amongst other non-farming rural and urban inhabitants increases (compare columns a and b of Table 6). These considerations once again contribute to mitigating the "cotton paradox".

Rural Household Goods

The possession of assets such as means of transportation and communication as well as housing comfort are additional measures of standard of living that are likely to be less susceptible to measurement errors or short-term variations than per capita consumption. We thus examined the rate of possession of assets such as agricultural equipment, bicycles, motorbikes and radios. It emerges from these surveys that cotton producers are also better equipped than other farmers in terms of durable goods: in 2006, 92 percent of cotton producers owned a bicycle versus 55 percent of other farmers, 44 percent a motorbike (against 22 percent), and 57 percent a radio (against 48 percent). (Table 7)

[Insert Table 7 about here]

Education

We next examine non-monetary measures of living conditions, such as education and child health. These indicators are less subject to measurement errors than per capita consumption. Furthermore, the data collection methods for education and health do not change from survey year, which makes it easier to analyse their evolution over time.

In Mali, education indicators, particularly school enrolment of children has posted an improvement since 1994 (Table 8). It is thus that the percentage of children from 12 to 16 years who have completed the primary school cycle increased by 7 percentage points nationally between 1994 and 2006 for boys (from 12 to 19 percent) and by 9 points for girls (from 6 to 15 percent). The children of cotton producers having been amongst the most disadvantaged in 1994 experienced the strongest improvement. This observation is valid for both boys and girls.

[Insert Table 8 about here]

Despite the effort to educate children, the general level of education is very low, and the difference between cotton producers and other farmers in terms of the literacy rate or the number of years spent in primary schooling remains minimal. Furthermore, in 2006 once the comparison is restricted to farmers in the cotton zones or other farmers in the same area the lead cotton producers had is no longer evident, which suggests that part of the lead in educating cotton producers' children is due to better access to school infrastructure in cotton zones than in other rural areas.

Standard of Living Distribution

The analysis developed thus far was based on an aggregation of cotton producers irrespective of the importance of cotton in their production. Yet, it is possible that this population is highly heterogeneous and that by comparing means by category, the analysis elides this variegated situation. This issue could be addressed by observing the distribution of standards of living according to the quantities of cotton produced or even according to the revenue earned from cotton.

Figure 3 below charts cotton production measures for 2006 against various standard of living indicators such as per capita consumption and education levels. The national average of each of these measures provides the benchmark. The quantities of cotton produced do not appear to have a real affect in terms of child education: the children of large cotton farmers attend school no more than others. On the other hand, levels of per capita consumption increase with the amount of cotton produced, without however this growth relationship allowing cotton producers in the highest production quartile to attain consumption levels much higher than the national average.

[Insert Figure 3 and Table 9 about here]

Nevertheless, the largest cotton producers (third and fourth quartile) have unquestionably higher levels of consumption than small cotton farmers and other farmers (Table 9): their food consumption levels are respectively 10 percent and 12 percent higher than the rest of the agricultural population, and 20 percent to 22 percent higher than the consumption levels of small cotton producers (first quartile). Finally, on average, the level of food consumption of cotton producers overall is 9 percent greater than that of other farmers.

Conclusion: Three Findings

As mentioned in the introduction, the findings of this examination of the Sikasso paradox are several-fold.

First, it brings a number of observations regarding cotton production and on public policy towards it in Mali.

The reworking of the data led to the conclusion that cotton producers have an “advantage” (at best minimal) over other rural inhabitants. This observation differs substantially from that of official statistics, although the absence of conclusive proof of greater well being linked to agricultural activities in the cotton zone still constitutes a paradox of sorts.

The following step, not undertaken here, will be to research causes of these findings – be they price fluctuations, migration, land changes, or agro-pastoral systems, etc – and so to remove the paradox. This work clearly requires a variety of qualified skills.

A second line of findings touches on the political economy of statistics. The Sikasso paradox illustrates the reactions of various actors when a statistical aberration is produced before them

in the sense that it clashes with intuition and its fragility can be identified by a specialist (by comparing regional poverty lines).

As it happens, the aberrant nature of this data is rarely identified and rarely commented upon, particularly in Mali, which demonstrates how poorly information such as poverty measures have infiltrated local public debate. The production of data appears to be pushed by the public administration, primarily under the impetus of funding bodies and it precedes a social demand linked to the need for public debate.

