

Growth, Income Distribution and Poverty: The Experience of Côte d'Ivoire from 1985 to 2002

By

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AERC Research Paper 248
African Economic Research Consortium, Nairobi
November 2012

1. Introduction

The nature of the relationship between economic growth, income distribution and poverty is at the heart of the dynamics of economic development. Many approaches have been used to try and design tools for measuring and analysing that relationship. The first research on the issue is that of Kuznets (1955). From an analysis of the historical evolution of inequalities during the process of development of two industrial economies (Germany and the UK), Kuznets (1955) proposes a general law that is still the subject of debate, and offers a field of analysis of the link between growth and inequality, and between growth and poverty.

A number of studies focus on econometrically analysing Kuznets' law using cross-sectional data per country (Alhuwalia, 1976; Anand and Kanbur, 1993; Deininger and Squire, 1996). Some of these studies support Kuznets' findings, while others do not (Cogneau and Robilliard, 2001). At the same time, numerous studies in the comparative statics of theoretical models of the dual economy in partial equilibrium are used to measure the impact of the movement of growth on inequalities (Bourguignon, 1990; Baland and Ray, 1992; Eswaran and Kotwal, 1993). All these considerations contributed to raising the issue of developing appropriate tools to analyse the impact of macroeconomic policies on the distribution of income and on poverty.

More recently, the debate on the impact of adjustment policies has led to the designing of analytical tools that are capable of enabling research into such an issue. These policies that were aimed at macroeconomic stabilization with a view to stimulating growth were decried especially because of their negative effects on the well-being of populations. Examples of such analytical tools are models of the computable general equilibrium and models of decomposition of the evolution of poverty (Datt and Ravallion, 1992; Kakwani, 1997). The first models are credited with their ability to produce disaggregated results at a microeconomic level within a coherent macroeconomic framework (Alderman and Robinson, 1978; Dervis et al., 1982; Taylor, 1990; Bourguignon et al., 1991). These models rest on the assumption of a representative agent. In this context, studying incoming distribution issues requires that one first identifies groups whose characteristics and behaviour are the most homogeneous possible before one can move from income distribution among several representative groups to overall income distribution.

Analytical studies using the computable general equilibrium model have sought to measure the distributive effect on income of the various economic policies that were implemented in Côte d'Ivoire (Bourguignon et al., 1995; Calipel and Guillaumont-

Jeanneney, 1996; Cogneau and Collange, 1998; Hartmut et al., 1992). However, those studies do not give information on the effect of macroeconomic changes in terms of inequality in income distribution at household level. That said, recent developments in the micro-simulation models of the computable general equilibrium are capable of making up for such insufficiencies.

Besides these computable general equilibrium models, other tools that enable one to measure the poverty dynamics exist. In this connection, it is often useful to determine whether the evolution of poverty through time is attributable to the growth in average income or to a variation in the relative shares of the incomes of the different layers of the population. According to Duclos (2002), that would enable one to see whether the impact of these last two factors points in the same direction or not through time. Studies by Jain and Tendulkar (1990), Kakwani and Subbarao (1990, 1991, 1997) and Datt and Ravallion (1992) are the classical references on the issue. The approach used by Datt and Ravallion (1992) uses initial distribution as the reference point to assess the impact of changes in the average income and distribution on poverty. Kakwani's approach (1997) is based on determining elasticities between growth and poverty, and between poverty and inequality. However, according to Kakwani (1997), all these previous approaches indirectly flout the natural axioms of reflexivity, symmetry and transitivity. That is why he proposed a new technique or approach called the "axiomatic approach".

Economic growth has not always been followed by an equitable distribution of benefits. High levels of inequality in spite of high growth lead, in different ways, to higher levels of poverty which slow down economic development. A high level of inequality can lead to a reduction in growth benefits. Besides its negative effect on growth, inequality also has a definite impact on well-being (Runciman, 1966).

The evolution trajectory of the main indicators of poverty in Côte d'Ivoire seems to reflect this analytical framework of the relationship between poverty, growth and inequality. The country experienced a rapid progression of its poverty rate, which rose from 10% in 1985 to 36% in 1995, then fell to 33.6% in 1998, and rose again to 38.4% in 2002. Poverty thus showed a net progression of 4.6 percentage points between 1998 and 2002. This evolution of poverty, with reference to the base year (1985) when the poverty ratio (P_0) was estimated at 10% (INS, 2002), is an indication of how poverty has amplified.

But the poverty in Côte d'Ivoire is unequally distributed: it is fundamentally rural poverty. It is indeed massive in rural areas: 87% of the population in 1985; 74% in 1993; 73% in 1995 and 69% in 1998. The most affected regions are the Savane Rurale (Rural Savannah) Region (54.6%) and all the regions in the north of the country; the Forêt Rurale Est (Rural East Forest) Region (46.6%) and the areas that host Liberian refugees in the Montagnes (Mountains) Region (24.5%).

The socioeconomic groups most affected by poverty are: half the households that farm food crops; 45% of the households that farm export crops; one-third of the households that are employed in the farming sector; a quarter of the informal sector employees; about 30% of the self-employed in the private informal sector; and women, who make up more than 50% of the poor population.

In 1998, the total income level of the richest 10% of the population was 12.4 times higher than that of the poorest 10%; it was 9.1 times higher in 1993 and 8.8 times in

1995. The total income level of the poorest 50% was less than one-quarter of the total national income level, while the level of the poorest 80% represented only 52% of the total income. In 1998, the richest 20% held 48% of the estimated total income. Between 1995 and 1998, despite 11.5% improvement in the level of income, the distribution of this income became more unequal (CS-DSRP, 2002). Table 1 gives an illustration of the evolution of the Gini index in urban areas of Côte d'Ivoire during the period 1985-1998.

Table 1: Evolution of inequality in Côte d'Ivoire between 1985 and 1998

Area		1985	1988	1993	1995	1998
Abidjan	Gini	0.34	0.37	0.37	0.44	0.38
	Confidence interval	[0.31-0.37]	[0.33-0.40]	[0.36-0.39]	[0.39-0.48]	[0.35-0.40]
Other towns	Gini	0.38	0.29	0.37	0.34	0.36
	Confidence interval	[0.35-0.42]	[0.27-0.31]	[0.36-0.38]	[0.31-0.38]	[0.33-0.39]
Urban area	Gini	0.38	0.37	0.40	0.43	0.38
	Confidence interval	[0.36-0.41]	[0.34-0.39]	[0.39-0.42]	[0.39-0.46]	[0.35-0.41]

Source: Grimm et al. (2001)

This evolution of poverty and inequalities is in stark contrast with the evolution of macroeconomic indicators, in particular the country's economic growth. According to Bamba (2001), the case of Côte d'Ivoire is out of phase with the premise that growth is indispensable in the fight against poverty and that structural adjustment is a prerequisite for growth. While negative growth increases poverty, it is however not certain that positive growth, even strong, will be enough to lead to poverty reduction, let alone to ensuring that there is equitable distribution of income. It is not even certain that growth will be a necessary, indispensable condition. By establishing a relationship between the variation in income inequality with that in economic growth, Bamba (2001) shows that there might not be a systematic relationship between economic growth and income distribution, at least in the case of Côte d'Ivoire, over the period 1959 to 1998.

This rapid progression of poverty and inequalities in the redistribution of income resulted from a macroeconomic imbalance characterized by over-evaluation of the exchange rate, high taxation of the rural population, and bad governance. Economically and politically, the periods 1985–1993, 1993–1995, 1995–1998 and 1998–2002 were marked, respectively, by structural adjustment schemes, a devaluation of the CFA franc, a return to growth and liberalization of the farming industry, and a marked return of economic crisis at the beginning of 2000, a crisis that was accompanied by political instability that is still going on.

The first government reaction in 1996 was to favour economic growth as the solution to the economic crisis. Indications were that growth was going to reduce poverty and inequality. But results were limited (INS, 1998; Kouadio and Monsan, 2000). In the recent past some studies have tried to show the link between economic growth, inequality and poverty in Côte d'Ivoire (Bamba, 2001; Grimm et al., 2001). Kakwani's pioneer research dates back to 1990. Kakwani (1990) analysed the relationship between economic growth and poverty and developed a methodology to separately measure the impact of changes on average income and the distribution of income on poverty. His research was exclusively based on data from the 1985 Living Standards Measurement

Survey (LSMS). Unfortunately, his approach does not enable one to measure the overall evolution of the impact of both growth and inequality on poverty and, mostly, to establish their microeconomic determinants. Moreover, with the evolution of the political, social and economic situation since 1990 (i.e. the devaluation of the CFA franc, the military coup, political tensions, measures to privatize and liberalize the farming industry etc.), the findings of the research based on the LSMS data have become outdated.

