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A Counterfactual Analysis of the Poverty Impact of Economic Growth in Cameroon

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Abstract

The Government of Cameroon has declared poverty reduction through strong and sustainable economic growth the central objective of its socioeconomic policy. This paper uses available household survey data to assess the performance of the economy with respect to this objective over the period 1996–2007. The authors use counterfactual decompositions based on both the Shapley method and the generalized Oaxaca-Blinder framework to identify proximate factors that might explain differences in observed outcomes over time, across regions and households. The concept of pro-poorness provides a basis for a normative evaluation of these outcomes. The analysis of changes in the size distribution of economic welfare reveals that formal sector employment, access to credit, education, and urban residence are characteristics that bring significantly high returns to households. Employment in smallholder agriculture has a negative impact on welfare across quantiles. Economic growth was accompanied by significant poverty reduction between 1996 and 2001. But poverty barely decreased between 2001 and 2007 due to very weak growth. Over the same period, household investment in human capital took a serious hit. Given the additional finding that the pattern of growth is characterized by urban bias and regional disparity, the overall assessment is that economic growth has been weakly pro-poor in Cameroon. There is therefore a need to re-examine and possibly reform the mechanisms governing the allocation of public resources designed to support individuals' efforts to improve their standard of living.

This paper—a product of the Poverty Reduction and Equity Group, Poverty Reduction and Economic Management Network—is part of a larger effort in the network to disseminate methods of assessing the poverty and distributional implications of economic growth. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted at bessamannash@worldbank.org.

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1. Introduction

Promoting economic growth and poverty reduction has long been recognized as an important goal of development. The first World Development Report (WDR) argues that development efforts should be aimed at the twin objectives of rapid growth and poverty reduction[1] (World Bank 1978). This vision of development has been reiterated in one form or another in subsequent reports culminating in a conception of development as *opportunity equalization* presented in WDR 2006 (World Bank 2005). In this context, equity is defined in terms of a level playing field where individuals have equal opportunities to pursue freely chosen life plans and are spared from extreme deprivation in outcomes. In this sense, the pursuit of equity also entails that of poverty reduction.

Consistent with the Millennium Declaration[2] (United Nations 2000), the Government of Cameroon has declared poverty reduction through strong and sustainable economic growth the central objective of ongoing policy reforms (Government of Cameroon 2003). On the basis of this declaration, poverty reduction becomes the yardstick by which to judge the performance of development interventions in Cameroon.

For the past twenty years or so, Cameroon has been battling a severe and persistent socioeconomic crisis that can be traced back to a terms-of-trade shock in the mid 1980s and the associated policy response. Prior to that crisis, the country enjoyed steady economic growth and relative social stability. For about 20 years following independence in 1960, the average annual growth rate of Gross Domestic Product (GDP) hovered around 5 percent. That growth was driven mainly by the agricultural sector which employed more than 80 percent of the labor force and accounted for 32 percent of GDP. This sector was also a major contributor to export earnings through mainly cocoa

[1] This recommendation is consistent with the theme underlying the study of redistribution with growth by Chenery et al. (1974). This study advocates the use of explicit social objectives as a basis for choosing development policies and programs. In particular, any development intervention must be evaluated in terms of the benefits it provides to different socio-economic groups.

[2] This Declaration defines the Millennium Development Goals (MDGs) for the year 2015 relative to 1990. The original list of MDGs includes: (1) Eradicate extreme poverty and hunger; (2) Achieve universal primary education; (3) Promote gender equity and empower women; (4) Reduce child mortality; (5) Improve maternal health; (6) Combat major diseases; (7) Ensure environmental sustainability; and (8) Develop global partnership for development.

and coffee (Benjamin and Devarajan 1986). The manufacturing sector accounted for about 25 percent of GDP and was mainly involved in import-substituting activities.

Cameroon became an oil producer in 1978 following the discovery of oil off the west coast of the country. This presented policymakers with a new set of opportunities and challenges. At that point in time, poor infrastructure and low levels of human capital were considered serious obstacles to development efforts. Some of the oil revenues could then be invested in capital formation. At the same time, there was a risk of Dutch disease[3] whereby traditional exports such as cocoa and coffee would lose competitiveness in the world markets as a result of domestic inflation induced by a rapid spending of oil revenues. In the early 1980s, the oil sector began to take over from the agricultural sector as the engine of growth. Between 1977 and 1981 the average rate of economic growth was about 14 percent and dropped to about 7.5 percent per year between 1982 and 1986 (Blandford et al. 1994). The share of the oil sector in GDP grew steadily from 1 percent in 1978 to 20 percent in 1985. During the same period the share of agriculture declined from about 29 percent to about 21 percent. Furthermore, the share of petroleum and oil products in exports increased form 3 percent to 65 percent while that of agricultural products plummeted from 87 percent to 27 percent.

The constant and steady growth achieved throughout the 1970s and 1980s earned Cameroon the title of middle-income country, a World Bank classification it shared with countries such as Indonesia, Morocco, Thailand and Tunisia. Cameroon's per capita GNP in 1988 dollars was estimated at US $1,010 (World Bank 1990). These positive achievements in economic growth were generally attributed to fiscal prudence and political stability. The World Development Report of 1988 did praise Cameroon along with Indonesia for managing cautiously the windfall from the 1979-1981 oil boom. It is reported that Cameroon saved up to 75 percent of the oil revenues abroad, and after the boom, ensured that expenditure grew slower than revenues in order to avoid deficits (World Bank 1988).

The fact that Cameroon did enjoy high and sustained economic growth throughout the 1965-1985 has been abundantly documented (Bradford et al. 1994, World

[3] This term refers to the deterioration of the Netherlands' export competitiveness associated with the exploitation of natural gas fields in the 1970s (Benjamin and Devarajan 1985).

Bank 1995). However, little is known about trends in poverty and inequality during those "good" times for lack of data. Based on the 1983 Household expenditure Survey, the World Bank (1995) found evidence of high levels of rural poverty and inequality in the distribution of income. The same report discusses factors indicating that the situation may not have been much better in years prior to the 1983 survey. While acknowledging that many urban residents did benefit from this growth episode, the report points to the following factors as contributing to high rural poverty: (1) an incentive structure that favored capital-intensive methods of production over labor-intensive ones; (2) an urban bias in the selection of public investment; and (3) the lack of human capital development in the rural areas.

In 1985, the economy was hit by a collapse of world prices of the country's major export commodities, namely oil, cocoa and coffee. This was further complicated by a 40 percent appreciation of the CFA franc between 1985 and 1988, and gains in competitiveness by Nigeria since 1985. The export price index fell by 65 percent for oil, 24 percent for cocoa, 11 percent for coffee and 20 percent for rubber (Bradford et al. 1994). Faced with this difficult international environment, the government adopted initially a strategy of internal adjustment[4] between 1985 and 1993. This entailed cutting back on public spending (mainly investment spending) and building up arrears. This policy choice was in part dictated by the fact that, as a member of the franc zone, Cameroon did not have the option of adjusting the nominal exchange rate to deal with the terms of trade shocks. Early 1989, Cameroon entered a structural adjustment supported by the International Monetary Fund (IMF), the World Bank and the African Development Bank.

The crisis and the initial response to it led to a severe recession and increased poverty (World Bank 1995). It is reported that by 1990, real GDP stood 20 percent below its 1985 level. Furthermore, per capita income fell by about 50 percent between 1986 and 1993. The loss of competitiveness also led to the loss of export markets for agricultural products and made it hard for domestic food crops and industrial products to compete with imports. This squeeze implied a decrease of demand for labor both for

[4] This point in time also marks the abandonment of five-year plans for socioeconomic management. The last one was the 5th Five Year Development Plan covering the 1982-1986's period.

tradable and non-tradable goods with adverse effects on living standards for both rural and urban areas. Also, reduced economic activity combined with a slackening of tax collection crippled the ability of the state to provide services, thus worsening the impoverishment.

In 1994, the Central African Economic and Monetary Community[5] of which Cameroon is a member devalued the CFA franc by about 50 percent in nominal terms (30 percent real), and implemented additional trade and fiscal reforms. This presented Cameroon with an opportunity to reverse the socioeconomic downturn. The country did experience some positive growth after the devaluation, but it was only in mid 1996, after some failed stabilization and adjustment efforts, that the government showed strong commitment to meaningful policy reforms. The successful implementation of these reforms let to macroeconomic stability and an average growth rate of real GDP in the neighborhood of 5 percent between 1997 and 2000. On the basis of the 1996 and 2001 household surveys, it is estimated that the incidence of poverty fell by 13 percentage points from about 53 percent to about 40 percent. However, income inequality remained high with the Gini index of inequality decreasing only by 3 percentage points, from 44 to 41 percent. Furthermore, other social indicators have not shown such an improvement.

A shift in borrowing strategy around 1986 combined with the severity of the socioeconomic crisis left the country saddled with an unsustainable debt burden. The stock of external debt increased from less than 33 percent to more than 75 percent of GDP between 1985 and 1993 (Government of Cameroon 2003). In October 2000, Cameroon became eligible for debt relief under the Enhanced HIPC[6] Initiative. In this

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[5] Mostly known under its French acronym CEMAC for *Communauté Economique et Monétaire d'Afrique Centrale.*

[6] HIPC stands for Heavily Indebted Poor Countries. This initiative was launched in 1996 by the International Development Association (IDA, the World Bank's fund designed to provide concessional credits and grants to the poorest countries) and the IMF. The initiative was enhanced in 1999 to tighten its link with poverty reduction and to widen its scope and make it more efficient (in terms of speed of relief delivery). Eligibility is based on three criteria: (1) qualify only for concessional assistance from IDA, (2) debt situation remains unsustainable after full application of traditional relief mechanisms, and (3) a track record of reforms combined with the development of a Poverty Reduction Strategy (presented in a document known as Poverty Reduction Strategy Paper or PRSP). The whole process entails reaching a *Decision Point* and a *Completion Point*. Two conditions must be met by a country to reach the Decision Point: (1) satisfactory preparation of an interim PRSP, and (2) satisfactory performance under the IMF's Poverty Reduction and Growth Facility (PRGF). At this point, the country gets conditional (on continued good performance) interim relief. At the Completion Point debt relief becomes irrevocable. Reaching this point requires the following: (1) maintain macroeconomic stability under a PGRF; (2) satisfactory

context, the government adopted a Poverty Reduction Strategy (PRS) in 2003. The strategy is designed to cut the number of poor by half by 2015 through strong and sustainable economic growth. Cameroon reached the Completion Point in May 2006, after three full years of implementation of the 2003 PRS. This achievement signals the satisfaction of Cameroon's development partners with the implementation of this strategy.

How much poverty reduction has this improved policy environment brought about? Preliminary analysis by the National Statistical Office based on the most recent household survey (2007) indicates that the overall incidence of poverty is still around 40 percent, about the same level as in 2001. The Gini index of inequality seems to have dropped a couple of percentage points from 41 percent in 2001 to 39 percent in 2007. These observations raise some interesting evaluative questions. To what extent has growth been pro-poor in Cameroon? What are the proximate causes of observed variations (over time and across socioeconomic groups) in the distribution of economic welfare?

The purpose of this paper is to use available household level data, particularly the 2001 and 2007 surveys, to try to answer these questions using counterfactual decomposition of changes in the distribution of economic welfare. To put things into perspective, we present in section 2 a profile of growth, inequality and poverty for the period 1996-2007. In that section we use the Shapley decomposition to explain variations in poverty in terms of changes in *per capita* expenditure and changes in inequality.