This aberrant data however is used in part to support proposals to modify cotton policy. Conversely, it is entirely rejected by the agronomists of the AFD who are highly involved in the industry and who commissioned a counter-study. The filter through which the robustness of the data is assessed depends closely on the way in which the data is used to support (or not) the professional experience of the experts involved and of the arguments that they are charged with producing. This critical showdown might not be such a terrible thing, as it eventually takes place, but it takes place between funding bodies and until now has never led to a reconsideration of data by all those involved in light of all information produced.

The confirmation of the 2001 aberrant data and the reproducing the methodological bias during the 2006 survey also uncovers the drawback of returning to officially produced and diffused past data.

The behaviour of these players is illustrative of this political economy of figures that is rarely studied in itself. It is however, probably fairly central in the study of public policy. The way in which institutions access and use data, repeat them or conversely, disregard them or discredit them is at the heart of the process of evaluation and development of public policy. This is a subject that doubtlessly merits greater attention, particularly from researchers.

Thirdly, we found a kind of presumption in the implementation of methods aimed at strengthening public policy effectiveness in poor countries such as results-based management or poverty-impact assessments. The adoption of the MDGs, the principle of managing by results, or the development of impact assessment all promote the idea that it is possible to take account of and direct public policy based on the shared observation of a very small number of impact indicators on well chosen population cohorts. The example of the Sikasso paradox tends to show that these methods require time so that the measurement of results and impact can be debated and so that they can encounter local and international expertise in the sector.

The above analyses established in fact, that an understanding of standards of living of cotton producers is only based on a certain number of dimensions – poverty, access to infrastructure, inequality, malnutrition, consumer goods, possession of property, migration...etc – that should be taken into account jointly in order to reach an objective evaluation of policy and that these factors respond with messages that are partly contradictory.

But above all, this analysis illustrates the complexity of measuring poverty and even more so of comparing poverty indicators over distances of time and region (which is the common assumption of impact assessment), the pitfalls of which escape the assessor or the author of public policy.

In countries such as Mali, it is not certain however that the level of public debate on this type of subject renders possible a period of debate on the measurement of policy results. The dangers of employing data too quickly, or even tactically, are thus real.

The conclusion of a case study such as this is clearly not to turn aside from measuring standards of living. On the contrary, the example of Sikasso pleads for authors and evaluators of public policy to place key importance on the production of data and that these should be the focus of open debate. In all mechanisms of steering, conception and evaluation of public policies, the gathering and treatment of data should doubtlessly receive at least as much attention as their analysis, and encourage, above all, contradiction.

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Table 1: Poverty Rates by Region 1994, 2001, 2006, official figures (percentage of population)

	1994	2001	2006
Mali	69	68	47
Kayes	45	68	45
Koulikoro	74	84	
<i>Sikasso</i>	85	82	81
Segou	85	65	49
Mopti	72	79	
Timbuktu/Gao/Kidal	58	54	29
Bamako	24	29	8

Sources: DNSI, 2004, 2007; ODHD, 2006.

Table 2: Poverty Rates by Socioeconomic Group of Head of Household, 2006

	Proportion of Population	Poverty Rate
National	100.0	47.4
Socioeconomic group of head		
Public employee	6.1	12.2
Private employee	4.7	29.5
Employer non-cotton	1.3	15.0
<i>Cotton producers</i>	13.7	77.8
Other independent agriculture	41.1	53.0
Independent non-agriculture	15.1	22.7
Other workers	1.8	70.2
Unemployed	16.1	49.4

Source: DNSI, 2007, (poverty line method 2 see below for more information).