Using a model of economic growth based on the distribution of income and data from household surveys conducted in 1993, 1995 and 1998, Bamba (2001) attempted to establish a dynamic interaction between economic growth and monetary poverty in Côte d'Ivoire. The results of his work show that the incentive to growth that stemmed from a surplus did not count for the biggest part of the country's growth. The state of income distribution in Côte d'Ivoire towards the end of 1995 led to strong growth which was essentially dependent upon low incomes. This is what explains the rapid end of growth of the Ivorian economy since 1998 (Bamba, 2001). It is clear that Bamba's research illustrates a dynamic relationship between growth, poverty and income distribution, with growth being a function of the other two variables. The author explains the sources of the evolution of growth by starting from the level of poverty and the distribution of income. Our study followed the opposite route: we tried to explain the sources of the evolution of poverty over the long period by relating them to growth and inequality.

Groups of authors, such as Grimm et al. (2001), have studied poverty in Côte d'Ivoire over a long period using data from a series of household surveys (LSMS 1985-1988, DSA 1993, EPAM 1995 and ECVI 1998). Using an econometric model, their research demonstrates the different dimensions of urban poverty and inequality, its evolution and the determinants of the inequality.

To date, no study has been carried out over such a long period to try and understand the dynamics of poverty, that is, poverty as can be decomposed into growth effect and income distribution effect in Côte d'Ivoire. Previous research focussed either on the 1980s (Glewwe, 1991; Grootaert and Kanbur, 1995; Kakwani, 1993) or on the early 1990s (World Bank, 1997).

It is against this background that our research was carried out. It was based on the multilateral comparison technique to measure the effects of growth and inequality on poverty dynamics. The overall aim of the study was to analyse the link between growth, income distribution and poverty in Côte d'Ivoire using data obtained from household surveys conducted by the National Institute of Statistics (INS) for the years 1985, 1993, 1995, 1998 and 2002. The specific objectives of the study were: (i) to decompose and analyse the effects of growth and inequality on the evolution of poverty from data for these five periods; (ii) to bring out the contribution of the various sub-groups of households to the evolution of poverty in Côte d'Ivoire; and (iii) to decompose and analyse inequality and its variation through time in Côte d'Ivoire. We assumed that the data were comparable.

This paper is organized into three main parts besides the introduction, the conclusion and the recommendations. Part III describes the different methods of analysis used; Part IV deals with the source of the data used; and Part V discusses the main findings of the research.

2. Theoretical framework and methods of analysis

The issue of developing a unified framework for decomposing the evolution of poverty was first raised by Shorrocks (1999). Let I be an aggregated indicator representing a measure of poverty or inequality, and let X_k , $k=1, 2, \dots, m$ a set of factors that contribute to the value of I . We then get:

$$I = f(X_1, X_2, \dots, X_m) \quad (1)$$

Where $f(\cdot)$ is an appropriate aggregation function. According to Shorrocks (1999), the goal of all the decomposition techniques is to assign contributions C_k to each of the factors X_k , ideally in a way that allows the value of I to be the sum of the m contributions.

Several decomposition techniques, whether static or dynamic, have offered a specific solution to this problem. In the static decomposition of the Foster-Greer-Thorbecke (FGT) indices of Foster et al. (1984), it was assimilated to P_α and the factors X_k of the sub-groups of the population. In the dynamic decomposition of Datt and Ravallion (1992), the indicator I corresponds to a variation of P_α between two dates and the variables X_k are variations of growth and redistribution. In addition, there are other decompositions, notably those proposed by Kakwani (1993, 1997) for poverty, and those proposed by Fields and Yoo (2000), Shorrocks (1999), Chantreuil and Trannoy (1999) for inequality.

The question is: what is the unified theoretical framework underlying all these approaches? To answer this question, Shorrocks (1999) starts from the Shapley value and demonstrates that this makes it possible to derive most of the results of decomposition. The Shapley value is a solution concept commonly used in the game theory (Owen, 1977; Moulin 1988; Shorrocks, 1999). We can thus assert that this theoretical framework is related to that of the cooperative games theory. The Shapley value serves as the framework for several types of decomposition, be they indices of poverty or of inequality.

This value was used in our study for the decomposition of the evolution of poverty

by applying, for comparison purposes, the approach used by Kakwani (1997) and that used by Datt and Ravallion (1992). In this way, our own approach consisted of testing the robustness of the measures of the effects of growth and inequality on poverty using two alternative procedures, the first of which is based on bilateral comparison and the second on multilateral comparison (see the annex for more details on the model).

Likewise, poverty can be expressed as being a sum of contributions of the poverty of different sub-groups of the population. Each sub-group contributes to the overall poverty as a proportion of its own level of poverty and its relative share in the total population (Ravallion and Huppi, 1991; Duclos, 2002). Moreover, it shows that the effect of variations of the size and the poverty of some sectors of the economy affects the variations of the overall poverty. To this effect, the Duclos (2002) model was applied as follows:

$$\begin{aligned}
 & P_{t+n}(z; \alpha) - P_t(z; \alpha) \\
 &= \sum_k^K \varphi(k) (P_{t+n}(k; z; \alpha) - P_t(k; z; \alpha)) \quad (\text{effects of intra-group poverty}) \quad (2) \\
 &+ \sum_k^K P_t(k; z; \alpha) (\varphi_{t+n}(k) - \varphi_t(k)) \quad (\text{demographic and sector-based effects}) \\
 &+ \sum_k^K (P_{t+n}(k; z; \alpha) - P_t(k; z; \alpha)) (\varphi_{t+n}(k) - \varphi_t(k)) \quad (\text{interaction term})
 \end{aligned}$$

Where $P_{t+n}(z, \alpha)$ and $P_t(z, \alpha)$ are respectively the FGT poverty indices at date $t+n$ and t with thresholds of poverty z and the coefficients of the aversion to poverty α at the indicated dates. $p(k; z; \alpha)$ and $\varphi(k)$ are the FGT poverty index for sub-group k and the weight of this sub-group in the total population.

We equally used the Shapley value to analyse the evolution of the inequality S-Gini as a component of inter-group and intra-group inequality according to Equation 3:

$$I(\varnothing) = \underbrace{\sum_{k=1}^k \varphi(k) \left(\frac{\mu(k)}{\mu} \right)^\theta I(k; \Theta)}_{\text{intra-group inequality}} + \underbrace{I(\Theta)}_{\text{inter-group inequality}} \quad (3)$$

where $\mu(k)$ is the average wages for group k and $y(k)$ is the vector of group k 's income.

We deduce that the form of the decomposition of inequality is:

$$I(\emptyset) = I_{intergroupe} + I_{intragroupe} \quad (4)$$

Defining the variables in the equations

The analysis of the evolution of poverty is also useful to the extent that we can make simulations of policy analysis from estimating the elasticity of the overall growth of poverty which enables us to define the growth–poverty elasticity. According to the Duclos approach, the use of the FGT and S-Gini indices gives the poverty–inequality elasticity. Those different types of elasticity are discussed below.

The gross elasticity of poverty in relation to growth

This reflects the elasticity of overall poverty $P(z; \alpha)$ in relation to total income, when the growth of the total income stems only from the growth of group k:

$$\varepsilon^y(k; z; \alpha) = \frac{\alpha(P(k; z; \alpha) - zP(k; z; \alpha - 1))}{P(z; \alpha)} \quad (5)$$

The elasticity of poverty in relation to inequalities

The effect on poverty of a change in inequality is based on the absence of a stable structural relationship between inequality indices and those of poverty even while assuming that the average income is constant. Following Duclos (2002), we used the potential links between the Gini and FGT indices in order to assess this elasticity. The elasticity thus defined is:

$$\varepsilon^G(z; \alpha) = \alpha \left(1 + \frac{P(z; \alpha - 1)}{P(z; \alpha)} \left(\frac{\mu}{z} - 1 \right) \right) \quad (6)$$

When the coefficient α is nil, these two expressions cannot be used. Two approaches can be used to evaluate the elasticity of the average income vis-à-vis the per capita expenditure: the first, using an empirical Lorenz curve obtained with the DAD software, and the second based on the econometric estimation of the parameters of the Lorenz curve. The method of parametric estimation is usually used but rests on an assumption related to the (beta or quadratic) functional form that is capable of influencing the results. However, this assumption becomes useless in the case of an empirical approach that is based on the sample observed in order to determine the Lorenz curve (Dorothee

and Kaboré, 2003). This, according to the two authors, makes it possible to evaluate the function of the density of incomes vis-à-vis per capita expenses, $f(x)$, when $x = z$. Kakwani (1993) demonstrates that when $\alpha = 0$, ε^y becomes:

$$\varepsilon^y(k; z; \alpha = 0) = -z \frac{f(x)}{H} \quad (7)$$

where H is the proportion of households that live below the poverty line. Moreover, Kakwani (1993) demonstrates that the Lorenz curve moves as a function of a parameter, λ , corresponding to the variation that is proportional to the Gini index. Furthermore, when the poverty ratio varies after a change in an inequality of a constant average income, the movement of the Lorenz curve corresponds to a z -to- z' variation in the poverty line. It will thus suffice to compare the incidence of poverty in the two cases in order to know the elasticity vis-à-vis the Gini index when $\alpha=0$.

