THE DECOMPOSITION OF POVERTY: A DISTRIBUTIVE APPROACH TO LIVING STANDARDS

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ABSTRACT

This study attempts to carry out a comprehensive analysis of the evolution of poverty trends using national household consumption survey I and II collected in 1996 and 2001 respectively. The theoretical decomposition frameworks propelling the study are motivated mainly by the Shapley value while empirical estimates are obtained from DAD 4.4. From our findings, we observe that Rural forest and Rural highlands regions were hardest hit by poverty and inequality trends in Cameroon. The result shows that the within-regions effects were found to be more instrumental in accounting for changes in all the classes of poverty measures than the inter-sector population shift effects in the period under review. While the between-region effects were systematically contributing in alleviating poverty in the Rural forest and Rural highlands and at the same time aggravating poverty in Yaounde, Douala. Based on our result, we suggest that policies and strategies for reducing poverty/inequality should place particular emphasis on the countryside and on a region-by-region approach such as decentralization, increase provision of rural extension services (roads, electricity, markets, portable water).

KEY WORDS

Decomposition; Poverty; Distribution; Standards of living; Approach.

The problem of poverty is a major concern for all governments and the struggle to alleviate poverty is leaving no government indifferent. Poverty and inequality are actually a world wide phenomenon which is spreading in rich and underdeveloped countries in different ways and is destined to worsen unless new approaches are developed and new scientific knowledge about its causes is discovered (Townsend, 1993). In Cameroon, overall poverty deepened within the period 1984/1996 with rural poverty remaining more widespread, deeper and more severe than urban poverty (see Baye 2005a, Fambon et al, 2004). Despite the improve macro economic situation, public education and health indicators have remained poor and Cameroon is still perceived as a very corrupt country on the basis of surveys undertaken in 1998 and 1999 by transparency international.

The Poverty Reduction Strategy Paper PRSP, (2003) also confirms that, nearly four out of every ten Cameroonians in 2001 were living with an annual income below the poverty line of CFAF 232.547. This represents the estimated annual income necessary for an individual in Yaounde to buy a 'minimal basket' of essential food and non food items. In 2001, eight poor people out of ten were living in the country-side and the incidence of poverty there is more than double the incidence in the cities. More so, transparency international, (1998 and 1999) state that the index for the cost of living rose by 60% within 1998 and 1999, however, nominal wages remained unchanged. From December 1992 to December 1995, real wages of senior civil servant fell by 75/80 %, and this had a deleterious impact on civil servants motivation and fuelled corruption as well as poverty and inequality.

As noted in GOC (2003), the increasing level of poverty in rural communities induced many young people to migrate to large towns where they expected to find better conditions. They ended up in a net work of relatives and friends who initially supported them against the worst hardships; eventually some succeed in making ends meet, while others are exposed to unemployment or under-employment, crime and social- behaviour, which posed insecurity problems to both the authority and other city dwellers.

More generally, as argued by Baye and Fambon, (2002), the joint effects of the economic crises and structural adjustment programmes

(SAPs) forced many Cameroonians to adopt coping devices such as moonlighting, seeking for survival in the informal sector. Also, they engaged in occupational and geographical mobility, changing regional patterns of activities and productivities, and adopting ''behavioural innovations'' like corruption and other malpractices for survival. These adaptations are thought to have modified the pattern of welfare among households in the different regions and sectors of activities.

According to Baye (2006b), the adverse International environment as reflected in the overvaluation of the CFAF against the dollar and the sagging world market prices of commodity exports in the late 1980s and early 1990s, and its implications for government revenue, production, consumption and relative prices, led to 50% of devaluation of the CFAF in January 1994. Being a centre-piece of adjustment, the devaluation was intended to perform two functions: (1) reduce expenditure on imports and (2) re-allocate resources away from non-tradable commodities with a view to propping up the global competitiveness of the economy subsequent to the 1994 devaluation of the CFAF, Cameroon achieved macro-economic stability. Yet, rural incomes were slow to improve because much of the acreage under coffee and Cocoa had been abandoned, in addition to the typically low short run elasticities of supply of these commodities.