Table 3: Poverty Rates 2001, 2006

	DNSI	DNSI	DIAL ^c	DNSI	DNSI	DIAL ^c
	Method 1 ^a	Method 2 ^b		Method 1 ^a	Method 2 ^b	
	2001	2001	2001	2006	2006	2006
National	68.3	55.6	55.2	64.4	47.4	44.5
Place of residence						
Urban	37.4	24.1	34.0	31.8	25.5	27.8
Rural	79.2	66.8	62.9	79.5	57.6	51.9
Regional groups						
Kayes-Koulikoro	76.2	65.1	69.2	61.5	44.7	49.6
<i>Sikasso</i>	81.8	80.1	63.0	81.7	80.8	51.8
Mopti-Segou	71.4	51.9	48.0	75.2	48.7	47.9
Timbuktu-Gao-Kidal	51.3	30.8	33.6	57.9	29.0	28.9
Bamako	27.5	17.6	41.6	11.0	7.9	18.5

a. Food and non-food consumption aggregate at nominal price and poverty line based on the food-energy intake method (see note 7).

b. Food and non-food consumption aggregate at nominal price and poverty line based on the cost-of-basic-needs method (see note 7).

c. Food consumption aggregate at Bamako price, and food poverty line based on the cost-of-basic-needs method (see section below).

Sources: DNSI (2007) and EMEP 2001, ELIM 2006, author's calculations.

Table 4: Share of Non-food Expenditure, 2001

2001 (%)	DNSI Poverty Lines		DNSI Current Consumption	
	Urban	Rural	Urban	Rural
Kayes	27.2	19.3	24.9	19.9
Koulikoro	29.2	14.3	31.3	30.2
Sikasso	39.3	42.1	35.0	28.3
Segou	39.5	26.9	34.0	29.4
Mopti	33.9	23.5	29.7	23.9
Timbuktu	20.2	21.7	26.8	26.8
Gao	31.0	13.9	32.4	20.0
Kidal	32.6		31.6	.
Bamako	32.6		37.9	.

Source: EMEP 2001, ELIM 2006, author's calculations.

Table 5: Food Poverty Rates by Region and Area, 2001 and 2006

Poverty Rates	Regional	Urban		Rural	Regional	Urban		Rural
		2001 ^a				2006 ^b		
Kayes	63.9	38.8	70.0	52.7	33.2	59.6		
Koulikoro	73.9	51.0	76.6	47.1	27.8	52.1		
Sikasso	63.0	34.3	67.6	51.8	49.3	52.7		
Segou	43.3	27.0	46.7	45.7	29.9	50.4		
Mopti	53.4	13.6	62.5	50.3	25.5	55.0		
Timbuktu-Gao-Kidal	33.6	15.3	42.2	28.9	21.8	33.1		
Bamako	41.6	41.6		18.5	18.5			
National	55.2	34.0	62.9	44.5	28.3	52.0		

a. Per capita food consumption at Bamako prices 2001. Food poverty line: 90 300 XOF per annum.

b. Per capita food consumption at Bamako prices 2006. Food poverty line: 95 800 XOF per annum.

Source: EMEP 2001, ELIM 2006, authors' calculations.

Table 6: Food Poverty Rates of Cotton Producers and in the CMDT Zone, at Bamako Prices, 2001 and 2006

	2006 ^a	2006 ^a
	(a)	(b)
	per capita food consumption	food consumption per income unit ^b
National ^c	44.5	44.5
Cotton producer	51.2	49.6
Other farmers	55.6	54.8
Other rural	46.0	47.4
Urban	27.8	29.0

a. Per capita food consumption at Bamako prices 2006. Food poverty line: 95 800 XOF per annum.

b. Oxford equivalency scale: (1 adult + 0.7 other adults + 0.5 children from 0 to 14 years).

c. While the Oxford scale is used, the poverty line is adjusted so that national poverty lines remain equal to those calculated on the basis of the per capita aggregate.

Source: ELIM 2006, authors' calculations.

Tableau 7: Goods Possession in Cotton-Producing and Non-Cotton Households in 2001 and 2006

(% of individuals whose household possesses the durable good)	1994	2006
Bike		
National	49	48
<i>Cotton producer</i>	89	92
Other farmers	43	55
Other rural	42	47
Urban	24	26
Motorbike		
National	23	34
<i>Cotton producer</i>	35	44
Other farmers	14	22
Other rural	20	30
Urban	37	42
Radio		
National	61	57
<i>Cotton producer</i>	74	57
Other farmers	53	48
Other rural	62	47
Urban	73	70

Sources: EMCES (1994), ELIM (2006), authors' calculations.