According to Dorothée and Kaboré (2003), it is also possible to define a marginal rate of substitution between the two elasticities. This makes it possible to determine the increase percentage of the average income vis-à-vis per capita expenditure, so that poverty does not vary following a 1% change in the Gini index. This rate is equal to the ratio between the elasticity of inequality and that of income or -expenditure (in other words, expenditure prefixed with a negative sign).

The percentages of the variation in poverty can also be determined. To this end, it would suffice to multiply the growth rates of the real per capita gross domestic product (GDP) by the poverty elasticities in relation to the average-income-expenditure.

3. Source of data

The data used in our study came from the Living Standards Measurement Surveys (LSMS) carried out in 1985, 1993, 1995, 1998 and 2002. These surveys contain variables which we deemed relevant for the decomposition of the redistribution of the estimated growth. In relation to these data, income was determined by calculating the total of the total expenses spent by a given household on goods and services. For the 2002 survey, the expenses of the people surveyed and the potential sources of income were specified. These surveys were conducted by the Côte d'Ivoire National Institute of Statistics (INS), with financial and technical support from the French Cooperation Mission, the United Nations Development Programme (UNDP), the World Bank, etc. They covered the entire country and involved a wide spectrum of households. The surveys aimed at achieving two objectives: to describe household income and to determine the socio-economic activities of households. Our study was based on the assumption that the data were comparable.

The details on the comparability of the various data used in the study are given in Table 2.

All the household Survey are using a two-stage stratified sampling

An analysis of the results in Table 2 shows that the sampling structure was virtually the same for all the databases.

There were five strata, three rural zones (*Forêt rurale Est* [East Rural Forest], *Forêt rurale Ouest* [West Rural Forest] and *Savane Rurale* [Rural Savannah]) and two urban zones (Abidjan and Other towns). However, the definition of "Other towns" was not constant over time: the towns included in this category were not the same in all the surveys. Likewise, the size of towns varied from one survey year to another: for example, the population of Bouaké rose from 5,000 inhabitants to more than 400,000 (in 1998). The variation in the average size of a town (which was 75,000 inhabitants in 1985, 58,000 in 1988, 41,000 in 1993, 60,000 in 1998, and 150,000 in 2002) suggests that the urbanization process was not well grasped by the various surveys.

The way in which expenditure issues in the various databases were disaggregated is similar, if not identical. However, for our study further information was needed: the definition of expenditure used was guided by the concern to capture their current dimension in all the databases. Because of this, types of investment such as purchase of housing and land, expenses on consumer durables such as TV sets, cameras, radios, air conditioners, and private means of transport were excluded from the aggregate used. Moreover, money transfers were not included due to the absence of information in some surveys.

Table 2: Summary of information from the survey data

Name of survey	Data collection period	Sample size	Sampling basis	Data collection procedure	Stratification by region	Questionnaire used
LSMS 85	February 1985 to January 1986	National level: 1,588 households Abidjan: 333 households Other towns: 344	1975 census revised in 1983 (except for Abidjan and Bouaké for which the basis was the 1979/1980 census)	Two visits by household separated by a 15-day interval	1- Foret rurale est [East Rural Forest region] 2- Foret rurale ouest [West Rural Forest] 3- Savane rurale [Rural Savannah] 4- Other towns 5- Abidjan	Unified questionnaire with 12 sections
LSMS 88a	May 1988 to April 1989	National 1,600 households Abidjan: 304 Other towns: 429	1988 census	Two visits by household separated by a 15-day interval	1- Foret rurale est 2- Foret rurale ouest 3- Savane rurale 4- Other towns 5- Abidjan	Some nuances in the two questionnaires used in 85 and 88
DSA 1993	Abidjan: March 1992 to April 1992 Other areas: June 1993 to November 1993	National 9,600 households Abidjan: 2,482 Other towns: 2,878	1988 census	One visit per household	1- Foret rurale est 2- Foret rurale ouest 3- Savane rurale 4- Other towns 5- Abidjan	Used the same elements as the 1988 questionnaire but took into account concerns of the SAPs

continued next page

Table 2 Continued

Name of survey	Data collection period	Sample size	Sampling basis	Data collection procedure	Stratification by region	Questionnaire used
ENV1995b	April 1995 to May 1995	National: 1,200 households Abidjan: 266 Other towns: 212	1988 census	One visit per household	1- Foret rurale est 2- Foret rurale ouest 3- Savane rurale 4- Other towns 5- Abidjan	Same objectives and structure as the DSA93
ENV1998	August 1998 to December 1998	National: 4,200 households Abidjan: 860 Other towns: 1,060	1988 census	One visit per household	1- Foret rurale est 2- Foret rurale ouest 3- Savane rurale 4- Other towns 5- Abidjan	Questionnaire similar to those used for the ENV93 and ENV95 surveys.
ENV ^c 2002	From 15 May to 31 July 2002	National: 10,800 households Abidjan: 1,980 Other towns: 3,000	1988 census	One visit by household	Ten statistical regions divided each into a rural zone and an urban zone, in addition to the city of Abidjan, thus making up a total of 21 strata (one can reconstruct the old 5 strata)	The household questionnaire was based on that of the ENV98 and incorporated the data needs of the PRSP of the PRSP partners

Self-consumption was included in the aggregate as it weighs little in the total expenses of urban zones and can be considered to be negligible (Grimm et al. 2001, Guenard et Mesple Soms (2004)), which is the opposite in the rural zones where self-consumption was prevalent in the databases.

Issues of harmonization between the various databases were tackled using the approach expounded below. These are issues about the manner in which data on food expenses were collected and the period when the collection took place. The questionnaires used allowed one to use at least two estimation methods (see Jones and Ye, 1997): (i) an annualized estimation from data collected over a two-week period for the LSMS surveys, and an annualized estimation from data collected over a one-week period for the other surveys; the two types of estimation involve multiplying by 26 and 52.1 respectively the food expenses of households informed over a two-week period or one-week period before the survey; (ii) a normative annual estimation that consists of annualizing two types of response: the number of months during which a household consumed a specific item and the average amount this household paid each month for that item. The method used consisted of averaging the results of the two methods (Jones and Ye, 1997). Specifically, the estimated annual food expenses represented 12 times the arithmetic mean of the declared food expenses for the past 15 days (multiplied by 2) or during the week (multiplied by 4.29) preceding the survey and the expenses declared monthly. For all the other goods, expenses were annualized by multiplying each declaration by the corresponding annualization coefficient.

Another important aspect concerns the data collection procedure and the impact of seasonal variation in the food expenses statement. This is a particularly relevant point for the EP and ENV surveys for which interviews were conducted over a period of 3 to 6 months. For comparison, the interviews for the LSMS surveys lasted the whole year. In order to test the influence of seasonal variation in the various surveys (LSMS, EP and ENV), Jones and Ye (1997) introduce seasonal indicator variables while calculating the regression on the logarithm of the per capita expenses in addition to household characteristics. None of these indicator variables were significant; we therefore did not consider the seasonal variation in household expenses.

Finally, in order to take into account the price differentials between Abidjan and Other towns, the coefficients of the regional prices calculated by Grootaert and Kanbur (1995) and revised by the Côte d'Ivoire National Institute of Statistics (see Jones and Ye 1997) were used. Unfortunately, data on the evolution of these regional deflators for 1988, 1993, 1998 and 2002 do not exist. We therefore made the unsatisfactory assumption that the price differential between Abidjan and the Other towns remained constant over time. To be more specific than in 1998, the regional deflators used were those of the EPAM85 survey. It was only in 2002 that the main survey was coupled with a price survey to update the regional deflators. It is these that were used for the 2002 database.

With regard to the comparability of data, the method used by Côte d'Ivoire to calculate the thresholds is specific in that it combines two methods. Thus, for 1985 the absolute poverty threshold was calculated while for 1993, 1995, 1998 and 2002, relative thresholds were calculated. These relative thresholds were deflated from that of 1985 on the basis of a price collection every interest year. This rendered the databases comparable. In our study we only used data on household consumer expenses provided by INS in accordance with the approach described in this paper. (See the deflators of the poverty threshold in Table 14.)