In section 3 we explain the Oaxaca-Blinder decomposition framework and use it to identify sources of variation in the distribution of economic welfare. In general, this decomposition technique can be used to study group differences in any continuous and unbounded outcome variable. For policymaking purposes, we need to understand the nature of the changes in the distribution of welfare associated with the process of economic growth. While the Shapley decomposition limits this understanding to changes in mean welfare and inequality, the generalized Oaxaca-Blinder decomposition as

implementation of a full PRSP for one year; (3) implementation of structural and social reforms agreed upon at the Decision Point.

explained by Bourguignon and Ferreira (2005) allows a much richer analysis[7]. However, both methods base the identification of the determinants of differences across distributions of economic welfare on the comparison of *counterfactual distributions* with observed ones. The empirical implementation relies on regression analysis (OLS and Quantile).

In section 4 we use measures of pro-poorness from the recent literature to ascertain the extent to which economic growth has been pro-poor in Cameroon. Ultimately, impact analysis entails a comparison of social states (or states of the world) represented by profiles of individual outcomes. In this paper, social states are interpreted as growth patterns represented by growth incidence curves (GICs). The social desirability of a pattern of growth depends on the chosen *social evaluation* function. The social evaluation functions used here can be written as a weighted sum of points on the GIC. The specification of the relevant weights hinges on the underlying value judgments. Concluding remarks are made in section 5.

2. A Profile of Growth, Inequality and Poverty

In this section, we present a summary of the three datasets we use in the analysis. We also discuss the observed poverty outcomes and try to link them to changes in per capita expenditure and inequality.

Evolution of per capita Income and Inequality

Table 2.1. Distribution of Per Adult Equivalent Annual Expenditure in Cameroon (1996-2007)

	Mean	Lowest Decile	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
1996	243262.2	2.89	3.78	4.88	6.66	7.26	8.04	7.99	10.45	13.94	34.10
2001	372742.6	2.64	4.00	5.19	6.79	6.67	8.59	10.07	11.56	15.59	28.90
2007	432894.2	2.70	3.95	4.74	6.22	7.74	9.30	10.65	12.87	16.64	25.19

Source: Authors' Calculations (using data from the 1996, 2001 and 2007 household surveys)

[7] Within this framework outcome differentials are explained in terms of individual (or household) endowments (or characteristics) and the returns to those assets.

Table 2.1 presents a summary of the distribution of per adult equivalent[8] expenditure based on the 1996, 2001 and 2007 household surveys conducted by the National Statistical Office. All these surveys follow the sampling frame of the 1987 population census. The samples are stratified and the 1996 survey has the smallest sample size with 1,728 observations 36 percent of which represent the rural sector. The National Statistical Office (2002) has noted this under-representation of the rural areas in the 1996 household survey. For the other two surveys, the sample size is 10,992 observations for 2001 and 11,391 observations for 2007.

On the basis of the means reported in the second column of table 2.1, we find that (see table 2.2) the average per adult equivalent expenditure grew 5.4 percent per year over the period of 1996-2007 in nominal terms. Looking within sub-periods, the mean per adult equivalent expenditure grew by about 9 percent per year between 1996 and 2001, and by about 2.5 per year between 2001 and 2007. In real terms, these average rates of growth fall respectively to 1.9 percent, 4.1 percent and 0.5 percent. National account statistics tell a different story. The real per capita GDP is believed to have grown only by 1.57 percent per year between 1996 and 2001, and by 0.57 percent between 2001 and 2007 (National Statistical Office 2002, 2008).

Table 2.2. Growth in Average per Adult Equivalent Expenditure in Cameroon (1996-2007)

Period	Average Growth Rate (percentage)	
	Nominal	Real
1996-2001	9.0	4.1
2001-2007	2.5	0.5
1996-2007	5.4	1.9

Source: Authors' Calculations

[8] The underlying scale assigns weights to individual members of the household according to their age and gender. However there is no gender differential for children up to the age of 10. Thus children who are at most 1 year old get a weight of 0.255. Those with age between 1 and 3 years get assigned a weight of 0.45. Between the age of 4 and 6, the weight is 0.62 while it is 0.69 for the 7-10 age group. Starting from age 11, males get assigned the following weights: 0.86 between 11 and 14, 1.03 between 15 and 18, 1 between 19 and 50 and 0.79 above 50. All females between 11 and 50 get a weight of 0.76 and those above 50 get a weight of 0.66.

According to the National Statistical Office, there are at least five factors that explain the level of economic growth achieved between 1996 and 2001. These include: (1) a good performance of the export sector, particularly coffee, cocoa and cotton; (2) investments associated with the privatization program; (3) the expansion of the timber industry; (4) increased salaries in the public sector; and (5) job creation and multiplier effects associated with the construction of the Chad-Cameroon pipeline. The National Statistical Office also explains that the poor performance of the economy between 2001 and 2007 is due mainly to the fact that growth occurred in low productivity sectors such as the urban informal sector and traditional agriculture.

The data presented in table 2.1 also reveal a significant amount of inequality in the distribution of per adult equivalent expenditure. The share of the richest decile is equal to almost 12 times that of the poorest decile in 1996, about 11 times in 2001 and 9.3 times in 2007. Furthermore we note that, for all three years, the share of expenditure of every decile up to the sixth is strictly less than its population share (10 percent). For the seventh decile, the share of expenditure is about 8 percent in 1996, and a little over 10 percent in 2001 and 2007. The Gini measure of inequality has hovered around 40 percent in 1996 and 2001 and declined slightly to about 39 percent in 2007.

Changes in Poverty over Time

Figure 2.1 presents a picture summarizing the evolution of aggregate poverty from 1996 to 2007 based on TIP curves associated with poverty measures which are members of the Foster-Greer-Thorbecke (FGT) family. The acronym TIP stands for the *three I's of poverty* because the curve provides a graphical summary of *incidence*, *intensity* and *inequality* dimensions of aggregate poverty based on the distribution of poverty gaps (Jenkins and Lambert (1997)[9]. These dimensions are shown as follows: (1) the length of the non-horizontal section of the curve reveals poverty *incidence* ; (2) the *intensity* aspect of poverty is represented by the height of the curve; and (3) the degree of concavity of the

[9] This curve is constructed in four steps: (1) rank individuals from poorest to richest on the basis of the welfare indicator **y**; (2) compute the relative poverty gap of individual **i** as $\mathbf{g_i=max\{(1-y_i/z), 0\}}$ where **z** is the poverty line; (3) form the cumulative sum of the relative poverty gaps divided by population size; and (4) plot the resulting cumulative sum of poverty gaps as a function of the cumulative population share.

non-horizontal section of the curve translates into the degree of *inequality* among the poor.

Figure 2.1. A Picture of Poverty in Cameroon, 1996-2007

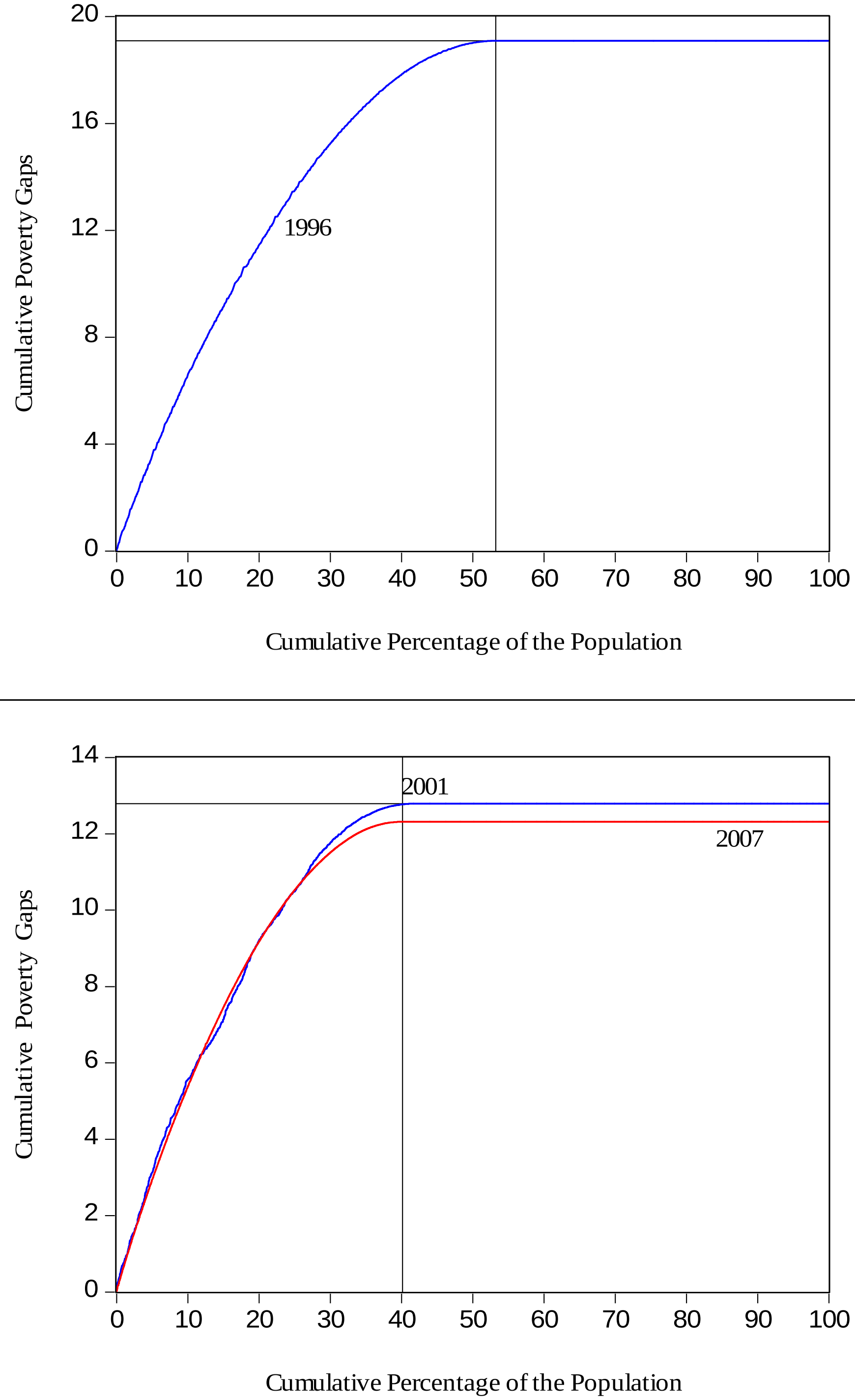


Table 2.3. A Profile of Poverty and Inequality, 1996-2007

	Overall			Urban			Rural		
	1996	2001	2007	1996	2001	2007	1996	2001	2007
Headcount	53.26	40.18	39.90	41.39	17.88	12.17	59.62	52.08	55.04
Poverty Gap	19.09	12.79	12.31	14.67	4.28	2.81	21.46	17.32	17.50
Squared Poverty Gap	9.00	5.55	5.03	6.92	1.59	0.96	10.12	7.67	7.24
Watts	26.66	17.38	16.11	20.55	5.48	3.51	29.94	23.72	22.99
Atkinson (1)	23.84	24.00	21.94	28.72	24.31	18.59	17.81	16.63	15.35
Atkinson(2)	38.16	38.82	35.82	45.63	38.25	31.85	30.38	29.72	25.93
Gini	40.63	40.41	38.96	44.91	40.71	35.19	34.60	33.15	32.23
MLD	27.23	27.45	24.77	33.86	27.85	20.56	19.61	18.19	16.66
Theil	31.75	33.75	27.88	37.64	35.39	22.87	21.61	19.36	18.76

Source: Authors' Calculations (MLD stands for Mean Log Deviation).