Table 8: Education Levels of Malian Farmers, 1994 and 2006

% of children aged 12 to 16 completing the primary cycle	1994		2006	
	boys	girls	boys	girls
National	12	6	19	15
<i>Cotton producer</i>	4	2	12	10
Other farmers	8	2	7	4
Other rural	16	6	16	11
Urban	26	19	38	27
Average number of years in the Primary cycle				
	men	women	men	women
National	1.5	0.6	1.8	1.0
<i>Cotton producer</i>	0.6	0.1	0.9	0.4
Other farmers	1.1	0.2	0.7	0.3
Other rural	1.7	0.6	1.7	0.7
Urban	3.2	1.9	3.2	2.1
Literacy rate (%)				
	men	women	men	women
National	na	na	35	18
<i>Cotton producer</i>	na	na	21	9
Other farmers	na	na	18	6
Other rural	na	na	36	13
Urban	na	na	59	38

Sources: EMCES 1994, ELIM 2006, authors' calculations.

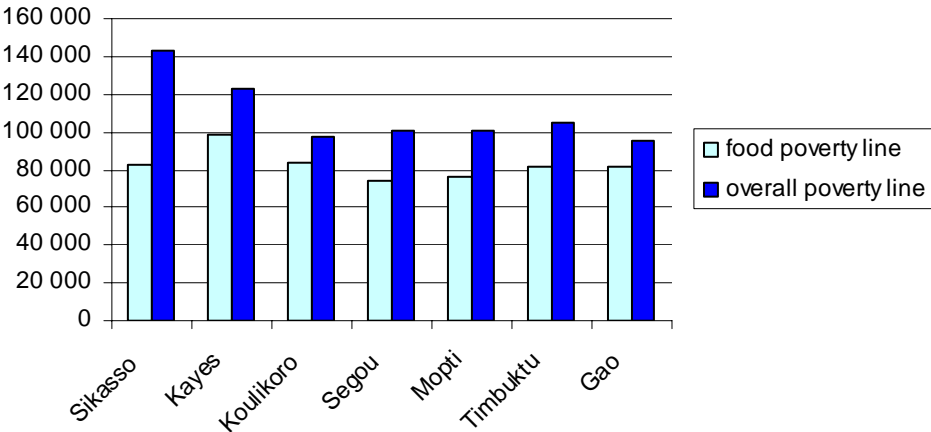
Table 9: Production Levels and Standard of Living

Dependent Variable	2006	
	Log(per capita food consumption) (1)	Log(per capita food consumption) (2)
Other farmers	ref.	ref.
Cotton prod = 1	9.4%	
Quartile prod = 1		-9.9%
Quartile prod = 2		-0.0%
Quartile prod = 3		10.3%**
Quartile prod = 4		11.9%**

Source: ELIM 2006, authors' calculations.

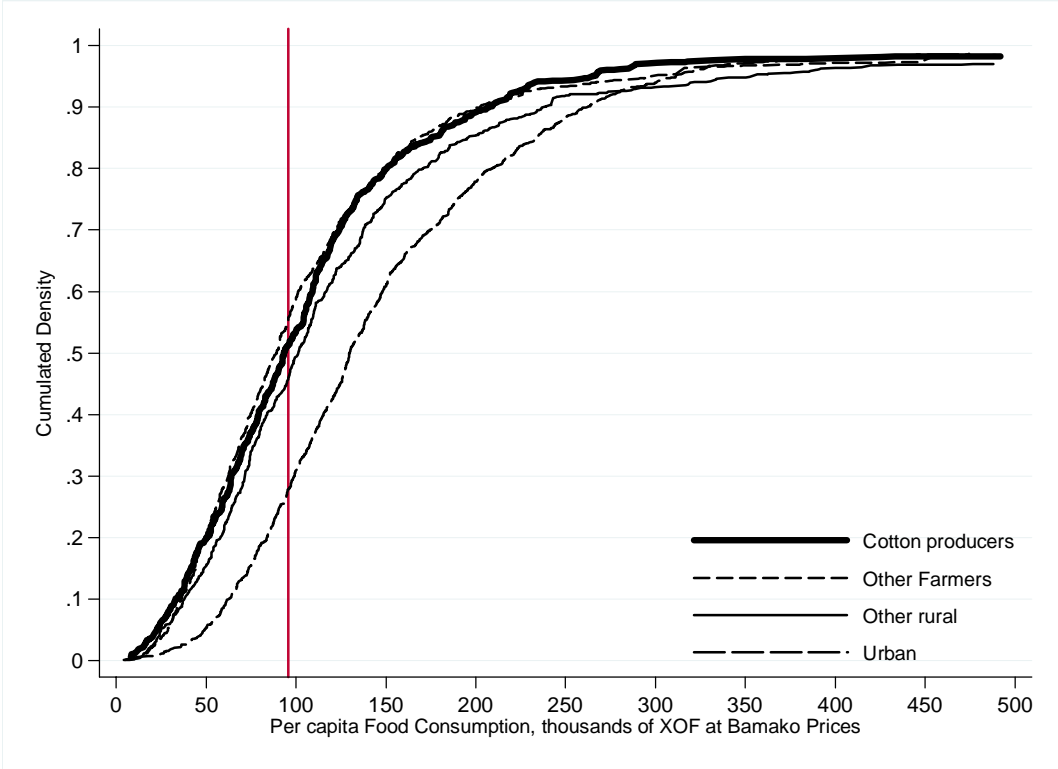
Note: ** significant to 1%, * significant to 5%.