As a subject of debate, many authors have approached the study on poverty change in the living standard of Cameroon. Among these, are pioneer authors such as Araar (2003), Baye (2005a), NIS (2002), Fambon et al (2004), Njinkeu et al (1997). However, very little is known about the exact contributions of intra and inter sectoral components to changes in aggregate poverty using the 1996 and 2001 household survey. Yet, such knowledge is required for public policy, especially in an era when poverty eradication is gaining prominence in the policy menu.

The objective of this study include; I) to examine the evolution of poverty between 1996 and 2001, 2) to assess the relative importance of the Within and Between sector effects to changes in aggregate poverty, 3) To derive policy implications on the basis of the analysis.

The rest of this work is divided into four sectors: section II covers the theoretical framework, section three exposes the methodology, section four presents the results and discussions while section five submit the general conclusions of the study.

THEORETICAL REVIEW

The poverty measure used in this work, is that suggested by Foster, Greer and Thorbecke FGT, (1984) and reviewed by the World Bank (1990), Lipton and Ravallion, (1995) and Fields, (1997).These include the headcount index, the poverty gap and the squared poverty gap. FGT (1984) shows that these three poverty measures may all be calculated using the following formula:

$$P_\alpha = \frac{1}{N}\sum_{i=1}^{M}\left(\frac{z - y_i}{z}\right)^\alpha \text{, where } \alpha \geq 0,$$

and y_i is the average real spending of i household, z is the poverty line, N is the number of adult equivalent households, M is the number of poor adult equivalent households, α can be interpreted as a measure of poverty aversion or coefficient reflecting different degrees of importance, which a government might accord to the depth or severity of poverty.

As reviewed in Baye (2005), Ravallion and Huppi (1991), we made use of the Pα class of poverty measures to identify the factors underlying the observed changes in aggregate poverty between two dates, *t* and *t+n*. This class of poverty measures is sub-group consistent and additively decomposable (FGT, 1984, Balisacan, 1995; Foster and Shorrocks, 1991). The factors explored were the intra and inter subgroup contributions to any observed changes in poverty. If *fk* and *Pαk* represent the population share and poverty level of subgroup k∈K, the property of subgroup decomposability of the Pα class of poverty measures enables us to write the expression $P_{\alpha,t} = \sum_{k\in K} f_{k,t} P_{\alpha k,t}$.

The aggregate change in poverty between period t and t+n yields:

$$\Delta P_\alpha = P_{\alpha,t+n} - P\alpha,t = \sum_{k\in K}\left[f_{k,t+n}P_{\alpha k,t+n} - f_{k,t}P_{\alpha k,t}\right] \quad (1)$$

The goal here is to account for the overall change in poverty, ΔPα, in terms of changes in poverty within subgroups, $\Delta P\ \alpha k = P\ \alpha k,t+n - P\ \alpha k,t,\ k \in K$, and the population shifts between subgroups, $\Delta fk = fk,t+n - fk,t,\ k \in K$.

Ravallion and Huppi (1991) exploit the additive decomposability of the Pα class of poverty measures to throw light on the relative importance of changes within sectors versus changes between them, such as due to the between sector

population or work-force shifts.[1] This decomposition of the aggregate poverty change is not exact because it requires an interaction term to establish its identity. Using the above notations, the Ravallion-Huppi decomposition of an aggregate change in poverty can be expressed as:

$$\Delta P_{\alpha} = P_{\alpha,t+n} - P\alpha,t = \sum_{k\in K}\left(P_{\alpha k,t+n} - P_{\alpha k,t}\right)f_{k,t}$$

(Within sector effects)

$$+\sum_{k\in K}\left(f_{k,t+n} - f_{k,t}\right)P_{\alpha k,t}$$

(Between sector population shift effects)

$$+\sum_{k\in K}\left(P_{\alpha k,t+n} - P_{\alpha k,t}\right)\left(f_{k,t+n} - f_{k,t}\right)$$

(Interaction effects) (2)

The within-sector effects are simply the contribution of poverty changes within sectors, controlling for their base period population shares. The between-group population shift effects are the contribution of changes in base period poverty due to changes in the distribution of the population across sectors between the based and terminal periods. The residual or interaction effects arise from the possible correlation between population shifts and within sector changes in poverty.