Figure 2.1 is consistent with the poverty outcomes presented in table 2.3, showing that poverty incidence dropped from about 53.3 percent in 1996 to about 40.2 percent and 40 percent in 2001 and 2007 respectively. The other three measures reported in that same table (the poverty gap, the squared poverty gap and the Watts measure) show a similar decline. These other three measures are members of the *additively decomposable*[10] class of poverty indices defined by the following equation.

$$P = \int_0^z \psi(y \mid z) f(y) dy \qquad (2.1)$$

where **z** is the poverty line, f(y) is the frequency density function for the welfare indicator **y**, and $\psi(y \mid z)$ is a convex and decreasing function measuring individual deprivation. This function is equal to zero when the welfare indicator is greater or equal to the poverty line.

To begin to uncover some of the factors that might explain the observed changes in poverty between 1996 and 2007, we start from that fact that poverty indices are computed on the basis of a distribution of living standards which is fully characterized by its *mean* and the degree of *inequality* (as represented by the associated Lorenz curve). Any poverty measure therefore is a function of these two factors. Formally we write this as $P_t = P(\mu_t, L_t, z)$. In other words, poverty at time **t** is a function of the mean, $\boldsymbol{\mu_t}$, the

[10] The class of poverty measures defined by (2.1) is *additively separable* because the deprivation felt by an individual depends only on a fixed poverty line and her/his level of welfare and not on the welfare of other individuals in society. When the population is divided exhaustively into mutually exclusive socioeconomic groups, this class of measures allows one to compute the overall poverty as a weighted average of poverty in each group. The weights here are equal to population shares. Thus such indices are also *additively decomposable*

Lorenz function, $\mathbf{L_t}$, and the poverty line, $\mathbf{z}$, (assumed constant over time). We can use counterfactual decompositions to sort out the contribution of each of these factors to changes in overall poverty. The basic idea underlying such decompositions is to compare observed poverty outcomes to what they would have been under some counterfactual state defined by letting only one factor vary while holding all other factors fixed. In particular and given a fixed poverty line, we use the Shapley decomposition[11] method to identify the contributions of changes in the mean and relative inequality to the overall change in poverty.

The Shapley decomposition rule respects the following restrictions: (1) *Symmetry* or anonymity (the contribution assigned to any factor should not depend on its label or the way it is listed; (2) the rule should lead to exact or *additive decomposition*; and (3) the contribution of each factor is taken to be equal to its (first round) *marginal impact*.

To see clearly how this works in the context of poverty outcomes, consider the following change in poverty between two time periods: $\Delta P = P(\mu_t, L_t, z) - P(\mu_{t-1}, L_{t-1}, z)$. The marginal impact of the change in the mean of the distribution is equal to the change in poverty that would have been observed had relative inequality remained constant. If relative inequality is fixed at the first period Lorenz function, then this marginal effect can be computed from: $\Delta P_\mu = P(\mu_t, L_{t-1}, z) - P(\mu_{t-1}, L_{t-1}, z)$. Scaling up the initial distribution by a factor equal to the ratio $\frac{\mu_t}{\mu_{t-1}}$ produces a counterfactual distribution with the same Lorenz function as the initial distribution and the same mean as the end-period distribution[12]. This is a *distribution-neutral* transformation. Alternatively, we could fix the end period Lorenz function to get: $\Delta P_\mu = P(\mu_t, L_t, z) - P(\mu_{t-1}, L_t, z)$. In order to respect anonymity, the

[11] The Shapley decomposition is based on a microeconomic approach to distributive justice where the key issue is a fair assessment of the productive contributions of partners in a joint venture. The Shapley value of a participant is in general a solution to a cooperative game. If players join the game sequentially, the value of a player is her net addition to overall payoff when she joins. The Shapley value is the average contribution to the payoff over all possible orderings of the participants. For more on the use of the Shapley value in inequality and poverty analysis, see Shorrocks (1999). Kakwani (200) proposes a similar decomposition using an axiomatic approach. Datt and Ravallion (1992) offer a decomposition technique that splits a change in poverty between two dates into a growth component, a redistribution component and a residual. They interpret this residual as an interaction term.

[12] See Lambert (2001) and Kakwani and Son (2008) for applications of this transformation.

Shapley contribution of changes in the mean, $\mathbf{S}_{\mu}$, to change in poverty is equal to the average of these two marginal effects. We refer to this term as the *scale component* and we write it as follows.

$$S_{\mu} = \frac{1}{2}\left[P(\mu_t, L_{t-1}, z) - P(\mu_{t-1}, L_{t-1}, z)\right] + \frac{1}{2}\left[P(\mu_t, L_t, z) - P(\mu_{t-1}, L_t, z\right] \qquad (2.2)$$

Similarly, we can show that the contribution of the change in inequality to change in poverty, ceteris paribus, is equal to:

$$S_{L} = \frac{1}{2}\left[P(\mu_{t-1}, L_t, z) - P(\mu_{t-1}, L_{t-1}, z)\right] + \frac{1}{2}\left[P(\mu_t, L_t, z) - P(\mu_t, L_{t-1}, z\right] \qquad (2.3)$$

Transformations that underlie the computation of the Shapley contribution of inequality to change in poverty are *size-neutral* to the extent they hold the mean of the distribution constant while changing the Lorenz function.

Table 2.4. Shapley Decomposition of Poverty Outcomes, 1996-2007

	Overall	Scale	Inequality
		1996-2001	
Headcount	-13.08	-12.57	-0.51
Poverty Gap	-6.30	-6.18	-0.13
Squared Poverty Gap	-3.45	-3.47	0.02
Watts	-9.29	-9.35	0.06
		2001-2007	
Headcount	-0.28	-0.12	-0.16
Poverty Gap	-0.47	-0.06	-0.41
Squared Poverty Gap	-0.53	-0.03	-0.49
Watts	-1.27	-0.09	-1.17
		1996-2007	
Headcount	-13.36	-12.32	-1.04
Poverty Gap	-6.78	-6.23	-0.55
Squared Poverty Gap	-3.98	-3.52	-0.46
Watts	-10.55	-9.39	-1.16

Source: Authors' Calculations

The results of our decomposition over the period 1996-2007 are reported in table 2.4. Those associated with the overall period, 1996-2007, suggest that on average both changes in the mean per adult equivalent expenditure and in relative inequality associated with the growth process have led to poverty reduction. The comparison of the magnitudes of the Shapley contributions indicates that the pure growth or *scale effect* dominates the *inequality effect*, except for the sub-period 2001-2007. The meager reduction in poverty observed in 2001-2007 is mostly due to the modest reduction in inequality.

Regional Disparity

Aggregate outcomes such as those discussed above can often hide a great deal of heterogeneity in the incidence of the growth process on poverty. This heterogeneity in impact also means that we can expect losers during spells of growth, even when poverty falls on average as we have observed above (Ravallion 2001). At this stage we limit our consideration of this issue to regional disparities[13]. Table A1 through A4 in the appendix present a profile of poverty and inequality for 12 regions of Cameroon (the two major cities Douala and Yaoundé, and the 10 provinces) for 2001 and 2007. The identification of winners and losers at the regional level is made on the basis of a comparison of regional outcomes to national outcomes. Focusing for instance on poverty incidence, we note that four provinces (Adamaoua, East, North and Far North) experienced a significant increase in poverty incidence between 2001 and 2007 while the trend in overall poverty was declining. The two Northern provinces (North and Far North) saw the biggest increase. Poverty incidence increased by 13.6 and 9.6 percentage points respectively in the North and Far North. The increase was 6.4 for the Eastern province and 4.5 points for Adamaoua.

For each of the two years, 2001 and 2007, we also observe a deviation of regional poverty levels from the national average. It turns out that we can also use a two-way Shapley decomposition to identify proximate explanations for these poverty differences across regions (Kolenikov and Shorrocks 2005). Just as in the case of overall poverty, regional poverty levels are fully determined by average real income and inequality in its distribution. Therefore, the Shapley contributions now indicate the influence of

[13] Later on we present some econometric results which will help us identify winners and losers at the household level.

deviations of mean (real) income and inequality from the national level. This decomposition allows us to uncover the dominant factor between these two.

Our results for some important members of the class of additively decomposable poverty measures defined by equation (2.1) are presented in table 2.5 (a&b for 2001 and 2007 respectively). There are six regions (the two major cities, and the coastal, western, southern and south-western provinces of where poverty is generally below the national average in both 2001 and 2007. Poverty is above the national average for the other six regions. The overall pattern that emerges from these results is that, except for the western, southern and south-western provinces, the real income (scale) effect dominates (in magnitude) the inequality effect in 9 regions. Thus regions (among these 9) with lower poverty rates than the national average tend to have average real income higher than the national average. Similarly, average real income tends to be lower than the national average for those regions (out of 9) with higher poverty rates than the national average. Poverty levels in the West, South and South-West tend to be lower than the national average due to lower inequality.

The above results suggest that regional disparity in Cameroon is mostly due to differences in average real income, an indication of significant between-group inequality. The results of similar analysis applied to rural-urban differences for 1996, 2001 and 2007 are presented in table A5-A7 in the appendix. These results confirm the urban bias noted earlier to the extent that urban poverty is consistently below the national average while rural poverty is consistently above. A close look at the Shapley contributions reveals that rural poverty would be much higher than the national average if rural inequality were not lower than the national average. For instance in 2007, the incidence of rural poverty would have been about 21 percentage points higher than the national average if rural inequality had been at the level of overall inequality. The observed difference stood at 15 points because the inequality effect was -6 percentage points.