4. Empirical results

Poverty, growth and inequality: a dynamic approach

Contribution of growth and inequality to poverty

This was calculated by applying the approach of Kakwani (1997), as defined above using the household survey data collected by INS between 1985 and 2002. For the purposes of comparability, the results obtained using this approach were compared with those obtained using the approach of Datt and Ravallion (1992).

In general, the two approaches allow a single poverty threshold between initial and final dates, which presupposes that the data have been deflated in an appropriate manner. Taking the initial year's poverty threshold for decomposition amounts to deflating the nominal poverty threshold of the final year by the ratio of the two thresholds. Expenses can be deflated either by the same ratio of thresholds or by other deflators such as the consumer price index (CPI). We know that in theory the Shapley-value-based decomposition of the poverty variation into a "growth" effect and an "inequality" effect gives the same results as the axiomatic approach of Kakwani (1997).

The different FGT indices were used as a poverty variable in order to appreciate its evolution. The results of the estimation of the FGT indices are presented in Table 3.

Table 3: Evolution of the FGT (P0, P1, P2) indices over the 1985–2002 period

Periods	Ratio of poverty or FGT0 = P0 (in %)	Depth of poverty or FGT1 = P1	Severity of poverty or FGT2 = P2
1985	9.85 (0.015) ¹	0.026 (0.003)	0.011 (0.002)
1993	32.08 (0.006)	0.089 (0.002)	0.035 (0.001)
1995	35.95 (0.020)	0.099 (0.007)	0.039 (0.004)
1998	33.54 (0.009)	0.103 (0.0039)	0.043 (0.0021)
2002	38.38 (0.0158)	0.128 (0.0032)	0.060 (0.0019)

1. Standard deviation in parentheses.

Source: Authors' computations.

The results obtained from the different estimations correspond overall to those reported in the literature on poverty in Côte d'Ivoire based on data from the household surveys carried out over the 1985–2002 period. The official figures on the incidence of poverty in the country were 10% in 1985, 32% in 1993, 36% in 1995, 33% in 1998 and

38% in 2002. These figures show a relative aggravation of poverty as reflected in the evolution of the FGT1 and FGT2 indices.

The evolution of the poverty incidence over the period under consideration shows three phases: a first phase during which there was a strong increase by about 26 points over the 1985–1995 period; a second phase of slight decline by 2 points for the period between 1995 and 1998; and finally, a third phase of a new increase, by 5 points, for the period between 1998 and 2002. Moreover, we see in Table 3 that between 1998 and 2002, in spite of the decline in the poverty incidence, the depth and severity of this poverty rose significantly. This observation is evidence of the relevance of the analysis of the components of the poverty dynamics in Côte d'Ivoire.

The results of the poverty decomposition are given in Table 4.

Table 4: Poverty decomposition between 1985 and 2002 (Reference threshold: F.CFA 75, 000 for the year 1985)

YEARS	$\Delta\%$ of total poverty	Approach used by Datt and Ravallion (1992)			Kakwani (1997) multilateral approach based on the Shapley value	
		Growth component	Inequality component	Residue	Growth component	Inequality component
FGT0						
1985–2002	0.2852	0.1767	0.0543	0.05418	0.2038	0.0813
1985–1993	0.2223	0.2323	-0.0376	0.02766	0.2461	-0.0238
1993–1995	0.0386	0.0437	-0.0002	-0.0048	0.0412	-0.0026
1993–1998	0.0145	0.0259	-0.0047	-0.0066	0.0226	-0.0080
1993–2002	0.0629	-0.074	0.1266	0.0103	-0.068	0.1318
1995–1998	-0.024	-0.0216	-0.0029	0.00053	-0.0213	-0.0026
1995–2002	0.0242	-0.1393	0.1299	0.03365	-0.1224	0.1467
1998–2002	0.0483	-0.0879	0.1396	-0.0033	-0.0896	0.1379
FGT1						
1985–2002	0.1021	0.0597	0.0165	0.0258	0.0726	0.0295
1985–1993	0.0630	0.0846	-0.0146	-0.0069	0.0812	-0.0181
1993–1995	0.0095	0.0185	-0.0090	0.00009	0.0185	-0.0090
1993–1998	0.0134	0.0106	0.0032	-0.0004	0.0104	0.0030
1993–2002	0.0391	-0.025	0.0725	-0.0080	-0.0294	0.0685
1995–1998	0.0039	-0.0078	0.0114	0.00033	-0.0076	0.0115
1995–2002	0.0295	-0.0435	0.0854	-0.01239	-0.0497	0.0792
1998–2002	0.0256	-0.0352	0.0721	-0.0112	-0.0408	0.0664
FGT2						
1985–2002	0.0490	0.0279	0.0065	0.0145	0.0352	0.0137
1985–1993	0.0243	0.0409	-0.0075	-0.0091	0.0364	-0.0120
1993–1995	0.0036	0.0088	-0.0046	-0.0006	0.0085	-0.0049
1993–1998	0.0072	0.0050	0.0021	0.00007	0.0050	0.0021
1993–2002	0.0247	-0.0115	0.0433	-0.00712	-0.0150	0.0398
1995–1998	0.0036	-0.0035	0.0074	-0.00026	-0.0037	0.0073
1995–2002	0.0211	-0.0185	0.0529	-0.01340	-0.0251	0.0462
1998–2002	0.0174	-0.0170	0.0437	-0.00925	-0.0216	0.0391

Source: Authors' computations.

The ratios between the poverty thresholds for the base year 1985 (F.CFA 75,000) and those of 1993, 1995, 1998 and 2002 were used as deflators for the expenses incurred during the same years. This gives the 1985 poverty threshold as the one for decomposition, as it is the one generally used as the reference threshold in Côte d'Ivoire when it comes to calculating the poverty indicators.

Over the 1985–2002 period, the variation in the poverty incidence can be decomposed into positive growth and distributive effects. However, over the 1993–2002 period, the decomposition of the variation in poverty incidence showed a negative growth component and a positive redistributive component. This means that the beneficial effect expected from growth over the period in terms of decline in the poverty incidence was dwarfed by the high inequality. This finding seems logical with reference to the decomposition of the evolution of the poverty incidence during the sub-periods of 1993–1995, 1995–1998 and 1998–2002, and with the results reported in the literature.

Between 1993 and 1995, the positive variation in poverty was due to the positive effect of growth despite the negative effect of inequality. This period corresponds to the launching phase of the third round of the structural adjustment programmes (SAPs) that materialized into monetary adjustment (devaluation of the CFA franc) with a negative evolution of the GDP (Kouadio etMonsan., 2000; Bamba, 2001).

For the 1995–1998 period, the observed trends were different those for the preceding period. There was a decline in the poverty incidence due to the beneficial effects of growth and inequality. Indeed, during this period, the annual GDP growth rate was on average about 5%, essentially due to the positive effects of the devaluation of the CFA franc on revenues from the export of agricultural products (coffee, cocoa, etc.)

However, this trend saw a net deceleration at the beginning of the 1998–2002 period, with an increase in the poverty incidence. The growth effect (reflected in a negative sign) was diluted by the strong effect of the redistributive component (reflected in a positive sign). The same period was marked by enormous problems of governance and by an unequal distribution of the dividends expected from the devaluation, as was shown by Sylla et al. (2005) in their study of the causes of the war in Côte d'Ivoire. Thus, despite positive growth, poverty increased as a result of an unequal distribution of wealth.

Generally, this observation corresponds to that made from the analysis of the evolution of the depth and severity of poverty. But, what about the poverty dynamics in relation to the sub-groups of the population that was, in this study, stratified into five: Abidjan, Other towns, the East Rural Forest region, the West Rural Forest region and the Rural Savannah region?

The contribution of the sub-groups of the population

The decomposition of the contribution of the different sub-groups of the population stratified into five strata with reference to the evolution of poverty over the 1985–2002 period was based on the approach developed by Duclos (2002) and programmed into the DAD software. In order to take into account the price differentials from Abidjan and Other towns, the coefficients of the regional prices calculated by Grootaert and Kanbur (1994) and revised by INS (see Jones and Ye, 1997) were used. Unfortunately, data on the evolution of these regional deflators in 1988, 1993, 1998 and 2002 do not exist. We

therefore made the unsatisfactory assumption that the price differential between Abidjan and the Other towns remained constant through time (Grimm et al., 2001). The results are compiled in Table 5.

