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Sources of Income Inequality: Empirical Evidence from Cameroon[1]

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Abstract

The purpose of this paper is to carry out an empirical analysis of the sources of income inequality in Cameroon. The methods of quantile regression and total income inequality decomposition into population sub-groups are used to analyze the data of the third Cameroonian household survey (ECAM3). The results derived from decomposition analysis show that there exist considerable differences in the average consumption expenditure of households and in within-groups inequality. However, in spite of these differences, in all the groups considered, between-groups inequality only explains a small proportion of total inequality.

Quantile regression analysis reveals the net positive effects of human resources and of social and physical capital on the level of consumption expenditure per adult equivalent at all the points of the expenditure distribution. The study also reveals a number of demographic effects in the urban and rural areas among which the most significant is caused by household size which contributes to the reduction of the household consumption expenditure across all the quantiles of the expenditure distribution. Moreover, regions where households reside also affect household consumption expenditure. Those who work in the services and trade sectors of the economy are better well-off than those who work in the other sectors of the economy.

Keywords: *Inequality; decomposition analysis; population subgroups; quantile regressions, Cameroon*
JEL Classification: *O18, D31, D63, C31 ,O55*

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Introduction

The purpose of this paper is to carry out an empirical analysis of the sources of income inequality in Cameroon, using both the methods of quantile regression and of the analysis of total income inequality decomposition into population sub-groups. The decomposition of inequality indexes through household groups or sources of income is useful in the estimation of the contribution of each component of total inequality. This may make it possible for decision makers to conceive efficient policies likely to reduce disparities in the distribution of income by using targeting tools.

The literature on the decomposition of income inequality measures is vast and has contributed to a large extent, to the understanding of the determinants of inequality and to the detection of the relative contributions of different factors[2] to total inequality. Studies of inequality that use the technique of decomposition by population sub-groups include, for instance, the study carried out by Bhattacharya and Mahalanobis (1967). These authors decomposed the Gini coefficient and the standard deviation of logarithms for the year 1957-58 based on household consumption expenditure survey data, and found that a quarter of total inequality was explained by the between-States inequality component, while the remaining three-quarters of inequality were explained by the within-States inequality component. Mehran (1974), Mangahas (1975), and Pyatt (1976) decomposed Gini coefficients for the cities of Iran, the regions of the Philippines and the urban/rural regions of Sri Lanka, respectively. Glewwe (1986), as well as Fields and Schultz (1980) used decomposition techniques to analyze inequality in Sri Lanka and in Columbia respectively. All of these studies more or less agreed on the lack of significance of regional effects on a country's total inequality, even with the existence of many highly pronounced inter-regional disparities[3].

Other studies have rather used regression analysis in the decomposition of inequality. The decomposition of Fields (1997), for instance, estimates the share of factors that contribute mainly to the determination of income inequality. This method consists in carrying out a set of regressions. The alternative approach is the quantile regression method in which, instead of estimating the mean of a conditional dependent variable using the values of independent variables, we estimate the median, that is, we minimize the sum of absolute residuals instead of the sum of squared residuals as in ordinary least squares regressions. It is possible to estimate different percentiles of dependent variables, and thus to obtain the estimates of different parts of the income or expenditure distribution (Deaton, 1997). Nguyen et al. (2007), for instance, used the quantile regression method to analyze urban-rural consumption expenditure inequality

[2] It is well known that multiple factors in combinations determine the existing level of inequality in a given country at a point in time. Each egalitarian economist (acting for political goals) should be interested in the quantification of the relative contributions of the different factors that cause inequality, and could concentrate more on factors that can be subjected to an efficient policy treatment.

[3] Other studies that used the decomposition of inequality include, for instance, Mookherjee and Shorrocks (1982), Ikemoto (1985), Ikemoto (1991), Ching (1991), Tsakloglou (1993), Tsui (1993), Jenkins (1995), Cowell, (1980), Bourguignon, (1979), **and** Shorrocks, 1980 and 1984).

in Vietnam in 1993 and 1998. The authors found that the income gap in 1993 was mainly explained by differences in the co-variables, while in 1998 the income gap was due to differences in the returns across regions, and for both years, the returns due to the co-variables were larger at the top of the distribution of household consumption expenditure per capita.

There exist a number of studies on inequality in Cameroon which have applied one or the other of the inequality decomposition methods mentioned above. For instance, Baye and Epo (2013) applied the inequality decomposition approach based on regression to explore the determinants of income inequality in Cameroon, using the 2007-Cameroonian household survey data. Their results show that the income sources attributable to education, health, urban residence, household size, the proportion of active household members, formal sector workers and ownership of agricultural land, are in that order the main determinants of household income inequality in Cameroon.

Chameni and Miamo (2012) analyzed consumption expenditure inequality in Cameroon over the period 1996-2007, using the Shapley-Shorrocks method of decomposing inequality into population sub-groups and by income/expenditure sources. Their results show that food and housing expenditures explain inequality according to income sources, while the expenditure distribution is more unequal among men household heads in the urban area and among those aged 31 and 50 in the case of decomposition into sub-groups of the population

Fambon (2010) examined the evolution of inequality in the distribution of income in Cameroon between 1984 and 1996 by breaking inequality down into within- and between-groups inequality components, using the Gini coefficient decomposition method based on the Shapely-value, and total expenditure per adult equivalent as welfare indicator to determine the contributions of these inequality components to total inequality at the national level. The decomposition is carried out according to areas, strata, educational level, gender, and the household head**--s** age group. The results of this study show that total expenditure inequality fell slightly between 1984 and 1996, and that the contributions of within-groups inequality components to total inequality for the five socio-economic characteristics mentioned above, predominantly explain total inequality at the national level in Cameroon**.**

Araar (2006) used both the Shapley-value and analytical approaches to carry out the decomposition of the Gini coefficient into population sub-groups. His results have shown that the Cameroonian rural area was contributing less than the urban area to total inequality in Cameroon. Decomposition by expenditure components has shown that the non-food expenditures component explained about two thirds of the country's total inequality.

Baye and Fambon (2002) examined the characteristics of inequality in Cameroon and carried out its decomposition with the help of the generalized entropy class of inequality indices, using the 1996-Cameroonian household survey data gathered by the National Bureau of Statistics of Cameroon. The results of this study show that inequality is more pronounced in the urban area and among the more educated, households headed by women, households whose heads are young, as well as among formal sector employees and qualified employees. Inequality is explained predominantly by the within-groups

inequality components while the between-groups inequality components' contributions to total inequality are marginal in some cases and negligible in others.

Let us note in passing that the aforementioned studies did not analyze the determinants of income inequality using the quantile regression method, which have been proved to be a useful tool when the researcher need to examine the partial effects of particular independent variables by observing how they differ across the whole distribution and not just at the mean.

The rest of the paper is organized as follows: Section 2 presents the methodology and data used in the study. Section 3 analyzes the results of the study. Finally, the conclusion and policy implications of the study's results are presented.

2. Methodology

In this study, we analyze the determinants of inequality in household expenditures using both the decomposition of inequality into sub-groups of the population and quantile regression. Decomposition into sub-groups of the population makes it possible for us to see the extent to which the level of total inequality may be attributed to inequality between population sub-groups or to inequality within population sub-groups. As to quantile regression, it helps us analyze the determinants of income inequality at different points of the income distribution.