Table 2.5a. Shapley Decomposition of Regional Differences in Poverty for 2001

	Headcount			Poverty Gap			Squared Poverty Gap			Watts		
	Difference	Scale	Inequality	Difference	Scale	Inequality	Difference	Scale	Inequality	Difference	Scale	Inequality
Douala	-29.29	-29.85	0.56	-10.71	-10.52	-0.19	-4.84	-4.64	-0.19	-14.76	-14.32	-0.45
Yaoundé	-26.84	-30.08	3.24	-10.13	-10.56	0.43	-4.70	-4.73	0.04	-14.10	-14.45	0.35
Adamaoua	8.20	14.54	-6.34	2.60	7.02	-4.42	0.83	3.70	-2.88	2.94	10.27	-7.33
Center	8.00	15.07	-7.07	2.19	6.42	-4.24	1.08	3.28	-2.21	3.67	9.40	-5.73
East	3.80	9.34	-5.54	2.58	5.70	-3.12	1.20	3.07	-1.88	3.48	8.43	-4.95
Far-North	16.11	22.73	-6.62	6.05	11.11	-5.05	2.62	5.96	-3.33	7.97	16.45	-8.48
CoastT	-4.70	2.47	-7.17	-2.70	0.71	-3.40	-1.38	0.36	-1.74	-3.95	1.02	-4.97
North	9.90	13.30	-3.40	2.71	6.36	-3.65	0.81	3.30	-2.49	3.05	9.24	-6.19
North-West	12.30	12.69	-0.39	8.11	7.08	1.03	5.15	4.10	1.05	13.45	11.00	2.45
West	0.15	10.17	-10.02	-1.69	4.33	-6.02	-1.36	2.21	-3.57	-3.19	6.22	-9.41
South	-8.63	3.94	-12.57	-5.43	1.61	-7.04	-3.13	0.76	-3.89	-8.34	2.24	-10.58
South-West	-6.36	-2.49	-3.86	-2.28	-1.05	-1.23	-1.04	-0.54	-0.50	-3.25	-1.53	-1.72

Source: Authors' Calculations

Table 2.5b. Shapley Decomposition of Regional Differences in Poverty for 2007

	Headcount			Poverty Gap			Squared Poverty Gap			Watts		
	Difference	Scale	Inequality	Difference	Scale	Inequality	Difference	Scale	Inequality	Difference	Scale	Inequality
Douala	-34.40	-26.66	-7.73	-11.44	-8.57	-2.87	-4.81	-3.51	-1.30	-15.10	-11.23	-3.88
Yaoundé	-33.96	-26.34	-7.62	-11.35	-8.54	-2.80	-4.79	-3.55	-1.23	-14.99	-11.25	-3.73
Adamaoua	13.05	17.73	-4.68	2.17	7.41	-5.23	0.39	3.69	-3.31	2.35	10.51	-8.16
Center	1.29	14.76	-13.46	-2.83	5.76	-8.59	-1.93	2.69	-4.62	-4.43	7.99	-12.43
East	10.51	16.43	-5.92	3.37	7.98	-4.61	1.20	4.25	-3.05	4.14	11.57	-7.44
Far-North	25.97	24.77	1.20	12.26	14.59	-2.33	6.18	8.43	-2.25	17.23	22.02	-4.79
Coast	-8.82	3.09	-11.91	-4.66	1.34	-6.00	-2.32	0.65	-2.97	-6.51	1.87	-8.38
North	23.76	24.15	-0.39	8.67	12.63	-3.96	3.55	6.68	-3.13	11.32	18.35	-7.03
North-West	11.10	9.66	1.44	4.30	5.61	-1.31	1.81	3.00	-1.19	5.67	8.15	-2.48
West	-10.95	2.85	-13.80	-5.68	0.98	-6.66	-2.76	0.47	-3.22	-7.87	1.36	-9.23
South	-10.64	-2.96	-7.68	-4.94	-1.27	-3.67	-2.38	-0.62	-1.76	-6.80	-1.77	-5.03
South-West	-12.39	-4.46	-7.93	-5.45	-1.78	-3.67	-2.55	-0.85	-1.70	-7.46	-2.47	-4.99

Source: Authors' Calculations

To assess the extent of between-group inequality in the distribution of economic welfare in Cameroon, we perform a threefold decomposition of the overall Gini measure of inequality following the framework proposed by Lambert and Aronson (1993). These authors explain that three basic components account for the overall inequality as measured by the Gini coefficient namely: (1) between group inequality, $\mathbf{G_B}$, (2) within group inequality, $\mathbf{G_W}$ (3) the extent of overlapping among subgroup distributions, $\mathbf{G_O}$ Let $\mathbf{G_Y}$ be the overall Gini for an income distribution for a population partitioned in m groups, then we have the following expression: $G_Y = G_B + G_W + G_O$. The within group component is known to be equal to a weighted sum of within group Gini coefficients where the weight of each group is equal to the product of its population share and its income share.

Our computation is based on a simple three-step procedure which Lambert and Aronson (1993) use to reveal the interrelation between these three components of the Gini coefficient. Like other decompositions used in this paper, this one also relies on a counterfactual comparison of distributions. Suppose that we start from a position of perfect equality where every individual (household) receives the overall mean income. We can introduce between group inequality by giving everybody, not the overall mean, but the mean income of her group. The Gini coefficient for this new distribution measures between group inequality.

Next consider the distribution obtained as follows. Keep individuals lined up by increasing order of group means. Thus all people from the poorest group will appear first in the income parade and members of the richest group will all appear last. Then, within each group, give people their actual incomes and sort them by increasing level of income within each group. The resulting distribution is such that the richest person in group (k-1) finds herself standing next to the poorest person in group k. By construction, this distribution accounts for both between group and within group inequality. We can net the between group component out by subtracting $\mathbf{G_B}$ from the concentration coefficient of this "lexicographic income parade"[14]. This operation yields an estimate of the within group component, $\mathbf{G_W}$.

[14] This terminology is from Lambert and Aronson (1993)

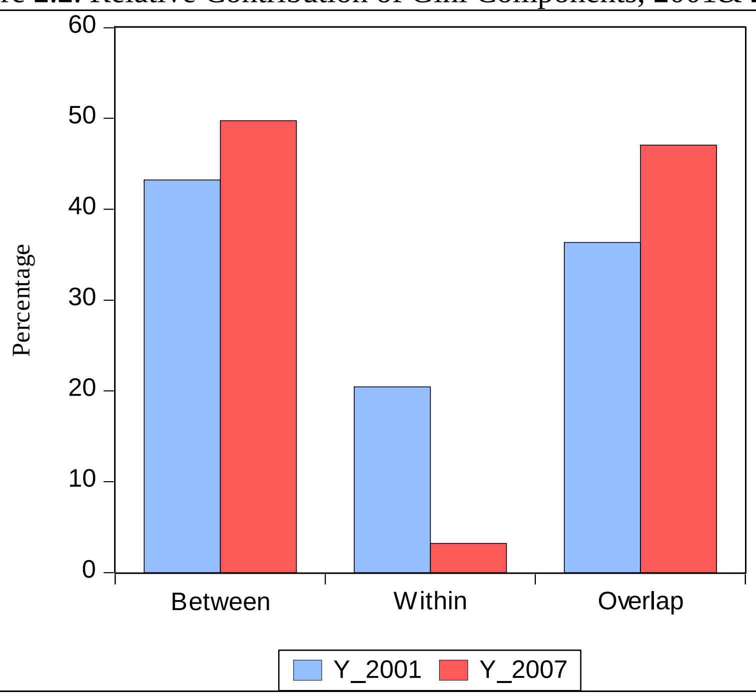
Finally, consider sorting individuals by increasing order of income their actual income with no attention paid to group membership. People are now ranked for the overall poorest to the overall richest. To the extent that there is overlapping between subgroup distributions, some people will shift ranks relative to their positions in the lexicographic parade. The extent of this overlapping is measured by subtracting the concentration coefficient of the lexicographic distribution (which embeds both the between and within group components) from the overall Gini coefficient.

Table 2.6. A Threefold Decomposition of the Gini Measure of Inequality for 2001&2007

	Level (in percentage)		Relative (in percentage)	
	2001	2007	2001	2007
Between-Group	17.46	19.38	43.21	49.75
Within-Group	8.26	1.25	20.45	3.21
Overlapping	14.69	18.33	36.35	47.05
Overall	40.41	38.96	100	100

Source:Authors' Calculations

Figure 2.2. Relative Contribution of Gini Components, 2001& 2007



Source: Authors' Calculations

Our application of this procedure to data for 2001 and 2007 led to results reported in both table 2.6 and figure 2.2. The decomposition is based on the same groups listed in table 2.5. These results confirm the conclusion we reached on the basis of Shapley analysis of regional differences in Poverty. Between-group inequality is indeed a major component of overall inequality (as measured by the Gini Coefficient) in Cameroon. This component has increased from 43 percent of the total in 2001 to almost 50 percent in 2007. The results also reveal that there is significant overlapping between regional distributions and a low level of within group inequality. This dimension significantly declined over time, from about 20 percent in 2001 t0 1 percent in 2007.

3. Sources of Change in the Distribution of Economic Welfare

Ravallion (2001) argues that disparities in *access* to human and physical capital, and differences in *returns* to such assets are the main determinants of income inequality. Furthermore these disparities are most likely to inhibit overall growth prospects. The promotion of pro-poor economic growth thus entails paying particular attention to these factors. In this section we resort to the Oaxaca-Blinder decomposition framework to try to identify the effect of household characteristics and that of the returns to those characteristics on the distribution of economic welfare. We first explain the structure of the framework along with empirical implementation. We then discuss the results of its application to the data at hand.

The Oaxaca-Blinder Decomposition Framework

Just as in the case of the Shapley decomposition, the main *objective of the Oaxaca-Blinder method is to identify the factors that might account for the changes from one distribution to another*. Within this framework, we need a model linking the outcome of interest to individual (or household) characteristics. We therefore maintain the assumption that the welfare indicator **y** (e.g. real expenditure) has a joint distribution with individual characteristics such as age, education, occupation, area of residence and family size represented by a vector **x**. The methodology works for a summary statistic such as the conditional mean and for whole distributions.

Suppose that we are interested in explaining the difference in *conditional mean outcome* between two distributions. Following Bauer and Sinning (2008), write the conditional mean outcome as $E(y_t \mid x_t, \beta_t)$ for t=0, 1. This expression says that outcome **y** depends on some characteristics **x**, and the associated parameters, **β**. The index **t** could stand for two socioeconomic groups such as rural versus urban households or for two different time periods. Here we stick to the time dimension. The difference in conditional means between year 1 and year 0 can be written as.

$$\Delta M = E(y_1 \mid x_1, \beta_1) - E(y_0 \mid x_0, \beta_0) \tag{3.1}$$

Choosing year 0 as a reference group implies the *counterfactual* mean outcome for year 1 can be written as: $E(y_1 \mid x_1, \beta_0)$. Adding this value to and subtracting it from (3.1) leads to the following general two-fold decomposition.

$$\Delta M_0 = [E(y_1 \mid x_1, \beta_1) - E(y_1 \mid x_1, \beta_0)] + [E(y_1 \mid x_1, \beta_0) - E(y_0 \mid x_0, \beta_0)] \tag{3.2}$$

The first component on the right hand side is the *price effect*, the part of the differential that is due to differences in coefficients. That price effect represents how the average outcome of in year 1 would change if the observed characteristics were evaluated with coefficients applicable to year 0. The second component represents the *endowment effect* (also known as the composition effect), the part of outcome differential that is due to differences in the covariates. In other words, this component measures the change in the average outcome year 0 if the observed characteristics had been those of year 1.

Similarly, using the end period as reference, we would get the following decomposition.

$$\Delta M_1 = [E(y_0 \mid x_0, \beta_1) - E(y_0 \mid x_0, \beta_0)] + [E(y_1 \mid x_1, \beta_1) - E(y_0 \mid x_0, \beta_1)] \tag{3.3}$$

Again the first term on the right hand side represents the price effect while the second term measures the endowment effect[15].

It is possible to obtain a three-fold decomposition[16] of the form $\Delta M_1^*(3) = A + B + C = A + B + (C_1 + C_2)$ where **A** stands for the endowment effect using the end period as reference, and the **B** and **C_k** terms have the structure of a price effect (Bauer and Sinning 2008). The first two components are $A = E(y_1 \mid x_1, \beta_1) - E(y_0 \mid x_0, \beta_1)$; $B = [E(y_1 \mid x_1, \beta_1) - E(y_1 \mid x_1, \beta_0)]$. The two elements of the third component are: $C_1 = [E(y_1 \mid x_1, \beta_0) - E(y_1 \mid x_1, \beta_1)]$ and $C_2 = [E(y_0 \mid x_0, \beta_1) - E(y_0 \mid x_0, \beta_0)]$.