Table 5: Contribution of the different sub-groups of the population to the evolution of the poverty incidence (FGT0)

1985–2002 PERIOD							
FGT0 Difference D2-D1	Distribution (1): YEAR 1985 (D1)			Distribution (2): YEAR 2002 (D2)			
	0.0985			0.3838			
	0.2852						
Strata/ Groups	FGT* (D1)	Proportion of the population (D1)	Absolute Contribu- tion (D1)	FGT* (D2)	Proportion of the population (D2)	Absolute contribu- tion (D2)	Difference between contribu- tions (2-1)
Abidjan (1)	0.007	0.201	0.001	0.149	0.188	0.028	0.026
Other towns (2)	0.075	0.213	0.016	0.318	0.243	0.077	0.061
Forêt Rurale Est [East Rural Forest] (3)	0.132	0.232	0.030	0.450	0.174	0.078	0.048
Forêt Rurale Ouest [West Rural Forest] (4)	0.015	0.139	0.002	0.522	0.234	0.122	0.012
Savane Rurale [Rural Savannah] (5)	0.225	0.212	0.047	0.482	0.158	0.076	0.028
Strata/Groups	(A) Intra- group compo- nent	(B) Inter- group compo- nent	(C) Interaction compo- nent	Impact of (A) + (B) +(C)			
Abidjan (1)	0.028	-0.0001	-0.001	0.026			
Other towns (2)	0.051	0.002	0.007	0.061			
Forêt Rurale Est (3)	0.074	-0.007	-0.018	0.048			
Forêt Rurale Ouest (4)	0.071	0.001	0.048	0.120			
Savane Rurale (5)	0.054	-0.012	-0.014	0.028			
TOTAL	0.280	-0.016	0.021	0.285			

Source: Authors' computations.

The analysis of the contribution of the population's sub-groups to the positive evolution of poverty between 1985 and 2002 showed that the intra-group and interaction

components account for this high increase in poverty. This significant finding can be explained by several arguments. The intra-group component expresses the evolution of poverty within specific groups of the population. It thus constitutes the group's poverty effect. Although all the five strata positively contributed to the evolution of poverty, the Rural Savannah, the West Rural Forest and the East Rural Forest regions contributed to it most. This confirms the hypothesis that poverty is higher in the rural areas of Côte d'Ivoire. The inter-group component that illustrates demographic change was observed to be negative, which is an indication of the non-demographic nature of the poverty phenomenon in Côte d'Ivoire. The interaction component expresses a correlation between the variation of the relative weights of the regions and the evolution of intra-region poverty, the indirect impact of which is the movement of the population from one area to another. The positive sign that was observed for this component means that it has an effect on the poverty increase in Côte d'Ivoire. The interaction component for the West Rural Forest region essentially explains the effect of this component. This is all the more plausible because this region has experienced big population movements following the moving of the "cocoa loop" from the East region to the West.

Analysis of the evolution of inequality and the relative elasticity of poverty

The decomposition of inequality through time

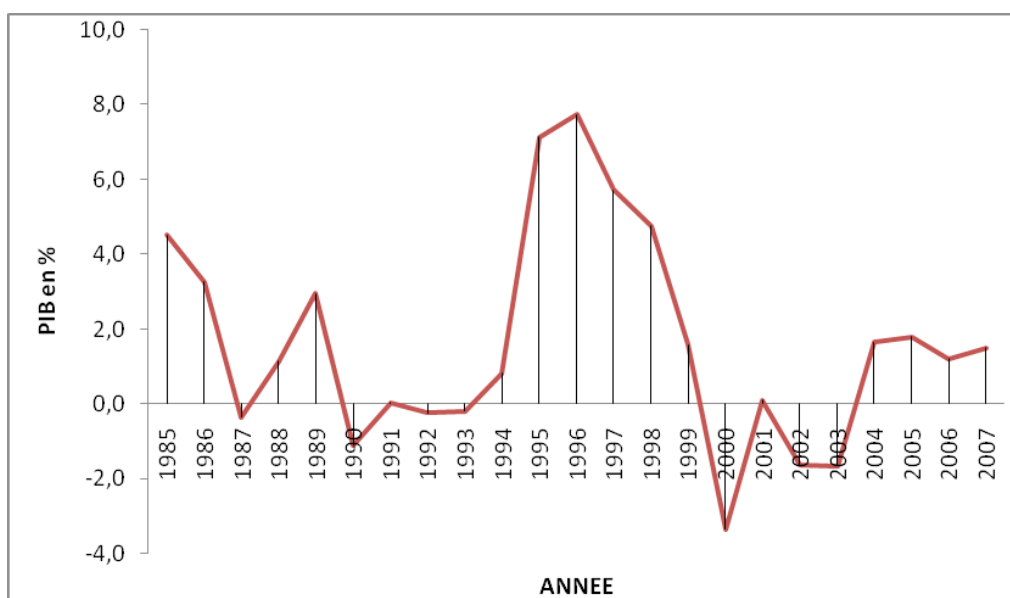
Our analysis of the evolution of inequality was based on the unified theoretical framework developed by Shorrocks (1999). We used the Shapley approach as defined in the DAD software. We used consumer expenses as a variable of interest. These were deflated by the ratio of the poverty thresholds for each year, taking the threshold for 1985 as the reference. The results in Table 6 give the evolution of the Gini index for the 1985–2002 period, calculated on the basis of $\rho = 2$.

Table 6: Evolution of the Gini index over the 1985–2002 period

	YEARS				
	1985	1993	1995	1998	2002
The S-Gini index	0.38	0.36	0.35	0.36	0.48

Source: Authors' computations.

Generally, the results seem to corroborate those reported in the literature (Bamba, 2001). Inequality was found to be high over the whole period and fluctuates around the average in Africa (about 0.39). Moreover, after stagnation between 1993 and 1998, inequality increased from 1998 to reach a peak of 0.48 in 2002. This seems to confirm with results reported in Table 6. Furthermore, from the macroeconomic data for 1985–2002, it transpires that there was a drop in GDP growth between 1998 and 2002, as shown in Figure 1.

Figure 1: Evolution of GDP (in %) over the 1985–2002 period

Source: UEMOA, 2008

The evolution of inequality is estimated as a contribution of two factors: an intra-group component and an inter-group one. Specifically, one has to analyse the incidence of the size of socioeconomic groups and the evolution of inequality within these groups for two distributions: that of 1985 and that of 2002 (see Table 7).

Table 7: Decomposition of inequality over the 1985–2002 period

Groups	Contribution		Contribution	
	Distribution (D1 = base year: 1985) Estimated S-Gini: 0.3828		Distribution (D2 = base year: 2002) Estimated S-Gini: 0.4827	
	Absolute	Relative	Absolute	Relative
Intra-group	0.265	0.699	0.342	0.708
Inter-group	0.117	0.306	0.140	0.291
Abidjan	0.051	0.135	0.081	0.169
Other towns	0.075	0.196	0.108	0.225
Forêt Rurale Est [East Rural Forest]	0.057	0.150	0.051	0.107
Forêt Rurale Ouest [West Rural Forest]	0.029	0.078	0.057	0.118
Savane Rurale [Rural Savannah]	0.050	0.133	0.042	0.08

continued next page

Table 7 Continued

Groups	Contribution		Contribution	
	Distribution (D1 = base year: 1985) Estimated S-Gini: 0.3828		Distribution (D2 = base year: 2002) Estimated S-Gini: 0.4827	
	Absolute	Relative	Absolute	Relative
Difference: Distribution (D1)-Distribution (D2)				
Estimated S-Gini: -0.099				
	Absolute	Relative		
Intra-group	-0.076	-0.014		
Inter-group	-0.023	0.014		
Abidjan	-0.029	-0.033		
Other towns	-0.033	-0.028		
Forêt Rurale Est	0.005	0.042		
Forêt Rurale Ouest	-0.027	-0.040		
Savane Rurale	0.008	0.045		

Source: Authors' computations.

Overall, the results in Table 7 show that the evolution of inequality over the 1985–2002 period was basically linked to its evolution within groups. Thus the intra-group component constituted the major factor in the increase of inequality. This is shown by the inequality distributions by stratum. The strata of Abidjan, Other towns and the West Rural Forest Region contributed most to the evolution of inequality. Clearly, inequality was found to be very strong within the population of these areas. The unequal distribution of income in the three strata was basically the cause of the increase in inequality in Côte d'Ivoire over the 1985–2002 period. At the other end there is the demographic effect, which was found to be the least significant variable.

Relative elasticities and the static approach to the evolution of poverty

Here the study derived the poverty elasticities in relation to the average income—or expenses—and to inequality. The approaches used by Duclos (2002) and Dorothee and Kaboré (2003) and described above were applied to the data. The results in Table 8 present the elasticities of the poverty indices in relation to the average income and to the Gini index; it also presents the marginal rates of substitution.