2.1 Decomposing Inequality by Population Subgroups

In this study we adopt the generalized entropy (GE) class of inequality measures (Shorrocks, 1980, 1984), which may be written as follows:

$$GE = I(y) = \begin{cases} \sum_{i=1}^{n} f(y_i)\left(\left(\frac{y_i}{\mu}\right)^{c} - 1\right), c \neq 0,1 \\ \sum_{i=1}^{n} f(y_i)\left(\frac{y_i}{\mu}\right)\log\left(\frac{y_i}{\mu}\right), c = 1 \\ \sum_{i=1}^{n} f(y_i)\left(\frac{\mu}{y_i}\right), c = 0 \end{cases} \quad (1)$$

In the preceding equation, $f(y_i)$ is the share of population in household i out of total population, y_i is the consumption expenditure per adult equivalent of household i, while μ represents average consumption expenditure per adult equivalent; n is total population, and c is a parameter selected by the user[4].

[4] The low values of c are associated with a greater sensitivity to inequality among the poor, and the higher values of c give more weight to inequality among the rich. For $c = 1$, we obtain the well-known entropy measure of Theil $GE(1)$; for $c = 0$, we obtain the mean log deviation $GE(0)$; and for $c = 2$, we obtain the squared coefficient of variation $GE(2)$.

The key characteristic of the GE measure is that it is additively decomposable. For K exogeneously given groups indexed by g,

$$GE = I(y) = \sum_{g}^{K} w_g I_g + I(\mu_1 e_1, ..., \mu_K e_K) \quad , \qquad (2)$$

Where,

$$w_g = \begin{cases} f_g \left(\frac{\mu_g}{\mu} \right)^c , c \neq 0,1 \\ f_g \left(\frac{\mu_g}{\mu} \right), c = 1 \\ f_g , c = 0 \end{cases}$$

Where, I_g is the inequality level of the g^{th} group, μ_g is the mean of the g^{th} group, and e_g is a vector of the 1s whose width is n_g, where n_g is the population of the g^{th} group. If n is the total population of all the groups, then $f_g = \left(\frac{n_g}{n} \right)$ is the population of the g^{th} group in the total population. The first term on the right hand side (RHS) of Equation (2) represents within-groups inequality, and $\left(w_g I_g / I(y) \right) * 100$ is the contribution of the g^{th} group to total inequality. The second term on the RHS of Equation (2) is the between-groups component of total inequality[5].

For all the values of parameter c, the GE measure is additively decomposable in the sense formalized by Shorrocks (1980, 1984). This property makes it possible for us to consider the contribution of the different components of total inequality. For the values of c lower than 2, the measure is sensitive to income transfers (Shorrocks and Foster, 1987) in the sense that it is more sensitive to transfers in the lower part of the distribution (i.e. the tail of the distribution) than those located at the upper part of the distribution.

For the analysis of the decomposition of inequality in this paper, we will use the mean log deviation ($GE(0)$), the entropy index of Theil ($GE(1)$) and the squared coefficient of variation) ($GE(2)$). These inequality measures have more desirable properties for decomposition analysis, and they have been used in the seminal studies of Bourguignon (1979) and (Jenkins 1995).

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[5] The decomposition of a cross section of a population at a point in time is called «static decomposition».

The mean log deviation $GE(0)$ is mainly sensitive to expenditures in the lower part of the distribution; $GE(2)$ is more sensitive to expenditures around the upper part of the distribution, while $GE(1)$ manifests a constant receptivity across all the ranges of expenditures. For reasons of comparison, we will also present the values the global Gini coefficient and those of the sub-groups considered[6].
Let-s note in passing that the Gini coefficient is more sensitive to expenditures lying around the middle of the expenditure distribution.

2.2 Quantile Regressions

We use quantile regression models to carry out the econometric estimation of determinants of household income inequality. The classical quantile regression (CQR) model introduced for the first time by Koenker and Bassett (1978), may be considered as an extension of the ordinary least squares (OLS) regression model. More specifically, the OLS model only estimates the extent to which predictor variables are related to the average value of the dependent variable. The CQR model, on the other hand, helps the researcher to model the predictors at different points of the dependent variables. The CQR model therefore completes and improves the OLS regression approach. The « boostrap » and asymptotic approaches are often used in CQR modelling to calculate the covariance of the correlation matrices of parameter estimates. The use of the CQR model therefore provides three mainly advantages: i) it precisely depicts the stochastic associations between random variables; ii) it also yields robust estimates when the dependent variable is not normally distributed; and iii) it minimizes the impact of outliers in the dependent variable, these outliers being a usual occurrence in the data of developing countries like Cameroon[7] (Koenker and Bassett, 1978)[8]. These

[6] The Gini coefficient (G) is an inequality index linked to the Lorenz curve, and it is expressed mathematically as follows :

$$G = \int_0^1 \left(1 - L(p)\right) dp$$

or, $$G = \frac{1}{2n^2\mu} \sum_i \sum_j \left| y_i - y_j \right|$$

Where, μ is the mean income (or expenditure) of the population, while y_i and y_j are the incomes (expenditures) of individuals i and j. The Gini index computes the average distance between the cumulative classes of the population and the cumulative living standards. It is equal to twice the area lying between the Lorenz curve and the perfect equality line. The Gini coefficient varies from 0 to unity, and when it is equal to zero, every individual in the population has the same level of income, thus indicating the absence of inequalities or a situation of perfect equality. In contrast, when the Gini coefficient is equal to unity, the implication is that a single individual monopolizes all of society's income, while everybody else gets nothing, thus indicating a situation of perfect inequality

[7] This is the case because in quantile regressions, the residuals to be minimized are not squared like in OLS regressions, and as a consequence, outliers receive less emphasis. If the error term of the regression is not normally distributed, the use of quantile regressions may be more efficient than the use of OLS regressions (Buchinsky, 1998).

methodological merits permit the associations of independent co variables with the response variable to vary according to the site, the scale and the form of the response of the distribution.

Quantile regressions of error terms use the minimization procedure of the absolute sum of errors, whereas OLS regressions minimize the sum of residuals squared. The estimator in quantile regressions is also called the «Least Absolute Deviations (LAD) estimator ». The median of regression coefficients may be estimated by minimizing the following equation:

$$\Phi = \sum_{i=1}^{n} \left| \ln(y_i) - x_i^{'}\beta \right| = \sum_{i=1}^{n} \left(\ln(y_i) - x_i^{'}\beta \right) \operatorname{sgn}\left(\ln(y_i) - x_i^{'}\beta \right) \qquad (3)$$

where, $\ln(y_i)$ is the natural logarithm of the expenditure per adult equivalent of the i^{th} household; $\operatorname{sgn}(a)$ is the sign of a which takes on the value of 1 if a is positive and -1 if a is negative or equal to zero ($a \leq 0$), where a is the difference between the real value and the expected value of $\ln(y_i)$ for the i^{th} household; x_i represents a column vector of realizations on k explanatory variables, and β, the column vector corresponding to unknown parameters.

In the present study, it is better to use the quantile regressions of the error terms than regressions at the median, and the former may be defined by minimizing the following equation:

$$\begin{aligned} \Phi_q &= -(1-q) \sum_{\ln y \leq x^{'}\beta} \left(\ln(y_i) - x_i^{'}\beta \right) + q \sum_{\ln y \geq x^{'}\beta} \left(\ln(y_i) - x_i^{'}\beta \right) \\ &= \sum_{i=1}^{n} \left[q - 1\left(\ln(y_i) \leq x_i^{'}\beta \right) \right] \left(\ln(y_i) - x_i^{'}\beta \right) \end{aligned} \qquad (4)$$

where, $0 < q < 1$ is the quantile of interest[9], and the value of function $1(z)$ is equal to 1 when declaration z is true and 0 if not.