For empirical implementation, we need the sample counterpart, $S(\hat{\beta}_t, x_t)$ of the conditional expectation $E(y_t \mid x_t, \beta_t)$. If we assume that the conditional means are linear in parameters, then the above expressions collapse to the standard Oaxaca-Blinder decomposition. In that case, (3.3) can be written as: $\Delta M_1 = [E(x_0)](\beta_1 - \beta_0) + [E(x_1) - E(x_0)]\beta_1$. Sample means are used to estimate **$E(x_t)$** while **β_t** are estimated by applying ordinary least squares (OLS) method to group-specific equations[17].

The basic Oaxaca-Blinder decomposition described above focuses on a statistic (namely the mean) summarizing the whole distribution. A poverty-focused evaluation creates a need for ways of decomposing whole distributions so as to explain outcomes in the neighborhood of and below the poverty line. We briefly review how to extend the Oaxaca-Blinder decomposition to accommodate whole distributions.

Let the probability density function $J_t(y, x)$; $t = 0,1$ represent the joint distribution of **y** and **x** (standing for a vector of relevant characteristics). The generalized

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[15] In the context of treatment effect analysis we can think of the initial year as representing the control group and the end year the treated. In that case, as noted by Melly (2006) the price effect in (3.2) identifies the average treatment effect on the treated (ATET). When the end year is the reference, the price effect is the average treatment effect on the untreated (ATEU). The endowment effect may be interpreted as selection bias.

[16] The third term is in fact an interaction term and can also be written as $C = [E(y_1 \mid x_1, \beta_0) - E(y_0 \mid x_0, \beta_0)] - [E(y_1 \mid x_1, \beta_1) - E(y_0 \mid x_0, \beta_1)]$.

[17] Bauer and Sinning (2008) explain how to apply this methodology to models with discrete or limited dependent variables.

Oaxaca-Blinder decomposition is based on the marginal distribution of income, $f_t(y)$, which can be obtained by integrating the **x**'s out of the joint density. For the purpose of our decomposition, it is useful to invoke the factorization principle and write the joint distribution of income and characteristics as the product of the distribution of income conditional on the characteristics, $g_t(y \mid x)$, and the joint distribution of the characteristics, $h_t(x)$. These are the two factors driving the generalized Oaxaca-Blinder decomposition. Any change in the marginal distribution induced by a variation in the distribution of characteristics (*ceteris paribus*) represents the *endowment effect,* while any change in the distribution associated with a variation in the conditional distribution is interpreted as the *price-behavioral effect* (Bourguignon and Ferreira 2005).

To see clearly what is involved, we express the joint distribution as a product of the two underlying distribution: $J_t(y,x) = g_t(y \mid x)h_t(x); \quad t = 0,1$. On the basis of this factorization, we can write the marginal distribution[18] of income in a way that facilitates the expression and interpretation of the decomposition, that is: $f_t(y) \equiv f_{gt}^{ht}(y)$. Thus the observed change in the distribution of income between the two periods (or groups) is equal to:

$$\Delta f = f_1(y) - f_0(y) \equiv f_{g1}^{h1}(y) - f_{g0}^{h0}(y) \tag{3.4}$$

We can add to and subtract from the difference defined in (3.4) the following counterfactual[19]: $f_{g0}^{h1}(y)$. This is the marginal distribution that would obtain if the conditional distribution were that of period 0, and the joint distribution of characteristics that prevailing in period 1. This transformation leads us to the following generalized decomposition.

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[18] To clarify our notation, we consider the simplest case where **x** represents a single characteristic. No loss of generality is involved. The marginal distribution of **y** is equal to $f_t(y) = \int_0^{mx} J_t(y,x)dx$, where **mx** stands for the maximum value of **x**. Equivalently, $f_{gt}^{ht}(y) = \int_0^{mx} g_t(y \mid x)h_t(x)dx$.

[19] In the simple case of one characteristic presented in footnote 18, this counterfactual is defined by: $f_{g0}^{h1}(y) = \int_0^{mx} g_0(y \mid x)h_1(x)dx$.

$$\Delta f(y) = [f_{g1}^{h1}(y) - f_{g0}^{h1}(y)] + [f_{g0}^{h1}(y) - f_{g0}^{h0}(y)] \tag{3.5}$$

The configuration of the indices (subscripts and superscripts) for the marginal distributions involved in (3.5) suggests an interpretation of the various components of the decomposition. The first component on the right hand side is the *price-behavioral effect* (linked to the change in the conditional distribution of income). The second component measures the *endowment effect* (based on changes in the joint distribution of characteristics).

Another relevant counterfactual is the marginal distribution associated with the conditional of period 1 and the distribution of characteristics of period 0: $f_{g1}^{h0}(y)$. Using this counterfactual leads to the following decomposition

$$\Delta f(y) = [f_{g1}^{h1}(y) - f_{g1}^{h0}(y)] + [f_{g1}^{h0}(y) - f_{g0}^{h0}(y)] \tag{3.6}$$

The endowment effect now is computed holding constant the first period (or group) conditional distribution. The price-behavioral effect is computed holding constant the distribution of endowments of period 0. There is no reason why these two decompositions should be equivalent. Thus, this generalized approach[20] also suffers from path dependence (Bourguignon and Ferreira 2005).

Empirical implementation of this generalized approach requires an estimator of the whole conditional distribution (not just of a summary statistic) and a way to derive marginal distributions from estimates generated by this estimator. Our study relies on quantile[21] regression to estimate conditional distributions and on the formal link between conditional and marginal quantiles.

[20] Finally, it is instructive to note that the decomposition principle underlying (3.5) and (3.6) also underlies the Shapley decomposition we used in Section 2 of this paper. In that case, the distribution of income is represented by the mean and the Lorenz curve. Counterfactual distributions are obtained by changing one of these factors at a time holding the other one fixed. In fact, Bourguignon and Ferreira (2005) explain that this principle applies to any statistic defined on the distribution of income characterized by the marginal density function **f(y)**. Such statistics include the mean, summary inequality and poverty measures.

[21] Quantile (or fractile) is a cut-off value of a variable such that a given fraction of values lie at or below the cut-off point (Freund and Williams 1991). For instance, the performance of a student on a standardized test is said to be at the τ^{th} quantile if a proportion τ of scores in the reference group are less than or equal to

In general, a regression of a variable **y** on a set of variables **x** is any characteristic of the probability distribution of **y** conditional on **x** which is considered a function of **x**. Regression analysis can usefully be framed within the logic of *conditional prediction*. A best predictor of **y** given **x** minimizes the expected loss associated with the chosen loss function. Any regression can therefore be characterized by the underlying loss function (Manski 1991). Let **p(x)** denote a predictor for **y**, **L(.)** a loss function, and **E[L(y-p(x))|x]** the expected loss associated with predicting **y** with **p**, conditional on **x.** For a given loss function, the value of the best predictor depends exclusively on the probability distribution of **y** conditional on **x**. Thus, as a function of **x**, the best predictor is a regression to the extent that it offers a succinct description of how the location of **y** varies with **x**.

Quantile regression is characterized by the following absolute loss function.

$$L(u) = (1-\tau)\,|u|\; if\;\; u \le 0; \quad L(u) = \tau\,|u|\; if \quad u \ge 0, \tag{3.7}$$

where **τ** is a specified constant in the interval (0, 1). The associated best-predictor is the **τ**-quantile of **y** conditional on **x**. In other words, it is the smallest number **q(τ)** such that: $\Pr\{y \le q \mid x\} = \tau$. The underlying loss function is asymmetric except for the case where **τ=0.5** which corresponds to the conditional median. As **τ** increases, the loss function penalizes under-predictions of **y** more heavily than over-predictions.

Quantile regression is usually defined by writing **q(τ)** as a function of relevant covariates. Assuming a linear relationship between the conditional quantile of the response variable (**y_i**) and the covariates (**x_i**), we write: $q_y(\tau \mid x_i, \beta(\tau)) = x_i \beta(\tau)$. This expression represents the *conditional quantile function* or CQF (Angrist and Pischke 2009). Estimation of the vector of coefficients associated with the conditional quantile solves the following mathematical programming problem:

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hers. Formally, let **y** be a random variable with probability distribution function $F(z) = \Pr\{y \le z\}$. The **τ^{th}** quantile of **y** is the smallest value of **y**, say **q(τ)** such that: $F(z) \ge \tau, \quad 0 < \tau < 1$. Equivalently we write: $q(\tau) = \inf\{z : F(z) \ge \tau\} = F^{-1}(\tau)$.

$$\hat{\beta}_n(\tau) = \arg\min_{\beta(\tau)} \left\{ \sum_{i=1}^{n} \rho_\tau [y_i - x_i \beta(\tau)] \right\} \quad (3.8)$$

where **ρ_τ()** stands for the loss function, which is also known as the check function. The above problem can indeed be solved by linear programming methods (Koenker 2005).

To link conditional quantiles to marginal quantiles, Angrist and Pischke (2009) start from the observation that the proportion of the population below **q** conditional on **x** is equal to the proportion of conditional quantiles that are below **q**. Let **I(u)** be the indicator function that takes a value of 1 if its argument is true and 0 otherwise. Let $F_{y/x}()$ stand for the conditional cumulative distribution function (CDF). Thus the proportion of the population for which the outcome **y** is less than **q** is equal to: $F_{y/x}(q \mid x) = \int_0^1 I\left[F_{y/x}^{-1}(\tau \mid x) < q\right] d\tau$, where the term on the right hand side is equal to the proportion of conditional quantiles[22] that are below **q**. Equivalently, we have: $F_{y/x}(q \mid x) = \int_0^1 I\left[x\beta(\tau) < q\right] d\tau$. The marginal distribution of **y**, $F_y()$ from which we derive the marginal quantiles $q(\tau) = \inf\{z : F(z) \geq \tau\} = F_y^{-1}(\tau)$, is obtained by integrating the conditional distribution over the whole range of the distribution of the covariates (Melly 2005). The resulting expression is: $F_y(q) = \int \left(\int_0^1 I\left[x\beta(\tau) < q\right] d\tau \right) dF_x$. The sample analog of this expression based on an estimation of quantile regressions at every percentile for a sample of size **n** is the following (Angrist and Pischke 2009).

$$\hat{F}_y(q) = \frac{1}{n} \sum_{i=1}^{n} \left(\frac{1}{100} \sum_{\tau=0}^{1} I[x_i \hat{\beta}(\tau) < q] \right) \quad (3.9)$$

[22] Note that the inverse of the conditional CDF is also the conditional quantile function. That is $F_{y/x}^{-1}(\tau \mid x) = q(\tau \mid x, \beta(\tau)) = x\beta(\tau)$.

The marginal quantile corresponding to the above estimator of the marginal distribution of the response variable is obtained by inverting (3.9). In other words, $q_\tau(x_i, \hat{\beta}(\tau)) = \inf\{q : \hat{F}_y(q) \geq \tau\}$.

The generalized Oaxaca-Blinder decomposition described by equations (3.5) and (3.6) can equivalently be stated in terms of these marginal quantiles. The observed change in the marginal distribution of the response variable is now written as: $\Delta q_\tau = q_\tau(x_1, \hat{\beta}_1(\tau)) - q_\tau(x_0, \hat{\beta}_0(\tau))$. To distinguish the endowment effect from the price effect, we subtract from and add to this expression the counterfactual outcome: $q_\tau(x_1, \hat{\beta}_0(\tau))$. This counterfactual involves the characteristics of group 1 evaluated with the prices (coefficients) of period 0. The corresponding decomposition analogous to expression (4.5) is the following.

$$\Delta q_\tau = \left[q_\tau(x_1, \hat{\beta}_1(\tau)) - q_\tau(x_1, \hat{\beta}_0(\tau)) \right] + \left[q_\tau(x_1, \hat{\beta}_0(\tau)) - q_\tau(x_0, \hat{\beta}_0(\tau)) \right] \quad (3.10)$$

Again, the first element on the right hand side represents the endowment effect, while the second is the price effect.