It has been suggested that the interaction term can be made to vanish by taking the average of the results got by using the initial and terminal periods as base periods. The problem with the averaging method is that it is not based on any theoretical underpinning. But this gap is filled when we appeal to the Shapley Value approach.

METHODOLOGY AND DATA SETTING

Methodology. With regards to Baye (2005b), the methodology proposed here, performs exact decomposition of changes in aggregate measure poverty into within and between sector components that hinge on Shapley Value.[2]

An important issue in distributive analysis would be how to assign weights to the factors that contribute to an observed level or change in a measure of living standards. For instance, the level and/or change of a distributive index between two dates may be attributable to factors such as within-sector and between-sector effects and analysts are interested in quantifying the relative importance of each component. There are different methods to perform the attribution, all of which must have to deal with the fact that the contribution of a factor depends on the presence of the other factors. This issue is similar to problems that arise in cooperative game theory, and recent literature in distributive analysis is proposing and applying an attribution according to the Shapley Value (see Shorrocks, 1999; Kabore, 2002; Rongve, 1995; Chantreuil and Trannoy, 1997; Baye, 2006b). We first appeal to cooperative game theory before applying the solution set to decomposed changes in poverty.

A typical question to address is what each player might reasonably expect to receive (or pay) as his or her share of the reward (or cost) in a cooperative game. The solution concept widely used in the theory of cooperative games to answer such questions is the Shapley Value (see Owen, 1977, Moulin 1988), which provides a recommendation for the division of the joint profits or costs of the grand coalition, while satisfying some reasonable properties.

For instance, let K = {1, 2, …, k,…, m} be a finite set of players. Non-empty sub-sets of K are called coalitions. To accomplish the division process, the players may form coalitions and the strength of each coalition is expressed as a characteristic function v. For any coalition or subset $S \subseteq K$, v(S) measures the share of the surplus or loss that the coalition, S, is capable of appropriating without resorting to agreements with players belonging to other coalitions.

For each player k, $K \notin S$, Shapley (1953) proposes a value based on the player's marginal contribution – defined as the weighted mean of the marginal contributions v(S$\cup$ {k}) - v(S) of player k in all coalitions S $\subseteq$ K- {k}. That is, player k is attributed the extra amount that he brings to the existing coalition of players. To identify this value, we imagine that the m players are randomly ranked in some order, or join the game in a random order, defined by σ,

$$\sigma = \left\{\underbrace{\sigma_1, \sigma_2, ..., \sigma_{k-1}}_{s}, \sigma_k, \underbrace{\sigma_{k+1}, ..., \sigma_m}_{m-s-1}\right\} \quad (3)$$

and then successively eliminated in that order. The elimination of players reduces the share accruing to the group of those not yet eliminated.

[1] As observed by Shorrock, (1999) and reviwed by Kaboré, (2002), standard decomposition techniques typically confront four major problems: (1) The contribution assigned to each specific factor does not always have an intuitive clear meaning, (2) Decomposition produced use only applicable to certain poverty and inequality indices; (3) The type of contributing factors considered are usually limited, (4) Above all, conventional decomposition methods lack a shared theoretical framework.

[2] The exposition of the Shapley Value Submitted here draws heavily on the Succinct Discussion in Baye (2006b, 2007).

When the coalition, S, is composed of s elements, we can only find the value they will obtain, v(S), when the first s elements of σ are exactly the elements of S. The weight of the coalition S is measured by the probability that the first s elements of σ are all elements of S. This probability is found by dividing the number of ordered arrangements of which the first s elements are all in S by the total number of possible ordered arrangements. The numerator can be obtained by imagining that the first s players are orderly arranged in a sequence and the remaining m-s-1 players are also orderly arranged in another sequence.