In the context of the models specified in equations (1) and (2), quantile regressions help us estimate the parameters at any quantile[10]. These estimated parameters make it possible for us to establish the magnitudes of the *ceteris paribus* effects of the co

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[8] This CQR approach appears to be of considerable intuitive interest and could also, in case heteroscedasticity is present, have properties that are better than those of the ordinary least squares approach (see Deaton (1997) for more details).

[9] Several notable sites are the first quartile *Q*(0.25), the median *Q*(0.5), the third quartile *Q*(0.75), as well as the first and the last deciles Q(0.1) and Q(0.9), respectively. Researchers may specify any value of q to implement quantile regressions of error terms.

[10] The interpretation of parameter estimates is similar to those of OLS models but they are slightly different from those of OLS models (Buhai, 2005; Koenker & Hallock, 2001). In OLS models, the coefficient of a specific predictor X, represents the expected change in the dependent variable which is associated with a unit change in X. On the other hand, the coefficient of X in the qth quantile may be interpreted as the marginal change (relative to the value of the qth quantile of the dependent variable) which is due to a unit change in X. Since *q* may be specified as several values lying between 0 and 1, coefficient estimates may be numerous, but here we report only those quantiles that are commonly used, such as 0.10, 0.5 and 0.75.

variables at different points of the conditional distribution ln(y), and in this study we focus on the 10th, 50th and 90th quantiles[11]; this helps us concentrate on the impact of the characteristics of poor households in the lower part of the welfare ratio distribution (i.e. the lower quantiles) and on the relatively-rich households in the upper part of the distribution of the welfare ratio (i.e. the upper quantiles).

2.3 The Data

The data used in this study is derived from the Cameroonian household survey ECAM3 which is representative at the national level, and was conducted in 2007 by the National Institute of Statistics (NIS) of Cameroon.

The basis of the ECAM3 survey is that of the cartography of the General Census of the Population and the Habitat (GCPH 3) carried out in 2003. The survey sets 32 strata apart. The two largest cities of the country, namely Douala and Yaoundé were considered as two different strata. Each of the 10 provinces of Cameroon was subdivided into three strata, namely an urban, semi-urban, and rural stratum respectively (which add up to 30 strata in all). The draw was set at two degrees in all the zones and all the strata. At the first degree, the count zones (CZs) were drawn proportionally to the size of their population, and households with equal probabilities were drawn at the second degree, Survey workers planned to investigate 12.600 households in order to have a basis of 12 000 households at their disposal. But only 11391 households were surveyed with success.

Data gathering lasted for 3 months, from September to December 2007. The survey questionnaire was based on 13 modules, namely: 1) Household composition and characteristics; 2) Health; 3) Education; 4) Employment (including the labour of children aged 5 to 17) and the incomes derived from these activities; 5) Anthropometrics and vaccine cover; 6) Housing and equipment; 7) Migration of households; 8) Accessibility to basic infrastructures; 9) Perceptions of poverty; 10) Household capital; 11) Retrospective non food household expenditures; 12) Daily household expenditures; and 13) The price constituent.

Let's note that this paper uses household consumption expenditure as inequality measure instead of household income. Income may not be a good measure of inequality. The evaluation of income is often problematic. Seasonality constitutes a problem for income; in particular, agricultural income may be extremely volatile. Given the fact that households may smooth out their consumption, consumption expenditures may be a better welfare measure[12]. Practically speaking, it is difficult to obtain a more precise measure of income than expenditures mainly because the majority of households in Cameroon are self-employed. The consumption expenditures variable used in this paper was constructed from the data of the third Cameroonian household survey (ECAM3) by a team made up of researchers of the National Institute of Statistics (NIS) of Cameroon

[11] This means that we will estimate the relationship between the welfare ratio and its determinants at these different quantiles and will examine whether the relationship is homogeneous or heterogeneous across these quantiles of the welfare distribution.

[12] See, for instance, Deaton and Muellbauer (1980), Deaton (1997) for a discussion on the choice between household income and household consumption expenditures as indicator of welfare.

and Work Bank research personnel. The aggregated consumption expenditures variable comprises food expenditures (including meals eaten outside the household), non monetary food consumption resulting from home consumption and donations; the acquisition value or (purchase price) of non durable goods and services; an estimation of the use value of durable goods, and the imputed value of housing for those households who are owners or housed gratuitously by a third party (for more details on the estimation of these forms of consumption, see NIS (2007)).

Given that households have different sizes in the number of children and adults, we use the distribution of total consumption expenditure per adult equivalent to measure inequality. The adult equivalent scale used by the NIS is 1 for each adult and 0.5 for each child.

3. Empirical Results

3.1 Results of the Inequality Decomposition by Population Sub-groups

Tables 1, 2, 3, 4 and 5 present inequality decomposition results. Each table reports decomposition values as well as the values of average household consumption expenditure and of the shares of population for each sub-group.

By observing Table1, it seems that the geographic zone is the key factor which explains Cameroonian between population sub-groups. Decomposition between urban and rural area shows that average household consumption expenditure is higher in the urban than in the rural area, while the share of population is higher in the rural than in the urban area. The values of the class of GE measures is also interesting to comment, all the GE(0), GE(1) and GE(2) yield higher values in the urban than in the rural area. The same thing holds for the Gini coefficient. Knowing that GE (0) and GE (1) are more sensitive in the lower part of the distribution, then GE (2) is more sensitive in the upper part of the distribution, and we may conclude that in 2007 inequality was higher in the urban area both among the poor and the rich. However, consumption expenditure inequality in the urban area is lower than inequality at the national level.

The indexes used for between-groups and within-groups inequality decomposition explain a share of total inequality. All these indexes show that not less than 27% of total inequality is attributable to between-groups inequality. The largest contribution of within-groups inequality (84%) to total inequality is given by GE (2) and the smallest contribution (73%) is given by GE (0). The policy implication of this result is apparent. If inequality between these regions were eliminated (as far as the average household consumption expenditure is concerned) while within-regions inequality remained the same, total inequality would not be reduced by more than 27 %. As a consequence, any policy not targeted on the reduction of within-regions inequality in each region would have only a limited impact in the reduction of total inequality

Table 1 *: Inequality Decomposition by Areas, 2007*

Areas	**Share Population**	**Mean Total Expenditure p.a.e in cfa francs**	***G***	$GE(0)$	$GE(1)$	$GE(2)$

Rural	0.6469	313 338	0.3223	0.1666	0.1875	0.2694
Urban	0.3531	662 289	0.3519	0.2056	0.2287	0.3475
All groups	1.00	439 787	0.3896	0.2477	0.2787	0.4449
Within-groups (% share)				0.1804 (73%)	0.2097 (75%)	0.3721 (84%)
Between-groups (% share)				0.0673 (27%)	0.0691 (25%)	0.0728 (16%)

Source: *Calculations of the author using expenditure data drawn from the ECAM3 household survey conducted by the National Institute of Statistics (NIS) of Cameroon.*

Examination of Table 2 shows substantial differences in the average household consumption expenditure between the regions of the country. For instance, the average household consumption expenditure was higher in Douala and Yaoundé. The lowest consumption expenditures were recorded in the Far-North and the North. Inequality varies significantly between these regions. The estimates of all indexes suggest that the most unequal regions are the regions of the Northwest, the Far-North, and the North, whereas the lowest inequalities appear in the regions of «the West» and the « Centre ». Examination of the values of the GE indicators shows that the interesting value is that of GE (2) for the North region which is the highest of all the regions. The high level of inequality explained by GE (2) highlights the existence of very well-off households among the very poor population of this area.