Alternatively, a decomposition corresponding to (3.6) can be written as:

$$\Delta q_\tau = \left[q_\tau(x_1, \hat{\beta}_1(\tau)) - q_\tau(x_0, \hat{\beta}_1(\tau)) \right] + \left[q_\tau(x_0, \hat{\beta}_1(\tau)) - q_\tau(x_0, \hat{\beta}_0(\tau)) \right] \quad (3.11)$$

The operating counterfactual[23] in this case is: $q_\tau(x_0, \hat{\beta}_1(\tau))$.

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[23] The two counterfactuals involved in this generalized decomposition are obtained by inverting marginal distributions of the form: $\hat{F}_y(q(x_k(i), \hat{\beta}_t(\tau)) = \frac{1}{n}\sum_{i=1}^{n}\left(\frac{1}{100}\sum_{\tau=0}^{1} I[x_k(i)\hat{\beta}_t(\tau) < q]\right), \quad \forall k, t = 0,1$.

Our empirical implementation relies on a Stata routine, **rqdeco**, written by Melly (2006). The routine decomposes differences in distributions as follows. The distribution of the outcome variable conditional on characteristics is estimated by linear quantile regression. Both the conditional and unconditional distributions are approximated by a number of quantiles supplied by the user. Unconditional distributions are obtained from conditional ones by integration over the regressors. The difference in outcome between

Empirical Results

The regression framework allows us to analyze the conditional distribution of the logarithm of real per adult equivalent expenditure given observed household characteristics. We consider four broad categories of characteristics: (1) *Demographics* (gender of household head, age of household head, and household composition in terms of proportions of various age groups up to age 25); (2) *Household and community assets* (years of schooling of head of household, land ownership, access to credit, at least one migrant in household, distance to nearest hospital, distance to nearest tarred road); (3) *Sector of employment* (public sector, formal private sector, smallholder agriculture, informal non-agriculture, unemployed[24]; and (4) *Area/province of residenc*e[25].

Our estimates of the marginal impact of each characteristic on household welfare in 2001 and 2007 are reported in tables B1 and B2 in the appendix. All demographic variables are statistically significant. As expected, an increase in any component of household membership reduces welfare. The male dummy variable has a negative sign in 2001 and a positive one in 2007. In other words male-headed household fared better in 2007 than the reference female-headed household and worse in 2001, other things being equal. Among the non-geographical characteristics, the following have the highest positive and statistically significant impact on household welfare: (1) formal sector employment (public or private), (2) access to credit and (3) years of schooling of the head of household. Interestingly, the impact of public sector employment is consistently higher than that of the formal private sector. Yet the public sector has the reputation of being less productive than the private sector. Having at least one migrant in the household had a positive and significant impact on welfare in 2007 and not in 2001. The coefficient for agricultural employment is statistically significant in both years but has a negative sign.

period 1 and 0 at each unconditional quantile is then decomposed (using appropriate counterfactuals) into a part that is due to differences in the distribution of characteristics and another that is explained by differences in coefficients. In the context of treatment effect evaluation, if year 0 is the control then the price effect in (3.11) is the quantile treatment effect on the treated (QTET). The related average effect can be recovered by integrating over quantiles.

[24] The reference group here is not in the labor force.

[25] Our choice of dummy variables implies that the reference household (conditional on characteristics represented by continuous variables) lives in the rural area of the central province with the head out of the labor force, has no access to credit and no migrant.

This is certainly another manifestation of urban bias noted earlier. Indeed, these regression results confirm that urban residence has a strong positive impact on welfare.

The OLS results discussed above give only the average impact of the characteristic of interest on household welfare. We now consider results from quantile regression to learn how these impacts vary across quantiles. It is much easier to deal with plots of the coefficient estimates at various quantiles rather than the estimates themselves. Fundamentally these plots provide information that can be used to summarize the impact of each covariate on inequality in the conditional distribution of real per adult equivalent expenditure. Given that the dependent variable is in log form, the difference in the coefficient estimates at two different quantiles is a measure of the impact of the corresponding covariates on the log of the ratio real per adult equivalent expenditure at these quantiles (Machado and Mata 2005). To keep our story manageable, we focus on three groups of covariates, namely, household assets (education of head, access to credit, and having a migrant), sector of employment, and area of residence (urban-rural). The effects of these characteristics are plotted in figures B1 through B7 (in appendix B).

Figure B1 shows the impact of years of schooling of the head of household on welfare for 2001 and 2007 respectively. Returns to education (in terms of real per adult equivalent expenditure) are positive and statistically significant across all quantiles. The conditional-quantile function for 2001 is right-skewed because the slopes below the 75th quantile are more or less flat while those above are steep. Not surprisingly, economic welfare increases with education over the whole distribution. In addition, we note that (except perhaps for the 10th quantile), the impact of education was higher in 2001 than in 2007. This could be a manifestation of the lack of economic growth experienced by the country over that period. Indeed the lack of employment opportunities for the educated is a latent source of social tension in Cameroon.

The conditional quantile functions for the returns to access to credit presented in figure B2 show a similar pattern as those for education. The 2001 curve dominates the 2007 one. The effects of this covariate are much higher at the top of the distribution than at the lower end. While the returns to access to credit remain positive for all quantiles in 2007, the corresponding conditional quantile function is much flatter than the one for

2001. These returns are very small for the poorest households and increase steeply past the 80th quantile. This increase is much lower than the one observed in 2001.

The results for the impact of having at least one migrant (figure B3) are qualitatively consistent with the OLS discussed earlier. Having at least one migrant in the household in 2001 made no significant difference for any household over the entire conditional distribution. No coefficient in the underlying quantile process is significantly different from zero in a statistical sense. But all these coefficients are greater than zero and statistically significant in 2007. In addition, the associated conditional quantile function is skewed to the right because the slopes are more or less flat below the median and those above the median increase steeply. Thus having a migrant in the household contributed to increasing inequality in the distribution of welfare in 2007 and not in 2001.

With respect to the effects of the sector of employment presented in figures B4, B5 and B7, we note that households engaged in agriculture are worse off across quantiles and years, than those employed in other sectors of the economy. Indeed, all coefficients are negative and statistically significant so the conditional quantile functions are downward sloping. This shape implies that the penalty associated with being employed in agriculture hurts the households at the lower end of the distribution than those at the top. The returns to employment in the formal sector (figures B5&B6) are significantly positive in both years and for all quantiles. But there is a reversal in the pattern of the returns to public and formal private sector employment between 2001 and 2007. In 2001 both conditional distributions are skewed to the right suggesting that returns to formal employment are much higher for households located at the top of the distribution. The conditional quantile function for the public sector dominates that for the formal private sector up to the neighborhood of the 90th quantile. At that point the latter overtakes the former and shoots up dramatically. This dominance relation between the public sector and the formal private sector also prevails in 2007. However, this time, both functions are downward sloping indicating that the economic crisis may have hurt more those households at the top of the distribution.

On the basis of figure B7 we conclude that *urban bias* is the bedrock determinant of inequality in the distribution of economic welfare in Cameroon and the situation may be getting worse. The conditional quantile distribution function for 2001 has a U-shape with a bottom at about the median. This indicates that the urban-rural gap was much more pronounced at both ends of the distribution compared to households located near the median. The conditional quantile distribution function for 2007 dominates entirely that for 2001. In addition, it is monotonically increasing across quantiles. The increase accelerates past the 80th quantile. Rich urban households are thus way better off than their rural counterparts.

The generalized Oaxaca-Blinder decomposition described earlier provides clues that might explain these observed changes in the distribution of economic welfare between 2001 and 2007 both overall and for the urban and rural areas.

Figure 3.1 Differences in the Distribution of Living Standards between 2001 and 2007

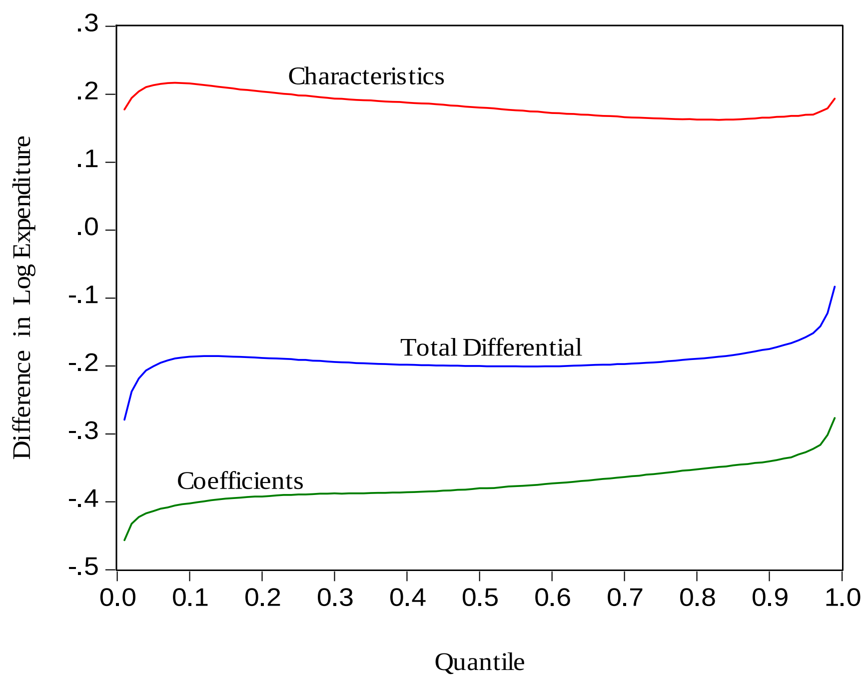
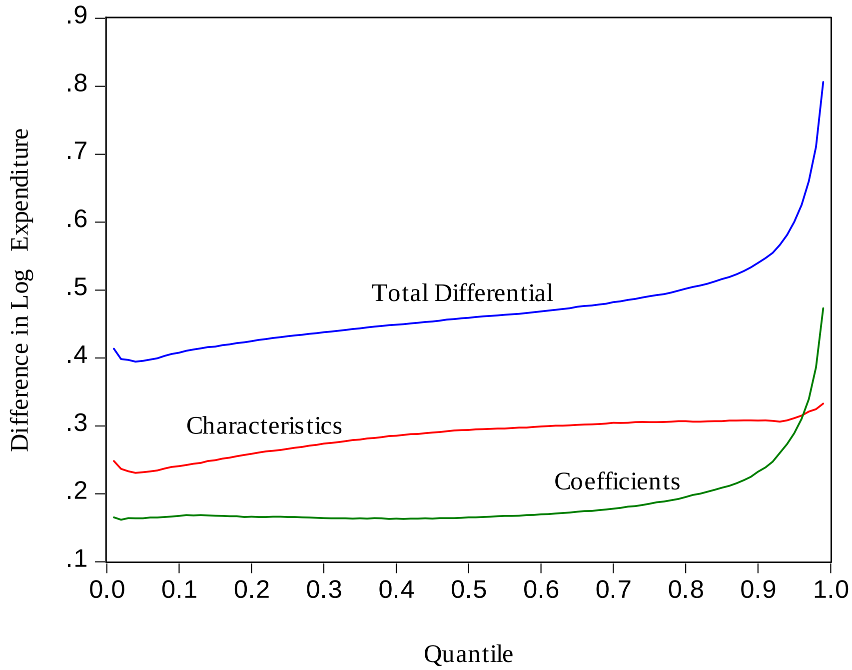