The results in Table 8 show that between 1985 and 2002, the sensitivity of poverty to economic growth was high and lay between -2.34 and -1.43 for the elasticity “income” associated with the poverty incidence. These elasticities are higher than 1. This means that a 1% increase in average income will lead to a greater reduction of poverty on condition that inequality remains constant. This reduction was, however, found to be bigger for 1985 than for the other three years. Similarly, despite its decline between 1985 and 2002, the sensitivity of the depth and severity of poverty through an increase in income remained stronger (higher than 2 on average), unlike the poverty incidence. Thus, an increase in average income will have a greater impact on the poorest people. This result corroborates that found by Dorothee and Kaboré (2003).

Table 8: Elasticity of the FGT indices/average income per capita and in relation to the Gini index and marginal rates of substitution

Year	Poverty index	Poverty measurement	Elasticity (ϵ^y)/ average per capita income/year		Elasticity (ϵ^g)/ Gini index		MSR		
Empirical Lorenz									
1985–1993	FGT0	0.098	0.320	-2.19	-1.81	4.76	1.33	2.17	0.73
	FGT1	0.026	0.089	-2.71	-2.58	9.06	3.63	3.34	1.40
	FGT2	0.011	0.035	-2.64	-3.01	12.07	5.68	4.57	1.88
1995–1998	FGT0	0.359	0.335	-1.70	-1.67	1.03	1.10	0.60	0.65
	FGT1	0.099	0.103	-2.62	-2.25	3.20	3.14	1.22	1.39
	FGT2	0.039	0.043	-3.03	-2.79	5.06	5.15	1.66	1.84
1985–2002	FGT0	0.098	0.383	-2.19	-1.42	4.76	1.37	2.17	0.96
	FGT1	0.026	0.128	-2.71	-1.98	9.06	3.86	3.34	1.94
	FGT2	0.011	0.060	-2.64	-2.25	12.07	6.09	4.57	2.70
Parametric Lorenz¹									
1985–1993	FGT0	0.098	0.320	-2.34	-1.40	6.35	1.53	2.71	1.09
	FGT1	0.026	0.089	-3.14	-2.17	12.23	4.47	3.89	2.05
	FGT2	0.011	0.035	-3.76	-2.94	17.61	7.41	4.68	2.52
1995–1998	FGT0	0.359	0.335	-1.56	-1.63	1.61	1.86	1.03	1.14
	FGT1	0.099	0.103	-2.19	-2.20	4.28	4.66	1.95	2.11
	FGT2	0.039	0.043	-2.74	-2.67	6.87	7.34	2.51	2.74
1985–2002	FGT0	0.098	0.383	-2.34	-1.43	6.35	2.04	2.71	1.42
	FGT1	0.026	0.128	-3.14	-1.90	12.23	5.15	3.89	2.71
	FGT2	0.011	0.060	-3.76	-2.24	17.61	8.07	4.68	3.62

1. Annexe (A11) gives the estimated parameters of the Beta-type Lorenz curve for expenses/year/per capita. The choice of this functional quadratic form of the Lorenz curve. The programme also distributes the Lorenz curve. This can be done in two ways:

i) by comparing the sum of squared errors over the whole Lorenz curve; and ii) by comparing the sum of squared errors over the part of your Lorenz curve up to the headcount index of poverty. The latter way matters most.

Source: Authors' computations.

Overall, an increase in economic growth will generate a more than proportional reduction in poverty incidence, depth and severity through all the years on condition that the increase in the growth of the average per capita income does not generate an increase in inequality.

When one looks at the increase in inequality over the five years, it transpires that the sensitivity of the poverty depth and the poverty severity in relation to this increase are higher than the poverty incidence, except in 1985 when poverty incidence was higher. Moreover, the incidence of the variation in average income on poverty was lower than the variation in inequalities, especially with regard to poverty depth and severity. This implies a stronger sensitivity of these two poverty dimensions to an increase in inequality.

These observations suggest that there is need to link any policy aimed at economic growth to a vigorous and robust policy for the redistribution of income. This will avoid a situation where inequality annihilates the positive effects of growth on poverty reduction.

The marginal rates of substitution between growth and inequality are, in general,

relatively high, and higher than 1. Besides, they are increasing vis-à-vis the poverty index chosen. These results mean that in order to stabilize the different poverty measurements, the increase in per capita income must be more than proportional so as to compensate for a 1% increase in the Gini index.

Finally, it is possible to analyse the variation in poverty. To do this, it is enough to multiply, by the elasticity of “computed income”, the mean of the growth rates of the real per capita income, which reflects the dynamics in relation to the annual values that are sensitive to exogenous shocks (drought, heavy rains, fall in the prices of the main agricultural export products, etc.). In this study, we computed the average rate of annual growth of the per capita GDP estimated at -2.36% between 1985 and 1993, at 3.33% for the 1995–1998 period, and at -3.56% for the 1985–1993 period. The main results obtained from this computation are summarized in Table 9.

Table 9: Poverty variation between 1985 and 2002 in annual % with illustration from the results of the parametric approach

	Poverty index	Total variation of poverty (annual %)	
1985–1993	FGT0	5.52	3.30
	FGT1	7.41	5.12
	FGT2	8.87	6.93
1995–1998	FGT0	-5.19	-5.42
	FGT1	-7.29	-7.32
	FGT2	-9.12	-8.89
1985–2002	FGT0	5.52	5.09
	FGT1	7.41	6.76
	FGT2	8.87	7.97

Source: Authors' computations.

The estimated results of the total variation of poverty were obtained from the static elasticities by assuming that inequality remains constant. These results can be commented upon from three angles: first, by taking into account the signs of the poverty variation. The sign for this variation for 1985 to 1993 is positive for all the poverty indicators. This means that poverty prevailed during those years. This seems plausible since during this period, when SAPs were implemented, the average growth rate for the per capita GDP was estimated at -2.36%. Between 1995 and 1998 the sign for the annual variation of poverty was negative irrespective of indices. One could indeed think there was a reduction in poverty during this period, because the economy then benefited from the devaluation of the CFA franc; the growth rate of the per capita GDP was positive, at 3.33%. Moreover, when one looks at the constant inequality over the 1985–2002 period, one realizes that the sign of the poverty variation is positive. One can therefore conclude that this period was marked by persistent poverty. The intra-annual trend indicates that there was a downward trend in poverty irrespective of indices for the periods 1985–1993 and 1985–2002 despite a positive variation. Finally, taking into account poverty indices, we observed that poverty depth and poverty severity tended to be high. This means that the sensitivity of poverty reduction in relation to the variation in growth on the assumption of constant inequality was higher for the poorest households.

5. Conclusion and recommendations

In general, this study has confirmed the importance of decomposing poverty, be it in terms of growth and inequality or of the contribution of the various sub-groups of the population or sectors of activity. Furthermore, the study has highlighted methodological difficulties related to survey data (sampling structure, the issue of seasonal data, etc.) and, in particular, the choice of the deflator.

Solid conclusions arise from the results of the dynamic decomposition of poverty. With regard to the dynamic decomposition of poverty into growth and inequality components, the results show that any growth of average level of income or of expenses does not necessarily lead to a reduction in poverty. If this growth does not make up for the joint growth of the poverty threshold, this might lead to a worsening of poverty. With regard to the analysis of the contribution of the sub-groups of the population to the positive evolution of poverty between 1985 and 2002, the results show that the intra-group and interaction components account for the strong increase in poverty. The sub-groups Rural Savannah, East Rural Forest and West Rural Forest contributed to the evolution of poverty over the period of study. Moreover, one of the major findings is that the poverty phenomenon is non-demographic.

For the decomposition and the evolution of inequality, we observed that the unequal distribution of income in the strata Abidjan, Other towns and the West Rural Forest region basically accounted for the inequality in Côte d'Ivoire over the 1985–2002 period, unlike the demographic effect, which was found to be less significant.

To maximize the effect of policies, it is appropriate to combine the demographic policy with one aimed at creating jobs and ensuring balanced regional development.