Decomposition analysis shows that only a small share of total inequality may be attributed to between-regions inequality. In particular, the relevant estimates, as far as the contribution of between-groups inequality to total inequality is concerned was 24% for GE (0), 25% for GE(1) and 16% for GE(2). As a consequence, more than 75% of total inequality is attributable to within-groups (regions inequality in these regions). Since a higher percentage of total inequality is attributed to within-groups inequality, efforts for reducing this type of inequality are likely to contribute significantly to total equality. This type of information may provide an important guide in the conception of policies who purpose is the reduction of inequality and eventually of relative poverty.

Table 2 *: Inequality Decomposition by Regions, 2007*

Regions	**Share Population**	**Mean Total Expenditure p.a.e in cfa francs**	**G**	$GE(0)$	$GE(1)$	$GE(2)$
Douala	0.0996	745 132	0.3387	0.1872	0.2173	0.3361
Yaoundé	0.0960	761 813	0.3315	0.1815	0.2107	0.3339

Adamaoua	0.0518	349 144	0.3375	0.1827	0.2120	0.3131
Center	0.0763	354 190	0.2807	0.1268	0.1413	0.1907
East	0.0466	339 014	0.3288	0.1719	0.1899	0.2602
Far-North	0.1811	285 932	0.3652	0.2124	0.2507	0.3853
Coast-T	0.0350	413 866	0.3185	0.1663	0.1925	0.2858
North	0.0985	305 186	0.3533	0.2012	0.2465	0.4048
North-West	0.1014	367 278	0.3824	0.2354	0.2765	0.4494
West	0.1058	415 661	0.2973	0.1437	0.1580	0.2117
South	0.0324	458 844	0.3458	0.1987	0.2361	0.3906
South west	0.0755	472 595	0.3324	0.1808	0.1968	0.2811
All groups	1.00	439 787	0.3896	0.2477	0.2787	0.4449
Within-group (% share)				0.1865 (76%)	0.2134 (75%)	0.3725 (0.84%)
Between-group (% share)				0.0612 (24%)	0.0654 (25%)	0.0724 (16%)

Source: *Calculations of the author using expenditure data drawn from the ECAM3 household survey conducted by the National Institute of Statistics (NIS) of Cameroon.*

Table 3 below presents the estimates of differences in between- and within- households' inequality according the age of the household head. The estimates of all the inequality indexes show that households whose heads belong to the age group « 50 years and more» constitute the group that has the highest income inequality. This group is also the one that has the highest average household consumption expenditure. The lowest inequality was estimated in households whose heads were aged 35 or less. Moreover, decomposition of total inequality into between- and within-age groups' inequality components shows that the between-groups inequality component only explains a small share of total inequality, thus indicating that the disparities between age groups were not significant in total expenditure inequality. This result shows that it is hopeless to count on policies whose objectives are to reduce inequality disparities among age groups. By contrast, the within-age groups' inequality contributed substantially to the explanation of total inequality. This result suggests that any inequality reduction policy targeting within-age groups' inequality would be likely to reduce inequality in the country more effectively.

Table 3 : *Inequality Decomposition by Age of the Household Head, 2007*

Age Group	**Share Population**	**Mean Total Expenditure p.a.e in cfa francs**	**G**	$GE(0)$	$GE(1)$	$GE(2$
< 35	0.3114	524 760	0.3759	0.2333	0.2505	0.3819

35-50	0.2991	423 024	0.3827	0.2396	0.2640	0.4015
50 +	0.3871	383 428	0.3963	0.2566	0.2913	0.4826
All groups	1.00	439 787	0.3896	0.2477	0.2787	0.4449
Within-group (% share)				0.2416 (97.6)	0.2727 (97.9)	0.4469 (98.67)
Between-group (% share)				0.0060 (2.4)	0.0060 (2.2)	0.0059 (1.32)

Source: *Calculations of the author using expenditure data drawn from the ECAM3 household survey conducted by the National Institute of Statistics (NIS) of Cameroon.*

The examination of four inequality indexes in Table 4 below shows that inequality among male household heads is not very different from inequality at the national level, while inequality among female household heads is slightly more pronounced, when using the Gini coefficient and $GE(0)$.

The design of gender-sensitive policies requires the breakdown of inequality according to the gender of the household head. As indicated by the data in Table 4 below, gender inequality is not a major factor in overall expenditure inequality, because the between-groups inequality amounted only to less than 2 per cent of total inequality. In other words, the elimination of gender inequality will not reduce total expenditure inequality by very much. By contrast, the contribution to within-genders inequality remained a significant factor in explaining inequality in 2007.

Table 4 : *Inequality Decomposition by Gender of the Household Head, 2007*

Gender	**Share Population**	**Mean Total Expenditure p.a.e in cfa francs**	**Gini**	$GE(0)$	$GE(1)$	$GE(2)$
Male	0.7907	430 693	0.3883	0.2460	0.2766	0.4421
Female	0.2093	475 233	0.3899	0.2478	0.2803	0.4532
All groups	1.00	439 787	0.3896	0.2477	0.2787	0.4449
Within-group (% share)				0.2464 (99.48)	0.2774 (99.50)	0.4515 (99.70)
Between-group (% share)				0.0013 (0.52)	0.0014 (0.50)	0.0013 (0.29)

Source: *Calculations of the author using expenditure data drawn from the ECAM3 household survey conducted by the National Institute of Statistics (NIS) of Cameroon.*

Finally, differences in inequality levels were also found among household groups classified according to the educational level of the household head (see Table 5 below). The estimates of all the indexes show that the highest inequality level was observed in the group of households whose heads had a higher educational level.

On the whole, the contribution of the between-groups inequality component to aggregate inequality in these groups which were classified according to the household heads educational level, was estimated to be 27.9% for GE (0), 27.6% for GE(1) and 28% for GE(2); the latter estimates were the highest relevant estimates of the between-groups inequality component that we have found up to now. These results indicate the role of education in consumption expenditures differences. In spite of this, the elimination of differences in consumption expenditures between these household groups would only have a limited impact on the reduction of total inequality. In other words, a policy that would eliminate differences in average consumption expenditures among educational categories while leaving inequality in consumption expenditures among the households of each group unchanged could not reduce total inequality by more than 28%.

Table 5*: Inequality Decomposition by the Educational Level of the Household Head, 2007*

Education	**Share Population**	**Mean Total Expenditure p.a.e in cfa francs**	**G**	$GE(0)$	$GE(1)$	$GE(2)$
No education	0.3036	282 914	0.3296	0.1739	0.2041	0.3249
Primary school	0.3439	372 757	0.3275	0.1730	0.1850	0.2468
Secondary 1st cycle	0.1787	482 804	0.3261	0.1745	0.1892	0.2873
Secondary ,second cycle	0.1135	641 625	0.3318	0.1809	0.1915	0.2571
Higher Education	0.0603	1 031 748	0.3797	0.2409	0.2634	0.3921
All groups	1.00	439 787	0.3896	0.2477	0.2787	0.4449
Within-groups (% share)				0.1785 (72.1)	0.2017 (72.4)	0.3620 (79.6)
Between-groups (% share)				0.0691 (27.9)	0.0770 (27.6)	0.0908 (20.4)

*Source**:** Calculations of the author using expenditure data drawn from the ECAM3 household survey conducted by the National Institute of Statistics (NIS) of Cameroon***.***

3.2 Quantile Regressions Results

3.2.1 The Variables of the Model

The dependent variable is the logarithm of the « welfare ratio » which is a proxy for the standard of living. The welfare ratio is defined as consumption expenditures per adult

equivalent deflated or divided by a national poverty line[13]. This indicator reflects living standards as a multiple of the poverty line. A unitary value for the welfare ratio means that the household has its level of consumption expenditure per adult equivalent exactly at the level of the poverty line. A higher welfare ratio value means higher living standards.