Figure 3.1 shows a decomposition of the total difference in the distribution of welfare into two components. The first component shows the part that is due to changes in the distribution of characteristics while the second represents the contribution of changes in the distribution of returns to those characteristics. These two components pull in opposite direction. The effect of characteristics is positive and shows a slight decline

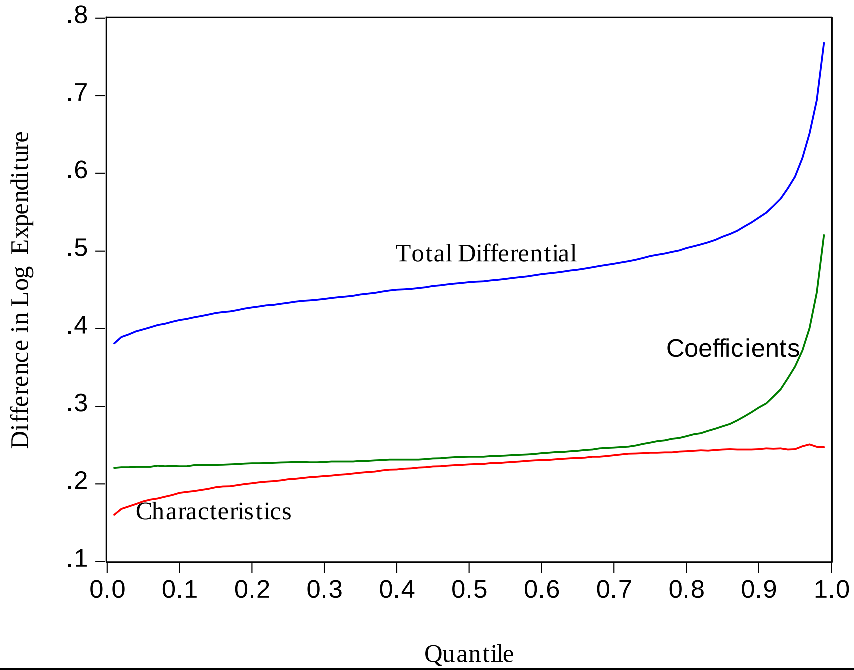
across quantiles. The effect of returns to those characteristics is negative and is upward sloping. This effect thus tends to be higher in absolute value for richer households.

Figure 3.2 Rural-Urban Differential in 2001



Given the importance of urban bias in the pattern of economic growth in Cameroon, we also present a decomposition of the urban-rural differential in 2001 and 2007 (figures 3.2&3.3). In both years the total differential is increasing across quantiles. The increase is steeper at the top of the distribution. In 2001 the endowment effect dominates the return effect up to the neighborhood of the 95th quantile. This pattern is reversed in 2007 as the returns effect dominates the endowment effect over the entire distribution.

Figure 3.3 Rural-Urban Differential in 2007



4. Pro-Poorness

The profile of economic growth and poverty outlined in section 2 of this paper for the 1996-2007 period clearly indicates that economic growth was accompanied by significant poverty reduction between 1996 and 2001 and that poverty barely decreased between 2001 and 2007. How desirable is this outcome socially? Any answer to this question is relative to the chosen *social evaluation* function. We propose to base our assessment on the concept of *pro-poorness*. Generally speaking, a pattern of economic growth is pro-poor if it induces an outcome that is favorable to the poor, in some sense. Fundamentally, assessing the pro-poorness of economic growth is an exercise in *social evaluation* to the extent that it ranks social states (represented by growth incidence curves) on the basis of variations in *individual* and *social welfare* attributable to the underlying process. We therefore need to specify an impact indicator both at the individual and social level and a decision rule for ranking growth patterns.

In our case, individual welfare at the household level is measured by per adult equivalent expenditure, which we call **y**. If **μ** stands for the mean of **y**, then following Essama-Nssah and Lambert (2009), we choose to measure the impact of growth on individual welfare by the point elasticity (or responsiveness) of **y** with respect to **μ**. We define this as follows,

$$q(y) = \frac{\mu}{y} \cdot \frac{dy}{d\mu} = \frac{d\ln(y)}{d\ln(\mu)} \tag{4.1}$$

This local impact indicator can also be written as $q(y) = \frac{d\ln(y)}{\gamma}$ where $\gamma = d\ln(\mu)$, the growth rate of the mean of **y**. The function **q(y)** defines a growth pattern and is essentially a normalized growth incidence curve (GIC)[26].

The next component of the evaluation framework entails the specification of an aggregation rule that translate individual outcomes into social impact. Poverty-focused evaluation requires that we pay special attention to the outcomes of the poor. We translate this concern for the poor by choosing evaluative weights implied by the class of additively decomposable poverty measures defined by (2.1). Thus the poverty impact of a change in individual welfare is equal to: $d\psi(y \mid z) = \psi'(y \mid z)dy$ where $\psi'(y \mid z)$ is the first-order derivative with respect to **x** of the chosen indicator of individual deprivation. Let $\omega(y) = \gamma\psi'(y \mid z)y$, then the poverty impact can be linked to a growth pattern as follows.

$$d\psi(y \mid z) = \omega(y)q(y) \tag{4.2}$$

In the above expression, we interpret the coefficient of **q(y)** as the social value (or social weight) attached to individual outcome **q(y)** by the chosen evaluation function. We obtain an indicator of social impact by averaging individual cases defined by (4.2) as

[26] Ravallion and Chen's (2003) growth incidence curve shows the growth rate of income at the p^{th} quantile of income distribution. It is defined by the following expression $g(p) = d\ln(y)$ where $p = \int_0^y f(t)dt$, and $f()$ is the density function characterizing the distribution of income.

follows: $dP = \int_0^z \omega(y) q(y) f(y) dy$. This indicator can be expressed as an elasticity by normalizing it with respect to **γP**.

$$\varphi_P(q) = \frac{1}{P}\int_0^z y\psi'(y \mid z) q(y) f(y) dy \qquad (4.3)$$

The social impact indicator defined by equation (4.3) is the growth elasticity of the poverty index **P** for the pattern **q(y)**[27]. The first-order derivative of the individual deprivation function is assumed to be negative. It follows that the growth elasticity of poverty will be negative if $q(y) > 0 \quad \forall y < z$. In other words, an increase in economic welfare among the poor reduces poverty. The issue is whether to count any poverty reduction as pro-poor.

Table 4.1. Shapley Decomposition of the Growth Elasticity of Poverty

	Overall	Scale	Inequality
		1996-2001	
Headcount	-1.34	-1.29	-0.05
Poverty Gap	-1.88	-1.85	-0.04
Squared Poverty Gap	-2.25	-2.27	0.02
Watts	-2.00	-2.02	0.02
		2001-2007	
Headcount	-0.24	-0.10	-0.13
Poverty Gap	-1.27	-0.17	-1.10
Squared Poverty Gap	-3.35	-0.22	-3.13
Watts	-2.54	-0.19	-2.35
		1996-2007	
Headcount	-1.39	-1.29	-0.10
Poverty Gap	-2.10	-1.93	-0.17
Squared Poverty Gap	-2.77	-2.45	-0.32
Watts	-2.40	-2.14	-0.26

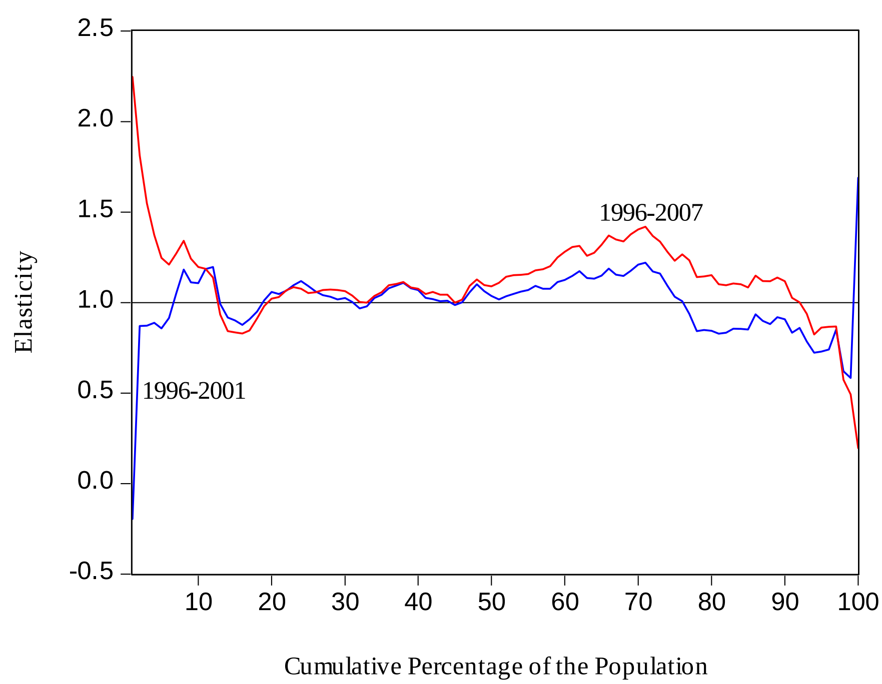
Source: Authors' Calculations

Osmani (2005) argues that poverty-reducing growth should not be regarded as inevitably pro-poor given a general dissatisfaction with the scale of poverty reduction

[27] See Essama-Nssah and Lambert (2009) for a formal proof. These authors also show that the growth elasticity of the headcount index is equal to $\varphi_H(q) = -\frac{zq(z)f(z)}{H}$.

brought about by past growth experience in developing countries. He recommends that economic growth be considered pro-poor if it achieves an absolute reduction in poverty greater than it would be in a *benchmark* case[28]. Such a benchmark could be either a counterfactual or a desirable growth pattern. We follow Osmani's recommendation and choose a distribution-neutral growth pattern as a benchmark. Thus economic growth is considered pro-poor for a poverty index **P** if it induces an absolute reduction in poverty greater than would a distribution neutral pattern. Kakwani and Son (2008) also propose an alternative benchmark where the benefits of growth are shared equally by every member of society. We consider this alternative later on.