The number of possible ordered arrangements is the number of permutations of m players taken m at a time, which is m!. By the same reasoning, since the first s players yield s! number of permutations, the remaining m-s-1 players would yield (m-s-1)! Number of Permutations. The number of ordered arrangements in which the first s players are all elements of S is thus given by s!(m-s-1)!.

The weight (or probability) that the first s elements of σ are all elements of S is thus defined by s!(m-s-1)!/m!, where s is the size of the coalition S. This weight also measures the probability that the player before player *k* will be in S. The Shapley Value of player *k*, denoted by $\varphi_k^{sh}(K,v)$, is thus the weighted mean of his marginal contributions v(S$\cup$ {*k*}) -v(S) over the set of coalitions S $\subseteq$ K- {*k*} given by:

$$\varphi_k^{sh}(K,v)=\sum_{s=0}^{m-1}\sum_{\substack{S\subseteq K-\{k\}\\ |S|=s}}\frac{s!(m-s-1)!}{m!}\left[v(S\cup\{k\})-v(S)\right] \quad (4)$$

by convention, 0! = 1 and v(ϕ) = 0

To apply the Shapley Value in distributive analysis instead; of considering m players as in cooperative game theory, we now consider m factors that contribute in the explanation of an observed phenomenon. The Shapley Value given in Equation 4 satisfies all three of Shapley's axioms. They state that: (1) the expression $\varphi_k^{sh}(K,v)$ should be symmetric (or anonymous) in the sense that the contributions assigned to any given factor should not depend on the way in which the factors are labelled or listed. In order words, $\phi_k^{sh}(K,v)$ should be independent of the factor's label, 1, 2, …, m; and (2) the decomposition should be efficient, that is, it should be exact and additive, so that, for $\forall_k \in K$, $\forall_{k+1} \in K, \phi_k^{sh}(K,v)\cap\phi_{k+1}^{sh}(K,v)=\phi$ and $\sum_{k=1}^{m}\phi_k^{sh}(K,v)=v(K)$.

That is, the intuitively appealing contributing factors should form a partition, so that there is no need for vague concepts such as residual or interaction terms to secure the identity of the decomposition.

Since by the additivity axiom the set of factors completely determine the aggregate indicator, which could be at levels or changes, it is convenient to assume that v(ϕ) = 0, in the sense that the aggregate indicator is zero when all the factors are extracted.

Applying the Shapley approach to sectoral decomposition, we denote the within sector factors by *W* and the between sector population shift factors by *B*. This implies that Equation 2 can also be expressed using the characteristic function v as $\Delta P\ \alpha = v\ \alpha(W,B)$. Here we have only two factors and the two elimination sequences are given by {*W, B*} and {*B, W*}.

Following Baye (2006b, 2007), from Equation 1, ΔP_a explains the overall change in poverty and which can now be rewritten in terms of exactly two components: changes in poverty within-sector and between-sector population shift effects as:

$$\begin{aligned}\Delta P_\alpha &= \phi_{\alpha W}^{sh}(2,v)+\phi_{\alpha B}^{sh}(2,v)\\ &= 0.5\sum_{k\in K}[f_{k,t}+f_{k,t+n}]\Delta P_{\alpha k}+0.5\sum_{k\in K}[P_{\alpha k,t}+P_{\alpha k,t+n}]\Delta f_k\end{aligned} \quad (5)$$

= Within-Sector Effects + Between-Sector Population Shift Effects

In contrast with the standard sectoral decomposition in Equation 2, as suggested by Ravallion and Huppi (1991), there is no interaction term in the Shapley decomposition in Equation (5).