The choice of explanatory variables listed in Table 6 below is guided both by economic theory and by the empirical context. We have therefore retained the following exogenous variables by specifying our regression models: a) household composition variables (household size), the age groups of household heads, their genders and matrimonial statuses (married) ; b) the educational level of household heads; c) the area of cultivated land and social and participation capital; d) access to infrastructures measured by the time spent to reach an infrastructure (i.e. the time spent to reach a food market, an asphalted road; and e) the region of residence of the household head.

The other variables introduced in the model are the following: « a household member belongs to an association»; «the household head has a spouse »; « the household head obtained a business credit or loan»; the activity sector of the household head, and the institutional sector of the household head.

Three age groups of household heads are included in explanatory variables, namely: the household heads age groups of 30-39 years, 50-59 years, and of 60 years and more.

Household size is another demographic variable used in the study. It represents the number of individuals living in the same household, and it is a continuous variable.

The gender of the household head is another factor which potentially affects the income of the household, and hence the consumption expenditure of the household. Gender is included among the regressors of the model by the variable called «the household head is a woman».

Moreover, we have included education among the exogenous variables of our model. To capture the impact of education, five dummy variables corresponding to the educational level achieved by the household head have been created; they included the following category-specific variables: « no education», « primary education», « first-cycle secondary education», « second-cycle secondary education», and « higher education».

With regard to the occupation of the household head, dummy variables are included in the model in terms corresponding to four occupational groups such as executives, self-employed, unqualified workers, managers (bosses). Similarly, the employment branches in which the household head works are also correlated with the consumption expenditure of the household. Four sectors are included among the regressors, namely the industrial sector, the trade sector and the services sector.

[13] *The welfare ratio and its theoretical properties are discussed in a study by Blackorby and Donaldson (1987). More practical applications of the welfare ratio may be found in Ravallion (1998), as well as Deaton and Zaidi (2002).

* The national poverty line of 2007, used in this study, is 269 443 CFAF per adult equivalent per year.

The credit variable was included among the explanatory variables of the model to test the assumption according to which the household heads who have access to credits (loans) are likely to be less poor. We also included among explanatory variables the physic asset called «log land» which is defined as the area of land used by the household either as property in the urban area or as agricultural land in the rural area.
To capture the impacts of access to road infrastructures on household consumption expenditure, three variables are included among the explanatory variables of the model, namely: the time spent to reach a food market and the time spent to reach an asphalted road.

In addition to variables of access to infrastructure, we have also created two other variables that are likely to affect the consumption expenditure of households: there is one variable to measure the matrimonial status of the household head, while the other variable captures the participation of the household head in an association.

Finally, to take account of regional heterogeneity, 12 regional binary regional variables representing the region where the household resides were created. The dummy variable takes on the value of 1 if the household lives in a given region, and the value of 0 of not.

The regional dummies are the following: region1 (Douala), region2 (Yaoundé), region3 (Adamaoua), region4 (Centre), region5 (East), region6 (Extreme-North), region7 (Littoral) region8 (North), region9 (North-West), region10 (West), region11 (South), and region12 (South-West). The expected signs of the regional binary variables are ambiguous. However, we expect some of these regional binary variables to have positive signs in case some of the regions retained in the study have more economic activities likely to provide residents with employment.

Several of the variables mentioned above are category-specific (i.e. dummy variables). Consequently, in running our regressions, it is necessary to leave one category of variables as a group of reference. Such categories are: region 2 (Yaoundé), male household head, the household head has no spouse; the household head has no education; one household member is not a member of an association; and the household head has not obtained a credit, etc.

Table 6 below presents the dependent and exogenous variables used in the study to represent the characteristics of the household and of the community in the regression model.

Table 6: *Descriptive statistics of the Model's variables*

Variables's description	**Urban**			**Rural**		
	Obs	Mean	Std. Dev	Obs	Mean	Std. Dev
Log of welfare ratio	**6365**	**12.91**	**0.657**	**5026**	**12.346**	**0.599**
Douala	**6365**	**0.164**	**0.37**	**5026**	0	0
Adamaoua	**6365**	**0.048**	**0.215**	**5026**	**0.053**	**0.225**
centre	**6365**	**0.040**	**0.197**	**5026**	**0.107**	**0.309**
East	**6365**	**0.042**	**0.201**	**5026**	**0.063**	**0.243**
Extreme-North	**6365**	**0.096**	**0.295**	**5026**	**0.172**	**0.377**
littoral	**6365**	**0.056**	**0.230**	**5026**	**0.055**	**0.228**
North	**6365**	**0.058**	**0.234**	**5026**	**0.079**	**0.271**
Northwest	**6365**	**0.099**	**0.299**	**5026**	**0.168**	**0.374**
West	**6365**	**0.096**	**0.295**	**5026**	**0.135**	**0.342**

South	**6365**	**0.040**	**0.196**	**5026**	**0.055**	**0.229**
Southwest	**6365**	**0.095**	**0.293**	**5026**	**0.108**	**0.311**
household size	**6365**	**4.430**	**3.035**	**5026**	**4.574**	**3.108**
female	**6365**	**0.258**	**0.438**	**5026**	**0.277**	**0.447**
household head has a spouse	**6365**	**0.493**	**0.499**	**5026**	**0.484**	**0.499**
Age of head of household: 30-39 years old	**6365**	**0.292**	**0.454**	**5026**	**0.224**	**0.417**
Age of head of household: 50-59 years old	**6365**	**0.227**	**0.419**	**5026**	**0.199**	**0.399**
Age of head of household: 60 years or older	**6365**	**0.126**	**0.332**	**5026**	**0.163**	**0.370**
Level of Head's edu: primary	**6365**	**0.294**	**0.455**	**5026**	**0.380**	**0.485**
Level of Head's edu: secondary 1rst cycle	**6365**	**0.231**	**0.422**	**5026**	**0.154**	**0.361**
Level of Head's edu: secondary 2nd cycle	**6365**	**0.205**	**0.403**	**5026**	**0.086**	**0.280**
Level of Head's edu: higher	**6365**	**0.121**	**0.327**	**5026**	**0.026**	**0.159**
Industrial sector	**5594**	**0.174**	**0.379**	**4725**	**0.080**	**0.271**
Trade sector	**5594**	**0.197**	**0.398**	**4725**	**0.060**	**0.238**
Services sector	**5594**	**0.479**	**0.499**	**4725**	**0.143**	**0.350**
Executives	**5596**	**0.104**	**0.306**	**4725**	**0.031**	**0.175**
skilled employees	**5596**	**0.236**	**0.424**	**4725**	**0.069**	**0.253**
unskilled workers	**5596**	**0.071**	**0.257**	**4725**	**0.037**	**0.190**
managers (bosses)	**5596**	**0.043**	**0.205**	**4725**	**0.035**	**0.184**
Is a member of an association	**6364**	**0.509**	**0.499**	**5025**	**0.407**	**0.491**
Travel time to market place	**6338**	**2.098**	**0.765**	**4936**	**2.877**	**1.098**
Travel time to reach an asphalted road	**6168**	**1.566**	**1.002**	**4265**	**3.270**	**1.517**
Area of land exploited	**1270**	**0.639**	**1.027**	**3645**	**0.633**	**0.750**
Head obtained a credit	**6365**	**0.047**	**0.212**	**5026**	**0.035**	**0.185**

Source: *Calculations of the author using the data of the Cameroonian household survey Ecam3*

3.2.2 Results of Quantile Regressions

Since habits and differences in consumption exist, quantile regressions are estimated for urban and rural areas in order to determine the factors that affect household consumption expenditure. Quantile regressions results for urban and rural areas are presented in Table 7.