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Annexes

Decomposition of the evolution of poverty using the Shapley approach

Let us assume that there are (n) periods for which we wanted to explain changes in poverty. Let Θ_{ij} be the evolution of poverty between dates 9i) and (j), represented by the function:

$$\Theta_{ij} = f(G_{ij}, I_{ij}) \quad (A1)$$

where G_{ij} is the growth effect between i and j, and I_{ij} is the inequality effect. The basic model verifies the axioms defined in Kakwani (1997) and produces new measurements of growth and inequality defined by \bar{G}_{ij} and \bar{I}_{ij} respectively, with:

$$G_{ij} = \frac{1}{n} \sum_{k=1}^n (\bar{G}_{ik} + \bar{G}_{kj}) \quad (A2)$$

and

$$\bar{I}_{ij} = \frac{1}{n} \sum_{k=1}^n (\bar{I}_{ik} + \bar{I}_{kj}) \quad (A3)$$

Where i and j vary from 1 to n and:

$$\bar{G}_{ij} = \frac{1}{2} \left[\theta(z, \mu_p, L_i(p)) - \theta(z, \mu_p, L_i(p)) + \theta(z, \mu_p, L_j(p)) - \theta(z, \mu_p, L_j(p)) \right] \quad (A4)$$

$$\bar{I}_{ij} = \frac{1}{2} \left[\theta(z, \mu_j, L_j(p)) - \theta(z, \mu_i, L_i(p)) + \theta(z, \mu_j, L_j(p)) - \theta(z, \mu_i, L_i(p)) \right] \quad (\text{A5})$$

Table 1: Estimation of the beta-type Lorenz curve for expenses/year/per capita
dependent variable = Log(p - L(p)). Regression method: Ordinary least squares (OLS)

Coefficients/ parameters	Coefficient value				
	1985	1993	1995	1998	2002
Log(a)	-0.21 (0.01)	-0.17 (0.03)	-0.24 (0.02)	-0.25 (0.01)	-0.20 (0.005)
γ	0.98 (0.008)	1.01 (0.01)	0.98 (0.009)	0.97 (0.005)	0.97 (0.002)
β	0.56 (0.006)	0.61 (0.01)	0.60 (0.01)	0.57 (0.008)	0.39 (0.003)
\bar{R}^2	0.999	0.999	0.999	0.999	0.999

Source: Authors' computations using the Povcal software.

Contribution of activity sectors to the evolution of poverty

We grouped the sectors of activity in which the head of the household was involved into nine socioprofessional categories:

1. Export farmer: owner of a farm on which export crops are produced
2. Foodstuff farmer and animal breeder: owner of a farm on which foodstuffs are produced and is also an animal breeder
3. Employee in the farming sector
4. Employee in the public sector
5. Employee in the modern private sector
6. Employee in the private informal sector
7. Self-employed (owner of a private modern and/or informal unit)
8. Unemployed
9. Outside the working population

Table 2: Contribution of the head of the household's activity sector to the evolution of the incidence of poverty between 1985 and 2002

PERIOD: 1985–2002							
Distribution (1) YEAR 1985 (D1)				Distribution (2) YEAR 2002 (D2)			
FGT0	0.0985			0.3838			
Difference D2-D1	0.2852						
Activity sector of the head of the household (see the socio-professional categories above)	FGT* (D1)	Proportion of the population (D1)	Absolute contribution (D1)	FGT* (D2)	Proportion of the population (D2)	Absolute contribution (D2)	Difference between contributions (2-1)
1	0.144	0.293	0.042	0.536	0.317	0.170	0.127
2	0.147	0.180	0.026	0.517	0.146	0.075	0.049
3	0.118	0.006	0.0007	0.561	0.027	0.015	0.014
4	0.003	0.094	0.0002	0.087	0.064	0.005	0.005
5	0.000	0.074	0.000	0.138	0.089	0.012	0.013
6	0.030	0.035	0.001	0.319	0.066	0.021	0.020
7	0.105	0.100	0.010	0.316	0.145	0.045	0.035
8	0.000	0.016	0.000	0.227	0.019	0.004	0.004
9	0.085	0.198	0.016	0.265	0.124	0.033	0.016
Activity sector of the head of the household (see categories above)	(A) Intra-group component	(B) Inter-group component	(C) Interaction component	Impact of (A)+(B)+(C)			
1	0.115	0.003	0.009	0.127			
2	0.066	-0.004	-0.012	0.049			
3	0.002	0.002	0.009	0.014			
4	0.008	-0.00009	-0.002	0.005			
5	0.0102	0.0000	0.002	0.012			
6	0.0101	0.0009	0.008	0.020			
7	0.021	0.004	0.009	0.035			
8	0.003	0.0000	0.0006	0.004			
9	0.035	-0.006	-0.013	0.016			
TOTAL	0.273	0.00009	0.011	0.2852			

Source: Authors' computations.

Contribution of the size of the household to the evolution of poverty

Table 3: Contribution of the size of the household to the evolution of poverty between 1985 and 2002

	Distribution (1): Year 1985(D1)		Distribution (2): Year 2002 (D2)				
	0.0985	0.28527338	0.3838				
FGT 0					0.3838		
Difference : D2-D1					0.28527338		
Size of groups (number of people in the household)	FGT 0 (D1)	Proportion of the population	Absolute contribution (D1)	FGT 0 (D2)	Proportion of the population (D2)	Absolute contribution (D2)	Difference between contributions (D2-D1)
1	0.03052836	0.01181717	0.00036076	0.07552300	0.02664328	0.00201218	0.00165142
2	0.02893385	0.02287893	0.00066198	0.09363750	0.03945388	0.00369436	0.00303239
3	0.04057460	0.04331322	0.00175742	0.15702855	0.06907631	0.01084695	0.00908954
4	0.03743838	0.07124390	0.00266726	0.27991467	0.09576415	0.02680579	0.02413854
5	0.04768660	0.09791619	0.00466929	0.36539698	0.09893269	0.03614971	0.03148041
6	0.07966359	0.09799917	0.00780697	0.40414050	0.10574244	0.04273480	0.03492784
7	0.07886326	0.08403859	0.00662756	0.43400366	0.10423922	0.04524020	0.03861265
8 (more than 8 people)	0.12966188	0.57079282	0.07401007	0.47017626	0.46014803	0.21635068	0.14234061

continued next page

Table 3 Continued

Size of the household (number of people)	(A) Intra-group component	(B) Inter-group component	(C) Interaction component	Impact of (A)+(B)+(C)
1	0.00053171	0.00045262	0.00066710	0.00165142
2	0.00148035	0.00047958	0.00107246	0.00303239
3	0.00504400	0.00104533	0.00300021	0.00908954
4	0.01727496	0.00091800	0.00594558	0.02413854
5	0.03110899	0.00004847	0.00032295	0.03148041
6	0.03179847	0.00061686	0.00251251	0.03492784
7	0.02984550	0.00159309	0.00717406	0.03861265
8 (more than 8 people in the household)	0.19436316	-0.01434641	-0.03767614	0.14234061
Total	0.31144713	-0.00919248	-0.01698127	0.28527338

Source: Authors' computations.

1. The different poverty thresholds used to evaluate and analyse poverty in Côte d'Ivoire were constant in real terms. They corresponded to the first decile income of the distribution of the per capita income for the EPAM85 survey, which was CFAF 75,000 per person. This amount was updated at each survey with a deflator. The deflator used was a consumer price index of typical African households in Abidjan between the period of data collection and that of the collection of the EPAM85 survey. So, for example, for the ENV95 data, the deflator was CFAF 193.11, which means that CFAF 100 in 1985 had the value of CFAF 193.11 in 1995.

**Explanation of the causes of the evolution of poverty between 1985 and 1995*

The high increase in poverty in Côte d'Ivoire could be explained by a combination of many factors, the main ones being:

- i) The high level of inflation. The deflators used for the analysis of poverty produced a measurement of inflation between 1985 and 1993 which was 34.8% and 42.9% between 1993 and 1995 following the 50% devaluation of the CFA franc that occurred in January 1994. Thus, within 10 years, the cost of living almost doubled.
- ii) Since the early 1980s, Côte d'Ivoire had gone through an economic crisis characterized by a deterioration of the exchange value, the fall in the prices of its main agricultural products, a large debt to service, and a negative economic growth rate. The impact of all this on the population was felt through a loss in income and often of employment, freezing of public service employees' salaries, job abandonment by teachers, and many cutbacks in the public service.
- iii) Faced with this crisis, the Ivorian government developed and implemented various structural adjustment programmes (SAPs) but with little success. The government then decided to embark on an austerity programme in the early 1990s in order to strike a balance between government expenditure and receipts.
- iv) The devaluation of the CFA franc in 1994 led, as an immediate effect (in 1994 and 1995), to a high rise in inflation of about 42.9% between 1993 and 1995. That said, the inflation was also high between 1985 and 1993, at about 35%.

Household incomes did not follow the same trend as inflation over the 1985–1995 period; they even deteriorated. The immediate consequence of this was a worsening of the poverty phenomenon, both in rural and urban areas.

2. The decomposition of inequality was carried out in two steps. The first consisted in decomposing total inequality into inter-group and intra-group contribution. The second step allowed us to express the total intra-group as a sum of the intra-group contributions in each of the groups.