Data Setting. Our approach to poverty in this study is based on the method of basic food and non food needs, identified using data from the two Cameroonian household surveys; ECAM I and ECAM II that were conducted nationwide by the national institute of statistics in 1996 and 2001 respectively. They provided a clear picture of poverty and living conditions in Cameroonian households. This statistics is defined as a snap shot of activities (economic, social, demographic) in a particular place at a particular time. The household prices of ECAM 1 and ECAM 11 were harmonised in other to make them comparable.

Also 1996 total expenditures were scaled up, employing consumer price indices, to express them in terms of 2001 prices to enable us use the poverty line computed from the 2001 survey for the two periods (See, NIS 2002). The welfare indicator used is expenditures per adult equivalent. Since the composition of households by age was captured by the surveys, we followed previous studies in Cameroon to adopt a hybrid of the Oxford Equivalent Scale by attributing adult equivalent scales of 0.5 for household members aged below 15 years and 1 for those aged 15 and above. This adult equivalent scale is consistent with 2400 kcal per adult per day to exercise normal activity (See, Araar 2006, Baye 2007).

The standard of living indicator used for determining the poverty threshold is annual household consumption. The poverty threshold was thus set as 232547CFAF in 2001 versus 148000 in 1996. For purposes of comparing the poverty situation between 1996 and 2001, a new threshold of 185 490 CFAF per year per adult equivalent was estimated by the National Institute of Statistics. This is the poverty line used in the computation of this study.

EMPIRICAL RESULTS AND POLICY RECOMMENDATION

Evolution of the Head Count Index ($\Delta P0$). As seen in Table 1, the incidence of poverty in 1996 and 2001 at the national level was 53.3% and 40.2% respectively, using a poverty line of 185 490CFAF. These results show that the prevalence of poverty retreated by some 13.1% within five years. Disaggregating the prevalence of poverty at regional levels depicts similar tendencies.

The incidence of poverty at the regional level between 1996 and 2001 is highest in the forest region and in the Rural highlands. In these areas, however, there has been a noticeable decline in poverty: the incidence was 55.4% and 50.7% respectively in 2001 compare to 72.5% and 62.9% in 1996 representing a decline of 17.1% and 12.2% points respectively. On the contrary, the phenomenon has accentuated in the savannah region (especially in the North and Extreme North Provinces), where the incidence rose by 1.3% points. The survey results also shows that within this period, poverty is more pronounce in rural than in urban areas.

Table 1 – Regional incidence of poverty in 1996 and 2001 in Cameroon

Region	1996			2001			Difference in Contribution
	Proportion	Po	ACi	Proportion	Po	ACi	(2001)-(1996)
Yaounde	0.071 (0.010)	0.490 (0.041)	0.035 (0.006)	0.087 (0.006)	0.183 (0.020)	0.016 (0.002)	-0.307 (0.007)
Douala	0.098 (0.014)	0.373 (0.059)	0.036 (0.008)	0.097 (0.006)	0.185 (0.016)	0.018) (0.002)	-0.188 (0.009)
Other towns	0.129 (0.019)	0.363 (0.043)	0.047 (0.010)	0.164 (0.017)	0.262 (0.019)	0.043 (0.005)	-0.101 (0.011)
Rural forest	0.182 (0.022)	0.725 (0.028)	0.132 (0.018)	0.145 (0.022)	0.554 (0.039)	0.080 (0.015)	-0.171 (0.023)
Rural highlands	0.279 (0.040)	0.629 (0.058)	0.176 (0.034)	0.0262 (0.028)	0.507 (0.027)	0.133 (0.016)	-0.122 (0.037)
Rural savannah	.0.242 (0.031)	0.444 (0.097)	0.108 (0.025)	0.245 (0.028)	0.457 (0.033)	0.112 (0.016)	-0.013 (0.029)
Cameroon	1.000 (0.000)	0.533 (0.033)	-	1.000 (0.000)	0.402 (0.015)	-	0.131 (0.036)

Source: Computed by the author from ECAM I and ECAM II Survey Data. Notes: Poverty line = 185.490 CFA francs per adult equivalent per year. Figures in parenthesis represent standard errors, Po is head count index, ACi is the absolute contribution.