On the whole, the results of quantile regressions actually confirm the fact that the levels of expenditures per adult equivalent of the different quantile expenditure groups are affected by different factors. These different expenditure groups not only face different challenges, but the challenges of each group also depend on the particular type of households concerned, i.e. whether these households belong to urban or rural areas.

Table 7 below shows that the pseudo-R^2s of quantile regressions lie between 0.24 and 0.36, thus indicating that the coefficient estimates derived from our model perform reasonably well.

In terms of geographic sites and by comparison with households residing in Yaoundé, the study results show that regional variables have negative effects on household consumption in urban areas, except for the consumption of households belonging to the 90th percentile of the Extreme-North region. On the other hand, in rural areas and compared with households residing in Yaoundé, the results show that regional variables (South-West, South, West and Littoral) have insignificant positive effects on consumption whichever quantile is considered, whereas the regional variables of the North-West, North, and Extreme-North rather have negative effects on household consumption.

Household size is significant and negatively associated with consumption expenditure per adult equivalent across all the quantiles of the distribution of expenditure in urban and rural areas. This result not only indicates that large-sized families usually have lower expenditure per adult equivalent, but it is also similar to the results of other studies such as that of Lanjouw and Ravallion (1995), which finds that large-sized households are more likely to fall into poverty than small-sized ones.

As regards the gender of the household head, quantile regression results show that households whose heads are females have a negative relationship with welfare (except for the households of the 10th quantile of the urban area), and these results are very significant for the 50th and 90th percentiles in rural areas. A large number of studies have shown that households headed by men tend to fare better than those headed by women (Barros et al., 1997), because households headed by women not only have more limited access to resources than men, but they also tend to experience more discriminations (World Bank, 1991). This situation underlines the constant need to include gender-specific policies in the formulation of policies aimed at alleviating poverty.

Age has an insignificantly positive association with household living standards, except for the household head's age group of 60 and more, and for the 50th and 90th quantiles of the consumption distribution in the rural areas. In effect, the study results suggest that the variable "household heads belonging to the 50 to 59 age group" is significant for the 50th and 90th quantiles in rural areas. On the other hand, the variable "the household head belong to the 60-and-more age group" is positively related to welfare for the 50th and 90th quantiles of the distribution of consumption both in rural and urban areas. This result suggests that households headed by the oldest household heads enjoy a higher level of welfare in the upper quantiles of the distribution of consumption expenditures, and they are less poor by inference. This result is different from the one derived from OLS regressions, according to which the older members of the household are negatively associated with consumption expenditure per adult equivalent.

The educational level of the household head is positively linked to household consumption expenditure at all the quantiles of the distribution of expenditure both in urban and rural areas. The first-cycle and second-cycle levels of secondary education significantly increase household consumption expenditure at the 10th quantile of the distribution of consumption expenditure, both in urban and rural areas. When higher education is considered, and when one moves from the 10th quantile to the 90th quantile

of the consumption expenditure distribution, one notes that in the urban and rural areas, the coefficients increase and reach their highest levels at the 90^{th} quantile, which means that education has a stronger effect on the welfare of rich households.

An examination of the sector in which the household head is employed reveals that household heads employed in trade have a positive relationship with welfare for all the three quantiles of the welfare distribution in both urban and rural areas. As for the results of the OLS regressions, they are significant for the 50^{th} and 90^{th} percentiles of the distribution of household expenditure in urban areas.

The household heads employed in the industrial sector have a positive relationship with welfare for the 50^{th} and 90^{th} percentiles of the distribution of household expenditures in urban areas, and for all the three quantiles of the distribution of household expenditure in rural areas. Contrary to OLS regression results, household heads who work in industry have a negative relationship with consumption for the 10^{th} quantile of the distribution of household expenditure in urban areas.

Household heads working in the services sector have a positive relationship with consumption for the three quantiles of the expenditure distribution in urban areas, and this result is similar to the result obtained from OLS regressions. On the other hand, in rural areas, household heads working in the services sector have a positive relationship with consumption only for the 50^{th} and 90^{th} percentiles of the distribution of expenditure, whereas those belonging to the 10^{th} quantile have a negative relationship with consumption, thus indicating the disadvantage associated with working in this sector.

Households whose heads are executives, skilled employees, and managers (bosses) tend to be more well-off for the three quantiles of the distribution of expenditure both in urban and rural areas. This result is similar to that obtained with OLS regressions. By contrast, households whose heads are unskilled workers tend to be poor for the three quantiles of the distribution of expenditure in urban areas, and for the 10^{th} quantile in rural areas. Contrary to the results derived from OLS regressions, households whose heads are unskilled workers tend to be rich for the 50^{th} and 90^{th} percentiles of the distribution of expenditure in rural areas.

Quantile regressions provide the evidence of a higher positive impact in terms of access to land in the three quantiles of the distribution of consumption expenditure in rural areas, thus indicating the higher significance of the role played by agriculture for households of this area.

In rural areas, the average time span spent to reach a market place or the time span spent to reach an asphalted road are positively correlated with the welfare of a household belonging to the 90^{th} percentile of the distribution of household consumption expenditure. In particular, the average time period spent to reach an asphalted road has a stronger positive impact on the consumption of rural households belonging to the 90^{th} percentile of the distribution of expenditure. These results are contrary to those derived from OLS regressions, which rather show the existence of a negative relationship between the variables “time span” and household consumption.

The fact of being a member of an association has a positive but insignificant effect on the consumption of households belonging to the 10^{th}, 50^{th} and 90^{th} quantiles of the distribution of consumption expenditure in urban areas. This result is similar to that obtained with the help of OLS regressions. In rural areas, on the contrary, to be a member of an association has a significant positive effect only on the consumption of the households belonging to the 10^{th} quantile of the expenditure distribution.

As for the results derived with OLS regressions, the fact that a credit is obtained by a household head has a positive effect on the consumption of a household in the three quantiles of the distribution of consumption expenditure in both the urban and rural areas. This result is significant for the three quantiles of the distribution of consumption expenditure in rural areas.