During the first step, we assumed that the two Shapley factors were inter-group inequality and intra-group inequality. The rules that were followed in computing the contribution if these factors are:

- a. First, to eliminate intra-group inequality and calculate inter-group inequality, we used an income vector for which the average salary $\mu(k)$ of the observation of group k was assigned to each observation.
- b. To eliminate the inter-group inequality and calculate the intra-group, we used an income vector where each observation was assigned to its income multiplied by the ratio $\mu(k)/\mu$ of its group k.

To be more specific, the inequality index I depends on individual people's incomes of $k = 1, \dots, K$ group, each group with $n(k)$ people.

Thus, $y(k)$ is the $n(k)$ income vector in group k. We wanted to express total inequality as a sum of inter-group inequality and intra-group inequality.

To estimate the contribution of intra-group inequality, we calculated the decline in inequality that was observed when the groups' average incomes were equalized. That could be done before or after the intra-group inequality has been withdrawn. Thus, the contribution according to the Shapley method was calculated as:

$$I_{inter-group} = 0.5 [I(y(1), \dots, y(K)) - I(\mu/\mu(1) \cdot y(1), \dots, \mu/\mu(K) \cdot y(K)) + I((1) \cdot 1(1); \dots; \mu(K) \cdot 1(K)) - 0],$$

$$I_{intra-group} = 0.5 [I(y(1), \dots, y(K)) - I(\mu(1) \cdot 1(1), \dots, \mu(K) \cdot 1(K)) + I(\mu/\mu(1) \cdot Y(1), \dots, \mu/\mu(K) \cdot y(K)) - 0],$$

We deduced that the form of the decomposition of inequality was:

$$I(y(1), \dots, Y(K)) = I_{inter-group} + I_{intra-group}$$

3. How were the thresholds for 1985, 1993, 1995, 1998 and 2002 calculated?

Two of the methods generally used consist of adopting (see CHRISTIAN GROOTAERT 1985: « Réformes économiques et analyse de la pauvreté, l'expérience de la Côte d'Ivoire » [Economic reforms and analysis of poverty: the experience of Côte d'Ivoire]):

- an absolute poverty threshold corresponding to a minimum of nutritional needs, calculated on the basis of minimum food expenses to which can be added a basket of goods considered as a vital minimum;

or

- a relative poverty threshold determined by the distribution of expenses. This threshold is thus an arbitrary and preselected proportion of the population having incurred these expenses.

It is preferable for the researcher to rely on information on expenses while studying poverty because of the households' reluctance to provide reliable information on income.

From the household expenses recorded during the 1985 Permanent Household Survey (referred to as EPAM 85), Grootaert (1985) defined:

- a relative poverty threshold of CFAF 128,600, which represents 30% of the poorest people when the population is classified in increasing order of per capita expenses (3rd decile);

and

- a relative extreme poverty threshold of CFAF 75,000, representing the 10% poorest (1st decile).

In our study on the evolution of poverty between 1985 and 1993, and between 1985 and 1995, the extreme poverty threshold of CFAF 75,000 was used. To this threshold we then applied a deflator to the consumer prices of African households. This deflator was an integrated index of consumer prices of the African households living in Abidjan. It was computed from average prices for May to December for the 1993 survey, and for March to May for the 1995 one.

To shed more light on the month intervals used in calculating average prices, we should specify that data were collected from June to November 1993 and April to May 1995 respectively. The responses to the questions on expenses of the last week and those of the last month partially or entirely cover the month preceding the beginning of the collection.

The formula used to compute the integrated index was:

$$\mathbf{Index}_{\text{integrated}} = \mathbf{0.8*Index}_{\text{labourer}} + \mathbf{0.2*Index}_{\text{executive}}$$

The 100 base for this index corresponds to the period when data were collected for EPAM 85, from February 1985 to January 1986.

Connection coefficients of 1.38 for the index "labourer" and of 1.32 for the index "executive" were also used to bring the consumer price indices (the 100 base for from November 1992 to October 1993) to the 100 base for August 1984 to July 1985. The results in Table 13 summarize the price deflators necessary for this study.

Table 4: The price deflators used

INDEX	1985	1986	1987	1988	1993	1995
1. ABIDJAN						
100 BASE: AUG 84–JUL 85						
LABOURER	102.58	112.51	121.22	128.85	139.60	
EXECUTIVE	102.58	108.82	115.21	122.79	133.10	
100 BASE: 1985 (EPAM 85)						
LABOURER	100.00	109.68	118.17	125.61	136.09	
EXECUTIVE	100.00	106.08	112.31	119.70	129.75	
SUMMARY	100.00	108.96	117.00	124.43	134.82	
100 BASE: Nov 92–Oct 93						
SUMMARY						137.48
(AVERAGE FOR MARCH–MAY 95)						
100 BASE: 1985 (EPAM 85)						
SUMMARY						193.11
(AVERAGE FOR MARCH–MAY 95)						
2. OTHER TOWNS						
100 BASE: JAN-DECEMBER 93						
(AVERAGE FOR MARCH–MAY 95)						138.34
3. DEFLATOR BY STRATUM						
ABIDJAN: 100 BASE EPAM 85, (AVERAGE FOR MARCH–MAY 1995)						193.11
ABIDJAN: 100 BASE (AVERAGE FOR MARCH–MAY 1995)						100.00
OTHER TOWNS						96.38
EAST RURAL FOREST REGION						87.24
WEST RURAL FOREST REGION						74.24
RURAL SAVANNAH REGION						81.29

The deflator for the stratum “Other towns” was obtained by bringing the Abidjan index (average for March–May 1995) down to the 100 base starting from January to December 1993. In the absence of prices collected in the rural area, the deflator in one stratum is equal to the average of the deflators that were used in 1986, 1987 and 1988 while analysing data for EPAM 86 to EPAM 88.

Is the threshold ratio comparable for all those years?

Yes, depending on which method was used to calculate the thresholds. The deflator of the national poverty threshold is the average of the consumer price indices for the typical African families over the period of the 100-base EPAM85 survey. The household consumer price index is regularly published by the National Institute of Statistics (INS).

Deflators for different regions were calculated from the data from the Programme of International Comparison for the EPAM surveys from 1985 to 1988. For the analysis of the ENV93 and ENV95 data, the deflator for “Other towns” was updated using data about regional prices collected by the regional offices of INS in some regional headquarters. In the absence of prices collected in the rural area, the deflator for a rural stratum is equal to the average of the deflators that were used in 1986, 1987 and 1988 while analysing data for EPAM 86 to EPAM 88. It is these same deflators that were used for the analysis

of the ENV98. In 2002, the price survey part of the study made it possible to update all the deflators for regions.

Table 5: Updating of all the deflators for regions

	1985	1986	1987	1988	1993	1995	1998	2002
Poverty threshold deflator (base: 100, for EPAM85)								
-	100.00	107.30	107.75	115.31	134.82	193.11	217.06	244.60
Deflators for regions (base: 100, for Abidjan)								
Abidjan	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Other towns	92.84	93.62	91.49	92.57	96.38	96.38	96.38	95.56
East Rural Forest	87.01	87.01	88.12	86.58	87.24	87.24	87.24	90.43
West Rural Forest	78.25	74.66	75.64	72.42	74.24	74.24	74.24	95.86
Rural Savannah	75.97	80.12	81.86	81.88	81.29	81.29	81.29	77.55

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THIS RESEARCH STUDY was supported by a grant from the African Economic Research Consortium. The findings, opinions and recommendations are those of the author, however, and do not necessarily reflect the views of the Consortium, its individual members or the AERC Secretariat.

Published by: The African Economic Research Consortium
P.O. Box 62882 – City Square
Nairobi 00200, Kenya

Printed by: Modern Lithographic (K) Ltd
P.O. Box 52810 – City Square
Nairobi 00200, Kenya

ISBN 978-9966-023-20-9

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Abstract

The aim of this study was to demonstrate the importance of analysing the relationship between growth, income distribution and poverty in Côte d'Ivoire. The study was based on the multilateral comparison method used to measure the effects of growth and inequality on the poverty dynamics. The data used were taken from the Côte d'Ivoire Living Standard Survey (CILSS) carried out by the National Institute of Statistics (INS); they were collected from households in 1985, 1993, 1995, 1998 and 2002. The study assumed that the survey data were comparable. As a first step we followed the procedure used by Kakwani (1997), which involved measuring the effects of growth and inequality on poverty on the basis of multilateral comparison. As a second step, we used the approach of Duclos (2002) to measure the growth–poverty elasticity and the poverty–inequality elasticity. The results showed that inequality was the key factor in the poverty evolution of Côte d'Ivoire. They further showed that this evolution was not linked to a demographic phenomenon, but rather to intra-group poverty and an unequal distribution of income within these groups.

Key words: *poverty, growth, income distribution, inequality*

Codes JEL: I32, O15