Decomposition of $\Delta P0$ to Within-and Between-Group Effects. Table 2 summits a sectoral decomposition of 13.1% points degrees of the head count index between 1996 and 2001. The absolute contributions of Yaounde, Douala and other towns to alleviating the incidence of poverty were favourable, but much lower in both cases.

In a nutshell while all the intra-sector effects contributed favourably, the inter sector population shift effects lessened the Yaounde, Douala, other towns and Rural savannah contributes to the declining incidence of poverty.

Table 2 – Regional decomposition of Δ*Po* into within and between group effects: Shapley Decomposition Approach

Region	1996-2001		
	Intra-sector effects	Inter-sector effects	Impact on Δ*Po*
Yaounde	-0.024 (0.000)	0.005 (0.000)	-0.019 (0.007)
Douala	-0.018 (0.000)	-0.000 (0.000)	-0.018 (0.009)
Other towns	-0.015 (0.000)	0.011 (0.000)	-0.004 (0.011)
Rural forest	-0.028 (0.000)	-0.024 (0.000)	-0.052 (0.023)
Rural highlands	-0.033 (0.000)	-0.009 (0.000)	-0.042 (0.037)
Rural savannah	0.003 (0.000)	0.001 (0.000)	0.004 (0.029)
Cameroon	-0.115 (0.000)	-0.016 (0.000)	-0.131 (0.000)

Source: Computed by the author from ECAM I and ECAM II Survey Data. Notes: Poverty line = 185 490 CFA francs per adult equivalent per year, figures in parenthesis represent standard errors, Δ*Po is change in head count index.*

Evolution of the Poverty-gap Index (ΔP_1). With respect to the results presented in table 3, an analysis of the depth of poverty shows that the two largest cities, Douala and Yaounde that accounts for about 20% of the country's total population, contributes only 13.3% points and 8.6% points as those classed as poor using a poverty line of 185 490 CFAF per adult equivalent. The fall in income gap disparity of Cameroon as a whole was felt in all the regions, while the fall in income gap disparity of the poor from the poverty line was largest in Yaounde and Douala, the savannah region had the least percentage fall.

Table 3 – Regional depth of poverty in 1996 and 2001 in Cameroon

Region	1996			2001			Difference in Contribution
	proportion	P1	ACi	proportion	P1	ACi	(2001)-(1996)
Yaounde	0.071 (0.010)	0.184 (0.023)	0.013 (0.003)	0.087 (0.006)	0.051 (0.007)	0.004 (0.001)	0.133 (0.003)
Douala	0.098 (0.014)	0.134 (0.027)	0.013 (0.004)	0.097 (0.006)	0.048 (0.005)	0.005 (0.001)	0.086 (0.004)
Other towns	0.129 (0.019)	0.121 (0.018)	0.016 (0.003)	0.164 (0.017)	0.078 (0.00	0.013 (0.002)	0.043 (0.004)
Rural forest	0.182 (0.022)	0.266 (0.043)	0.048 (0.007)	0.145 (0.022)	0.209 (0.028)	0.030 (0.007)	0.057 (0.010)
Rural highlands	0.279 (0.040)	0.229 (0.043)	0.064 (0.016)	0.262 (0.028)	0.209 (0.020)	0.055 (0.008)	0.02 (0.018)
Rural savannah	0.242 (0.031)	0.152 (0.037)	0.037 (0.009)	0.245 (0.028)	0.140 (0.014)	0.034 (0.005)	0.012 (0.010)
Cameroon	1.000 (0.000)	0.191 (0.017)	–	1.000 (0.000)	0.141 (0.009)	–	0.05 (0.019)

Source: Computed by the author from ECAM I and ECAM II Survey Data. Notes: Poverty line = 185 490 CFA francs per adult equivalent per year. Figures in parenthesis represent standard errors, PI poverty-gap index, ACi is the absolute contribution.