Table 7: *Quantile Regression Results, 2007*

	Urban				**Rural**			
Variables	OLS	10th	50th	90th	OLS	10th	50th	90th
Douala	**-0.266 (-2.66)*****	**-0.286 (-2.17)**	**-0.241 (-1.38)**	**-0.421 (-1.89)**	**dropped)**			
Adamaoua	**-0.090 (-0.82)**	**-0.188 (-1.35)**	**-0.030 (-0.16)**	**-0.048** (-0.37)	**0.083 (1.37)**	**-0.033 (-0.42)**	0.160 (2.27)	0.186 (1.50)
Centre	**-0.347 (-4.10)***	**-0.333 (-3.00)*****	**-0.304 (-2.11)**	**-0.544** (1.54)**	**-0.036 (-0.74)**	**0.033 (0.50)**	-0.100 (-1.59)	-0.163 (-1.51)
East	**-0.298 (-2.81)****	**-0.350 (-2.55)**	**-0.164 (-0.93)**	**-0.376 (-1.73)**	**(dropped)**			
Extreme-North	**-0.156 (-1.73)**	**-0.413 (-3.75)** *	**-0.091 (-0.66)**	**0.010 (0.06)**	**-0.192 (-4.14)***	**-0.260 (-4.07)** *	-0.176 (-3.03)**	-0.159 (-1.62)
Littoral	**-0.590 (-6.90)***	**-0.792 (-3.78)***	**-0.518** (-2.99)	**-0.659 (-3.79)***	**0.063 (1.06)**	**0.043 (0.56)**	0.138 (1.81)	0.183 (1.38)
North	**-0.14 (-1.62)**	**-0.162 (-1.45)**	**-0.176 (-1.23)**	**-0.127 (-0.71)**	**-0.182 (-3.50)***	**-0.245 (-3.53)***	-0.135 (-2.16)	-0.217 (-2.06)
Northwest	**-0.303 (-3.72)***	**-0.390 (-3.87)***	**-0.284 (-2.22)**	**-0.260 (-1.50)**	**-0.115 (-2.44)**	**-0.123 (-3.53)** *	-0.127 (-2.14)	-0.116 (-1.14)
West	**-0.340** (3.70)*	**-0.403 (-3.84)***	**-0.460 (-1.85)**	**-0.460 (-2.68)*****	**0.116 (2.39)**	**0.088 (1.35)**	0.105 (1.70)	0.045 (0.43)
South	**-0.346 (-3.72)***	**-0.314 (-2.46)**	**-0.289 (-1.76)**	**-0.594 (-2.90)****	**0.278 (3.95)***	**0.214 (2.58)**	0.111 (1.71)	0.182 (1.10)
Southwest	**-0.088 (-1.05)**	**-0.039 (-0.38)**	**-0.047 (-0.35)**	**-0.217 (-1.21)**	**0.113 (2.19)**	**0.058 (0.84)**	0.138 (2.08)	0.139 (1.22)
household size	**-0.074 (-9.92)***	**-0.087** (3.84)	**-0.081 (-11.26)***	**-0.083 (-6.04)***	**-0.081 (-17.76)***	**-0.071 (-24.04)** *	-0.048 (-1.32)	0.006 (0.10)
Female	**-0.058 (-1.19)**	**0.014 (0.23)**	**-0.016 (-0.21)**	**-0.039 (-0.39)**	**-0.070 (-2.53)**	**-0.080 (-2.35)**	-0.090 (-25.87)*	-0.002 (-9.20)*
household head has a spouse	**-0.163 (-3.74)***	**-0.032 (-0.61)**	**-0.164 (-2.50)**	**-0.221 (-2.52)**	**-0.146 (-6.52)***	**-0.075 (-2.82)** **	-0.001 (-0.80)	0.001 (0.32)
Age of head of household: 30-39 years old	**-0.066 (-1.55)**	**-0.065 (-1.13)**	**-0.069 (-0.97)**	**-0.123 (1.37)**	**-0.021 (-2.96)**	**-0.021 (-0.73)**	-0.082 (-2.26)	-0.036 (-0.56)
Age of head of household: 50-59 years old	**-0.108 (-2.57)**	**-0.105 (-1.87)**	**-0.111 (-1.63)**	**-0.082 (-0.95)**	**-0.128 (-5.48)** **	**-0.088 (-2.99**	0.029 (1.12)	0.021 (0.45)

						)		
Age of head of household: 60 years or older	**0.070** (**1.49**)	**-0.003** (**-0.06**)	**0.057** (**0.78**)	**0.120** (**1.36**)	**-0.048** (**-1.96**)	**-0.075** (**-2.54**)	0.119 (3.14)**	0.069 (1.05)
Level of Head's edu: primary	**0.063** (**1.36**)*	**0.095** (**1.68**)	0.147 (**2.54**)	**0.015** (**0.17**)	**0.068** (**3.18**)**	**0.039** (**1.47**)	0.153 (2.80)*	0.179 (1.85)
Level of Head's edu: secondary 1rst cycle	**4.04** (**4.04**)*	**0.304** (**4.52**)*	**0.216** (**2.54**)	**0.148** (**1.32)**	**0.154** (***5.25***)*	**0.144** (**3.77**) *	0.210 (2.12)** *	0.032 (0.20)
Level of Head's edu: secondary 2nd cycle	**0.278** (**4.76**)*	**0.318** (**4.14**)*	**3.55** (**3.55**)*	**0.138** (**1.13**)	**0.188** (**4.37**)*	**0.141** (**2.79**)* *	0.130 (1.92)	0.195 (1.71)
Level of Head's edu: higher	**0.629** (**8.01**)*	**0.647** (**6.80**) *	**0.580** (**4.55**)*	**0.830** (**6.15**)*	**0.348** (**3.69**)*	**0.135** (**0.141**)	0.179 (2.40)**	0.157 (1.29)
Industrial sector	**0.019** (**0.42**)	**-0.016** (**-0.28**)	**0.051** (**0.63**)	**0.078** (**0.87**)	**0.074** (**2.01**)	**0.050** (**1.13**)	0.104 (3.31)**	0.168 (3.16)**
Trade sector	**0.261** (**4.97**)*	**0.203** (**3.27**) **	**0.276** (**3.36**) **	**0.282** (**2.73**) ***	**0.223** (**4.41**)*	0.082 (0.76)	0.111 (1.21)	0.028 (0.16)
Services sector	**0.218** (**4.72**)*	**0.105** (**1.93**)	**0.176** (**2.51**)	**0.251** (**2.69**) ***	**0.068** (**1.60**)	**-0.022** (**-0.42**)	0.105 (2.14)	0.241 (2.88)**
Executives	**0.33** (**4.78**)*	**0.363** (**3.98**)*	**0.391** (**3.34**) **	**0.340** (**2.60**)	**0.344** (**4.47**)*	**0.454** (**4.75**)*	0.127 (3.86)*	0.231 (3.93)
skilled employees	**0.077** (**1.49**)	**0.147** (**2.28**)	**0.154** (**1.74**)	**0.039** (**0.37**)	**0.118** (**2.43**)	**0.095** (**1.55**)	0.096 (2.35)**	0.002 (0.04)*
unskilled workers	**-0.089** (**-1.49**)	**-0.088** (**-1.08**)	**-0.013** (**-0.13**)	**-0.202** (**-1.49**)	**-0.029** (**-0.56**)	**-0.000** **-0.00**)	0.051 (2.27)	0.033 (0.82)
managers (bosses)	**0.244** (**2.64**)***	**0.067** (**0.72**)*	**0.249** (**2.03**)	**0.331** (**2.25**)	**0.182** (**3.84**)*	**0.150** (**2.67**)* **	0.058 (3.90)*	0.136 (5.36)*
Head is a member of an association	**0.075** (**2.34**)	**0.058** (**1.42**)	**0.079** (**1.48)**	**0.091** (0.90)	**3.04** (**1.40**)	**0.078** (**3.19**) **	-0.236 (-2.56)**	-0.016 (-0.14)
Travel time to market place	**-0.057** (-2.05)**	**-0.035** (**-1.63**)	**-0.068** (**2.13**)	**-0.065** (**-1.63**)	**-0.024** (**-2.74**)***	**-2.49** (**-2.49**)	0.130 (0.94)	0.052 (0.27)
Travel time to reach an asphalted road	**-0.027** (**-1.90**)	**-0.041** (**-2.71**) ***	**-0.019** (**-0.85**)	**-0.004** (**-0.16**)*	**-0.019** (**-2.89**)**	**-0.020** (**-2.44**)	0.036* (6.81)	0.258 (3.87)*
Area of land exploited	**0.048** (**3.18**)**	**0.040** (**2.16**)*	**0.045** (**1.86**)	**0.036** (**1.39**)	**0.065** (**4.59**)*	**0.017** (**1.06**)	0.583 (3.86)*	0.817 (3.18)*
Head obtained a credit	**0.201** (**3.09**)**	**0.186** (**2.88**)*	0.147 (**1.44**)	**0.267** (**2.25)**	**0.173** (**3.56**)*	**0.156**	0.108	0.161