Figure 1: Rural Poverty Lines by Region in 2001



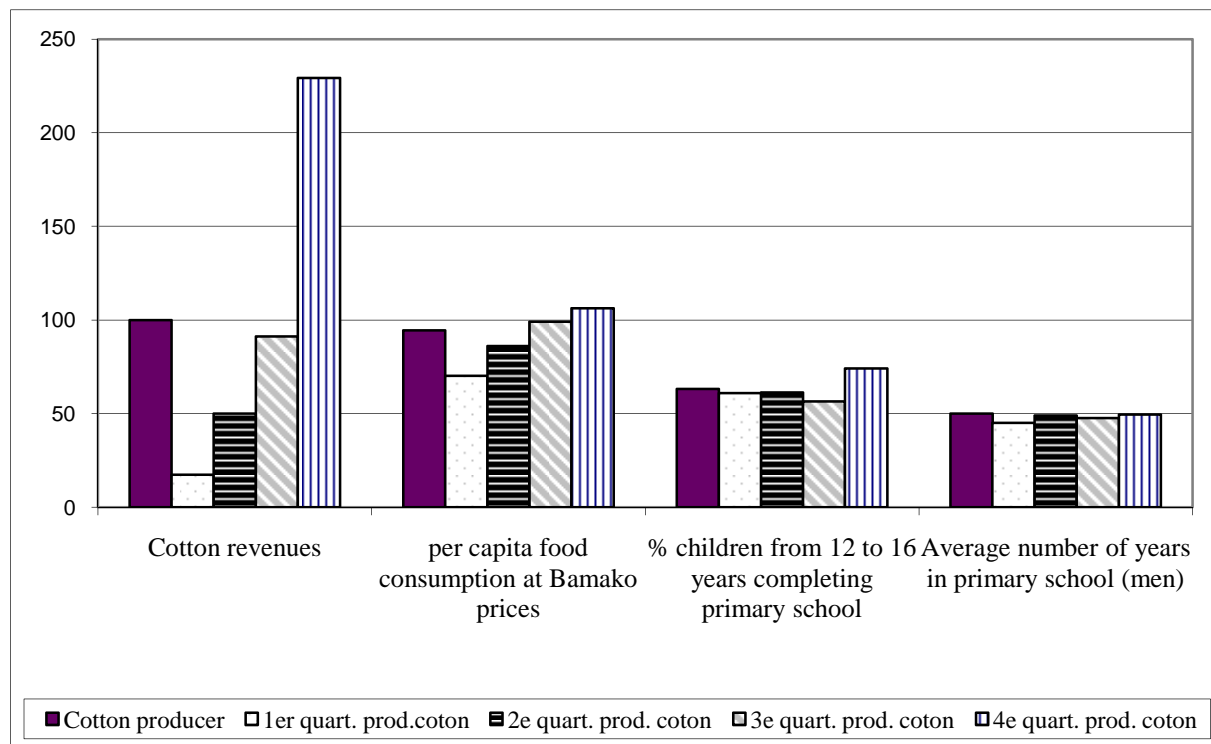
Source: DNSI (2007).

Figure 2: Cumulated Food Consumption - 2006



Source: ELIM 2006, authors' calculations.