Decomposition of Δ*P1* into Within- and Between-Group. The results presented here are basically tracing the same story line as revealed in the analysis of the head count index. Here, there is a national decline in the poverty gap of 4.9% points, of this percentage decline, Yaounde accounted for 0.9%, Douala 0.8%, Other towns 0.2%, Rural forest 1.8%, Rural highlands 0.1% and Rural savannah 0.3% points.

A clear observation of regional decomposition of changes in the Poverty gap index into within and between group effects shows that between 1996 - 2001. In the same line the intra sector effects in the country was 4.3%. As in intra-sector contribution, the rural sector effects contributed more in the period 1996-2001 with contribution effects of 2% for Yaounde, 0% each for Douala and Rural Savannah, 0.4% each for Other towns and Rural highlands 0.9% for Rural forest respectively.

The inter sector effects with 0.7% contributes more favourably in explaining changes in the poverty-gap as compare to the intra sector effects with 4.3% points. The impact of poverty-gap is felt more in Rural forest (1.8%) and least felt in Rural savannah with 0.2% points. On the general scale there is an absolute decline in the poverty-gap between 1996 and 2001 and the same applied in both the intra sector effects and inter sector effects.

Table 4 – Regional Decomposition of Δ*P1* into Within-and Between-Group Effects: Shapley Decomposition Approach

Region	1996-2001		
	Intra-sector effects	Inter-sector effects	Impact on ΔP_1
Yaounde	-0.011 (0.000)	0.002 (0.000)	-0.009 (0.003)
Douala	-0.008 (0.000)	-0.000 (0.000)	-0.008 (0.004)
Other towns	-0.006 (0.000)	0.004 (0.000)	-0.003 (0.004)
Rural forest	-0.009 (0.000)	-0.009 (0.000)	-0.018 (0.010)
Rural highlands	-0.006 (0.000)	-0.004 (0.000)	-0.009 (0.018)
Rural savannah	-0.003 (0.000)	0.000 (0.000)	-0.002 (0.010)
Cameroon	-0.043 (0.000)	-0.007 (0.000)	-0.049 (0.000)

Source: Computed by the author from ECAM I and ECAM II Survey Data. Notes: Poverty line = 185.490 CFA francs per adult equivalent per day. Figures in parenthesis represent standard errors; Δ*P1 is change in poverty-gap index.*

Evolution of the Squared Poverty-gap Index (Δ*P2*). In Table 5, one notice that at the national level the severity of Poverty stood at 9.0% for 1996 and 7.2% for 2001. However despite these values, the severity of poverty retreated between this 1996-2001 periods for about 2%. From above statistical presentation, one can see clearly that in this period (1996-2001) Rural forest and Rural highlands experience more of poverty severity as compared to other regions. It can equally be notice that despite the weight of poverty inequality, poverty at the regional level retreated between 1996-2001 with Yaounde scoring 6.8%, Douala 4.3%, Other towns 2.1% Rural forest 1.5%, Rural highlands 0.3% and Rural Savannah by 1% respectively.

Table 5 – Regional inequality of poverty in 1996 and 2001 in Cameroon

Region	1996			2001			Difference in Contribution
	proportion	P2	ACi	Proportion	P2	ACi	(2001)-(1996)
Yaounde	0.071 (0.010)	0.089 (0.013)	0.006 (0.002)	0.087 (0.006)	0.021 (0.003)	0.002 (0.000)	0.068 (0.002)
Douala	0.098 (0.014)	0.063 (0.015)	0.006 (0.002)	0.097 (0.006)	0.020 (0.003)	0.002 (0.000)	0.043 (0.002)
Other towns	0.129 (0.019)	0.055 (0.009)	0.007 (0.002)	0.164 (0.017)	0.034 (0.003)	0.006 (0.001)	0.021 (0.002)
Rural forest	0.182 (0.022)	0.124 (0.011)	0.022 (0.003)	0.145 (0.022)	0.109 (0.023)	0.016 (0.005)	0.015 (0.006)
Rural highlands	0.279 (0.040)	0.109 (0.026)	0.031 (0.009)	0.262 (0.028)	0.112 (0.015)	0.029 (0.005)	-0.003 (0.010)
Rural savannah	0.242 (0.031)	0.072 (0.019)	0.017 (0.005)	0.245 (0.028)	0.062 (0.008)	0.015 (0.003)	0.01 (0.005)
Cameroon	1.000 (0.000)	0.090 (0.009)	–	1.000 (0.000)	0.070 (0.006)	–	0.020 (0.011)