						(**2.98**)* *	(5.02)*	(4.32)*
intercept	**13.287 (123.30)***	**12.775** (**92.37**) *	**13.226** (**79.69**) *	**13.991 (66.19**)*	**12.827** (**212.46**)*	**0.078 (155.3 1**) *	-0.037 (-3.44)**	-0.026 (-1.36)
Number of observations		**1181**	**1181**	**1181**	2539	3036	3036	3036
Pseudo-R2		**0.277**	0.255	0.293		0.217	0.237	0.221

*Notes: Robust t- statistics are between parentheses *** Significant at the 1% level; ** significant at the 5% level; * significant at the 10% level*

Source: *Calculations of the author using data from the Cameroonian Household Survey, ECAM3*

4. Conclusion and Policy Implications

The objective of this paper was to examine the main determinants of income inequality in Cameroon. At the methodological level, the study used both quantile regressions to analyze the determinants of household welfare at different points of consumption expenditure distribution, and the analysis of the decomposition of total inequality in household consumption expenditure into sub-groups of the population to determine the significance with which total inequality is attributable to inequality between these sub-groups, and the significance with which it is attributable to inequality within these groups. The Gini index was also used to serve as a test of robustness for the parameter estimates in the decomposition exercise. The study used total household expenditure per adult equivalent as welfare indicator, while the data used were derived from the household survey conducted in 2007 by the National Institute of Statistics (NIS).

Decomposition analysis results show that total expenditure inequality per adult equivalent varies appreciably among the different population sub-groups considered. When we carried out decomposition analysis, we found that in all the groups considered, between-groups inequality only explains a very small proportion of total inequality. Reducing inequality between groups of households would therefore have only a limited impact on the reduction of total inequality. In particular, the analysis according to rural and urban areas showed that not more than 27% of total inequality is attributable to the between-groups inequality component. The relevant figure for between-regions inequality is 25%. This estimate is even lower for groups formed according to the age of the household head. On the other hand, the highest estimate of the between-groups component which is 28%, is found in the groups formed according to the educational level of the household head. Household groups which were formed on the basis of the occupational status of the household head, also showed a relatively high between-groups inequality components'contribution to total inequality. Of course, any attempt to eliminate between-groups inequality while leaving within-groups inequality unchanged, would not have a significant impact on total inequality. The policy implications of these results are the following: any policy that is not trageted to inequality reduction within each of the household groups mentioned above would have a limited impact in the reduction of total inequality.

In addition, the results of the study show that determinants of household welfare are numerous and complex, going from individual and household characteristics to the social characteristics of the community, but that the relative importance of these factors varies from one area to another and across the welfare distribution. The use of quantile regressions indicates that

human resources, social and physical capital play a major role in the improvement of household welfare. The study reveals a number of demographic effects in the urban and rural areas among which the most significant is caused by household size, which contributes to the reduction of the consumption expenditure of the household at all the quantiles. Moreover, the regions where household reside also affects the household consumption expenditure. Those who work in the services and trade sectors of the economy are better well-off than those who work in the other sectors of the economy.

Unlike the results of OLS regressions, which show a negative relationship between the variable "female gender" and welfare, quantile regressions yield contrary results for the household heads of the 10^{th} quantile of the distribution of expenditures in the urban area, and for the household heads of the 90^{th} quantile of the distribution of expenditures in rural areas.

OLS regressions results also show the presence of a negative relationship between the oldest household heads and welfare. This result is different from those derived from quantile regressions, which indicate that the oldest household heads enjoy a higher level of welfare in the upper quantiles of the distribution of consumption and, by inference, are less poor.

Contrary to OLS regressions results, household heads who work in the industrial sector have a negative relationship with consumption for the 10^{th} quantile of the distribution of household expenditure in urban areas.

In addition, contrary to the results obtained with OLS regressions, households whose heads are unskilled workers tend to be rich for the 50^{th} and the 90^{th} percentiles of the distribution of expenditure in rural areas.

In rural areas, the average time span spent to reach a marketplace, as well as to reach an asphalted road, is positively correlated to the welfare of households belonging to the 90^{th} percentile of the distribution of household consumption expenditures. These results are opposed to those of OLS regressions, which rather show the existence of a negative relationship between these "time spans" variables and household consumption.

Finally, the variable "being a member of an association" has an insignificant positive effect on the consumption of households belonging to the three quantiles of the distribution of consumption in urban areas. This result is similar to the one derived from using OLS regressions. On the other hand, the variable "being a member of an association" in rural areas has a significant positive impact only on the consumption of households belonging to the households of the 10^{th} percentile of the distribution of expenditure.

These results suggest some poverty reduction policy recommendations. One of the main results of the study is the significant role that the educational level of the household head plays in reducing the poverty of urban and rural households. This finding suggests that widening access to education[14] will reduce poverty both by increasing individual productivity

[14] Although ensuring good educational opportunities in urban areas may be the key poverty reduction policy, this does not imply that the government should make less efforts of this kind in rural areas. In the presence of a significant rural-urban migration, many rural residents end up finding themselves in urban areas where they can earn a better livelihood if they are educated. Moreover, in combination with greater regional development efforts, rural families may have the chance of benefiting from employment opportunities that reward education. The literature on endogenous growth emphasizes the role of education in the economic development process (Lucas, 1988).

and by facilitating the movement of poor persons from the low-paying jobs of the agricultural sector, towards the well-paying jobs of the industrial and services sectors of the economy. What is even more important is that, if public spending on education is targeted at the poor, it can yield a double dividend by reducing poverty in the short term and by increasing the chances of poor children who may then gain access to jobs in the formal sector of the economy, an opportunity that would help them bypass the intergenerational poverty trap. An increase in the levels and quality of education should be accompanied by a sound investment climate to make sure that productive jobs are created for those who are newly educated.

Since the study has shown that poverty increases with household size both in rural and urban areas, one way to reduce household size, and hence poverty is to heighten the awareness of household heads about the possibility of reducing the number of children in the household through such techniques as contraception or abstinence, which are provided by family planning services. More specifically, it is urgent in the case of Cameroon to intensify the efforts and activities of family planning services. This will entail increasing family-planning financial expenditure, and also carrying out research on the determinants of fecundity as well as on the decentralization, provision, and supervision of family planning services in the country.

Since the occupation of household heads working in agriculture does not reduce poverty, there is consequently an urgent need to increase farm income through a rise in farm productivity by providing farmers with inputs such as fertilizer, pesticides, selected seeds, and appropriate mechanization, which can make it possible for them to increase agricultural output. This can be done through agricultural finance development by creating agricultural credit institutions, which can help farmers finance these production inputs. Moreover, farmers should also be provided with extension services in order for them to adopt sound advice in terms of cultural practices and information about market conditions, which may enable them to choose which crops to produce and to sell at advantageous prices. Furthermore, the government should endeavor to design and implement rural development programmes in the areas of physical infrastructure, energy, and social infrastructure such as roads, communications, telecommunications, schools, and hospitals, which can open up the countryside and facilitate exchange between rural and urban areas, which may in turn contribute to the modernization of rural areas and improvements in the well-being of rural dwellers.

In addition, the study’s regression analysis results have highlighted the importance of infrastructure and of other market variables such as access to good roads. These are areas in which Cameroon has made modest progress during the last two decades, and therefore more needs to be done.

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