Figure 3: Standard of Living and Education Indices by Cotton Revenue, Mali 2006 (National Average = 100)



Source: ELIM 2006, authors' calculations.

Annex A: Short presentation of the EMCES 1994, EMEP 2001 and ELIM 2006 Surveys

Table A. 1: Characteristics of the EMCES 1994, EMEP 2001 and ELIM 2006 Surveys

	1994 (EMCES)	2001 (EMEP)	2006 (ELIM)
# households	9 516	7 365	4 494
# individuals	83 102	86 086	40 810
# strata	8	9	9
# clusters	475	729	749
Survey period	April-May 94	January-December 01 (4 sections)	June-December 2006

Table A.2: Sample of Cotton-producing Households in the CMDT Zone (1994, 2001, 2006)

	1994	2001	2006
Survey	EMCES	EMEP ^a	ELIM
Sample	9 516	7 364	4 912
Households ^b	908 774	991 293	1 081 492
Population ^b	8 071 547	10 258 995	10 264 226
Average size	8.9	10.3	9.5
Households in CMDT zone	1 300	1 719	1 124
Households ^b	203 060	245 865	289 558
Population ^b	2 486 824	2 887 118	2 769 703
Average size	12.2	11.7	9.6
Cotton Producers^c	731	n.a.	n.a.
Households ^b	110 888	n.a.	n.a.
Population ^b	1 578 740	n.a.	n.a.
Average size	14.2	n.a.	n.a.
Cotton Producers in CMDT zone	697	n.a.	n.a.
Households ^b	106 298	n.a.	n.a.
Population ^b	1 524 989	n.a.	n.a.
Average size	14.3	n.a.	n.a.

a. The second column corresponds to a sub-sample of 4 912 households for which food consumption data was collected.

b. Extrapolated statistics from statistical weight provided by the surveys.

c. Cotton producers are households claiming to produce cotton. This information was not collected in EMEP 2001.

Source: EMCES 1994, EMEP 2001, ELIM 2006, authors' calculations

The following explains the differences between the three available household surveys:

- The EMCES 1994 survey as the lightest of the three only records the value of current consumption purchases. Information about self-consumption is thus not given. Questions were posed on retrospective expenditure, over the past 15 days for food purchases, and over the past 12 months for other types of expenditure. The number of product items is very low: in the case of food, expenditure is only collected on 10 products. This very restricted number induces a serious risk of underestimating levels of consumption. Furthermore, it is impossible to control for the seasonality of expenditure or the frequency of purchases. To the extent that the survey was carried out during harvest season, the data risks underestimating the level of annual consumption.
- The EMEP 2001 survey differs in that it questions food consumption very closely. Through four visits over the course of a year, the population responds to a questionnaire on food consumption during which food ingredients in meals are weighed. This system gives an estimation of the quantities of several hundred foods consumed annually in each household. Further, each household is questioned on quantities purchased and their value from which it is possible to calculate individual prices.

- The ELIM 2006 survey is comprised of 4 sections on consumption: a questionnaire on self-consumption, one on current expenditure, one on less frequent expenses, and finally, one on gifts in kind. The list of product items on which households are questioned is quite long (for example, there are 86 products in the self-consumption module). For each product (with the exception of less frequent expenses), the following information is collected: amount consumed, frequency of consumption, numbers of months per annum when the product is consumed and, lastly, the average price of the consumed product as estimated by the household.

It is clear that these design variations in the surveys makes it difficult to obtain an analysis over time of consumption levels and poverty.

Annex B: Comparability of Household Surveys and the CMDT system of monitoring and evaluation

Table B.1: Cotton Production (1994, 2006)

	1994	2006	Variation
Survey	EMCES	ELIM	
Number of cotton households	110 888	180 668	62.9%
Production (tonnes)	223 432	444 314	98.9%
Production avg per household (kg)	2 015	2 459	22.1%
Number of CMDT cotton households	106 298	166 651	56.8%
Production in CMDT zone (tonnes)	221 177	386 659	74.8%
Production in CMDT avg per household (kg)	2 081	2 320	11.5%

a. Production estimated from revenues declared by producing households and with a hypothesized price for cotton of 160 XOF/kg in 2006.

Source: EMCES 1994, ELIM 2006, CMDT, authors' calculations.