Source: Computed by the author from ECAM I and ECAM II Survey Data. Notes: Poverty line = 185 490 CFA francs per adult equivalent per year. Figures in parenthesis represent standard errors, P2 is squared poverty-gap index, ACi is the absolute contribution.

Decomposition of Δ*P2* into Within-and Between-Group Effect. Table 6 traces the same story as Table 4 and 5. Thus considering intra-sector effects between 1996 and 2001, Yaounde contributed 0.5%, Douala 0.4%, Other towns 03%, Rural Savannah 0.2% respectively while the entire Cameroon economy contributed 1.7%. In the same line, the inter sector effects at the regional level was 0.1% for Yaounde, Douala is 0.0%, Other towns 0.02%, Rural forest 0.4% Rural highlands 0.2%, Rural Savannah 0.0% and 0.4% for the national territory respectively. From observation, though the percentages might change, the inter sector effects contributes favourably though the contribution of intra sector effects is non negligible.

However, considering the intra and the sector effects one can observed that regionally Yaounde contributed 0.4%, Douala 0.4%, Other towns 0.1%, Rural forest 0.6%, Rural highlands 0.1%, Rural Savannah 0.2% respectively for 1996-2001. Also during this same period the national territory of Cameroon contributed 0.1% to the intra and inter effects.

Table 6 – Δ*P2* into Within-and Between Group-Effect: Shapley Decomposition Approach

Region	1996-2001		
	Intra-sector effects	Inter-sector effects	Impact on Δ*P*2
Yaounde	-0.005 (0.000)	0.001 (0.000)	-0.004 (0.002)
Douala	-0.004 (0.000)	-0.000 (0.000)	-0.004 (0.002)
Other towns	-0.003 (0.000)	0.002 (0.000)	-0.001 (0.002)
Rural forest	-0.002 (0.000)	-0.004 (0.000)	-0.006 (0.002)
Rural highlands	0.001 (0.000)	-0.002 (0.000)	-0.001 (0.006)
Rural savannah	-0.002 (0.000)	0.000 (0.000)	-0.002 (0.005)
Cameroon	-0.017 (0.000)	-0.004 (0.000)	-0.021 (0.000)

Source: Computed by the author from ECAM I and ECAM II Survey Data. Notes: Poverty line = 185 490 CFA francs per adult equivalent per year, figures in parenthesis represent standard errors Δ*P2 is squared poverty-gap.*

Based on our analysis and in conformity with Baye (2006b), this observation is attributed to the importance of migration in the fight against poverty by the poor themselves. He suggested two possible transmission mechanisms that can explain this:

1. Remittances made by rural-urban migrants, who generally leave part of their family in rural areas and maintain active ties with them.

2. The rural consumption increasing effects of migration in the face of underemployment in rural agriculture, with or without remittances.

More so, we can outlined that the important result emanating from this study is that Rural forest and Rural highlands regions were hardest hit by poverty and inequality trends in Cameroon. This observation means that the income gap (differences) was so wide in Other towns, Rural forest and Rural highlands as compare to other regions. This difference can be explained as follows:

1. Natural heritage, whereby those who inherited properties receive an additional advantage which put them ahead of life as compare to those without this initial wealth.

2. Income distribution in this region is highly skewed this explains why the gap between the poor and the non poor is more pronounced. From our result, we suggest that policies and strategies for reducing poverty/inequality should place particular emphasis on the countryside and on a region-by-region approach such as decentralization, increase provision of rural extension services (roads, electricity, markets, portable water and etc).

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