Figure 4.1 The Pattern of Growth in Cameroon, 1996-2007



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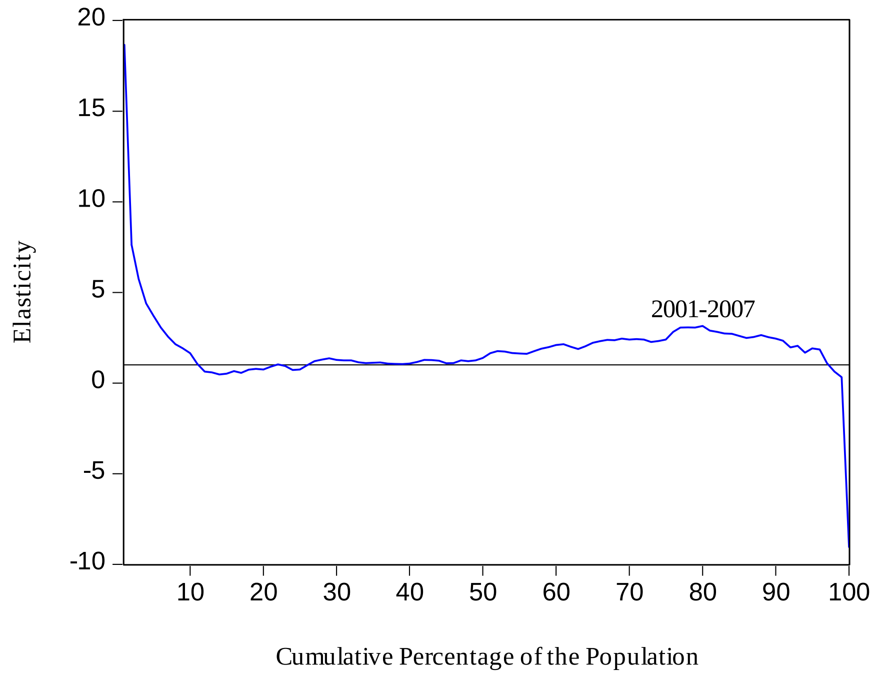
[28] Some authors such as Kakwani and Pernia (2000) consider economic growth pro-poor only when the income of the poor grows faster than that of the rich. This is the so-called relative approach to pro-poorness. The absolute approach takes into consideration changes in both the rate of growth and the distribution of gains. In that perspective economic growth is pro-poor if it leads to poverty reduction for some choice of a poverty measure (e.g. Ravallion and Chen 2003). Kakwani and Son (2008) provide a full characterization of various measures of pro-poorness.

Under distributional neutrality, the elasticity of **y** with respect to **μ** is equal to 1 for all **y**. We can therefore represent the corresponding growth pattern as $q_0(y) \equiv 1 \; \forall y$. In that case, the growth elasticity of poverty is equal to: $\varphi_P(q_0) = \frac{1}{P}\int_0^z y\psi'(y \mid z) f(y) dy$. In fact there is a Shapley decomposition of the overall growth elasticity of poverty into scale and inequality components. The scale component is equal to the growth elasticity under distributional neutrality. Let $\lambda(y) = [q(y) - 1]$, then the inequality component can be written as: $\varphi_P(\lambda) = \frac{1}{P}\int_0^z y\psi'(y \mid z)\lambda(y) f(y) dy$. We can therefore rewrite expression (4.3) as follows.

$$\varphi_P(q) = \frac{1}{P}\int_0^z y\psi'(y \mid z) f(y) dy + \frac{1}{P}\int_0^z y\psi'(y \mid z)\lambda(y) f(y) dy \qquad (4.4)$$

The results of this decomposition for Cameroon based on the method described in Kakwani and Son (2008) are presented in table 4.1. For a given poverty index, the decision to declare a growth pattern pro-poor hinges fundamentally on the magnitude of the overall growth elasticity relative to that of its scale component. The results presented in table 4.1 indicate that in absolute terms poverty has been generally more responsive to changes in mean welfare than in its distribution except for the sub-period 2001-2007 when the inequality component dominates the scale component in absolute value.

Figure 4.2 The Pattern of Growth in Cameroon, 2001-2007



A sufficient (but not necessary) condition for a growth pattern to be pro-poor for a specific poverty index is to have $q(y) > 1 \quad \forall y < z$ (Essama-Nssah and Lambert 2009). Figures 4.1 and 4.2 depict the pattern of economic growth in Cameroon between 1996 and 2007. Given the level of poverty incidence in 1996, 2001 and 2007, and the configuration of these curves up to the headcount, it is obvious that we cannot infer pro-poorness using this sufficiency condition. The growth pattern curve crosses the benchmark several times before the relevant headcount levels. We must resort to specific indicators of pro-poorness to determine the extent to which economic growth in Cameroon has been pro-poor.

Table 4.2 Indicators of Pro-Poorness, 1996-2007

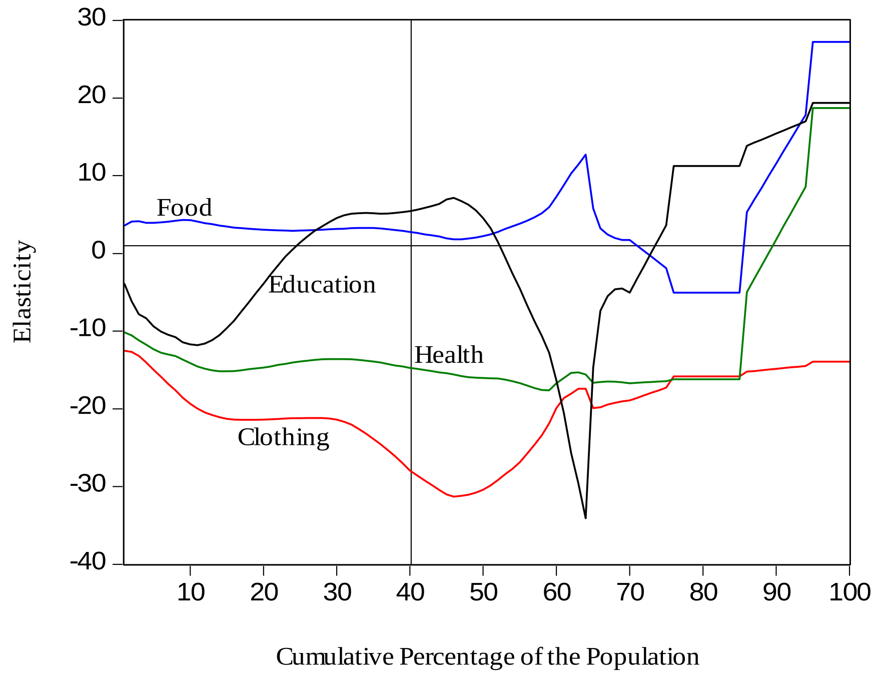
	Relative Measure			Absolute Measure		
	1996-2001	2001-2007	1996-2007	1996-2001	2001-2007	1996-2007
Headcount	1.04	2.40	1.08	0.68	1.54	0.69
Poverty Gap	1.02	7.47	1.09	0.47	3.13	0.48
Squared Poverty Gap	0.99	15.23	1.13	0.39	5.55	0.43
Watts	0.99	13.37	1.12	0.38	5.22	0.45

Source: Authors' Calculations

Table 4.2 presents indicators of pro-poorness for the period under consideration for the headcount ratio and poverty measures from the additively decomposable class. The relative measure of pro-poorness is equal to the overall poverty elasticity divided by its scale component. A pattern of growth is judged pro-poor if this measure is greater than one and the growth rate is positive. On the basis of the values for this indicator presented in table 4.2, we conclude that the amount of poverty reduction obtained between 1996 and 2001 barely matches what would have been achieved under distributional neutrality. Therefore economic growth in Cameroon was not pro-poor for that period relatively speaking. The same indicator shows that growth was pro-poor between 2001 and 2007. However, this conclusion should provide no comfort to policymakers given that the mean per adult equivalent expenditure grew only 0.5 percent on average in real terms. Sustaining a real growth rate of about 2 percent per year between 1996 and 2007 would have produced a relatively pro-poor growth path.

The absolute measure reported in table 4.2 is defined by Kakwani and Son (2008) as the ratio of the overall poverty elasticity to the *neutral absolute growth elasticity of poverty*. The latter is the elasticity of poverty with respect to growth subject to the benefits of growth being shared equally by every member of society. The growth process is pro-poor in the absolute sense if this ratio is greater than one. Our results show that economic growth in Cameroon was not pro-poor in the absolute sense between 1996 and 2001. It was pro-poor between 2001 and 2007, though the rate of growth was very weak over that period.

Figure 4.3. Incidence of Growth on some Expenditure Components (2001-2007)



Finally, we consider the incidence of economic growth on the following components of household expenditure between 2001 and 2007: food, health, education and clothing. Figure 4.3 portrays that incidence in terms of the elasticity of each expenditure component with respect to the overall mean[29]: $q(y_k) = \dfrac{d\ln(y_k)}{d\ln(\mu)}$. This figure reveals that only the incidence curve for food expenditure lies above the benchmark past

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[29] It can be shown that if x has m components then we can write: $yq(y) = \sum_{k=1}^{m} y_k q(y_k)$. This implies that the overall poverty elasticity can be additively decomposed as:

$$\varphi_P(q) = \frac{1}{P}\sum_{k=1}^{m}\int_0^z y_k \psi'(y \mid z) q(y_k) f(y)dy = \sum_{k=1}^{m}\varphi_{kP}(q).$$

Similarly, $y[q(y)-1] = \sum_{k=1}^{m} y_k [q(y_k)-1]$ implies that

$$\varphi_P(\lambda) = \frac{1}{P}\sum_{k=1}^{m}\int_0^z y_k \psi'(y \mid z)[q(y_k)-1] f(y)dy = \sum_{k=1}^{m}\varphi_{kP}(\lambda).$$ See Essama-Nssah and Lambert (2009) for the corresponding decomposition of various measures of pro-poorness.

the headcount level. Household spending on education fell significantly below the benchmark for the majority of poor households (more than half) and sharply declined between the 60th and the 70th percentile (a fact we cannot yet explain). The figure also shows that there was a sharp reduction in spending on health and clothing.

Table 4.3. Gini (Income) Elasticity by Expenditure Component

Inequality Aversion	Food	Health	Education	Clothing	Other Non-Food
			2001		
2	0.74	1.21	1.18	1.06	1.20
3	0.79	1.18	1.19	1.05	1.16
4	0.82	1.16	1.19	1.04	1.13
5	0.84	1.15	1.18	1.03	1.11
6	0.86	1.14	1.17	1.02	1.10
			2007		
2	0.68	1.08	1.08	1.03	1.25
3	0.72	1.09	1.12	1.01	1.21
4	0.75	1.09	1.14	1.01	1.19
5	0.77	1.09	1.15	1.01	1.17
6	0.78	1.09	1.15	1.01	1.16

Source: Authors' Calculations

To reconcile these changes in the pattern of spending between 2001 and 2007 with our finding that economic growth was pro-poor in that period, we consider the distributional characteristics of the expenditure components involved in figure 4.3. Table 4.3 shows the Gini elasticity for each expenditure component. This measure is analogous to income elasticity and is computed as the ratio of the extended concentration coefficient to the overall extended Gini index (Yitzhaki 1994). Its value depends on the chosen level of aversion towards inequality.

If a component is proportional to total expenditure, that component will have no particular effect on the overall inequality as the corresponding concentration index will equal the overall Gini coefficient. The corresponding elasticity will thus be equal to one. We say that an expenditure component has a positive effect on elasticity (i.e. increases inequality) if it rises more than proportionately with overall expenditure. In that case, the elasticity would be greater than one. If this elasticity is less than one, then the component reduces overall inequality. Table 4.3 shows that only food expenditure has a Gini elasticity that is less than one for all level of inequality aversion. All non-food components have elasticity greater than one. Therefore, the sharp reduction (relative to overall expenditure) observed for these components between 2001 and 2007 hurt the non-poor less than the poor, making economic growth relatively pro-poor over that period.

5. Concluding Remarks

The Government of Cameroon has declared poverty reduction through strong and sustainable economic growth the central objective of its development policy. This paper therefore seeks to characterize the pattern of economic growth in Cameroon focusing on its poverty implications. The constant and steady growth achieved throughout the 1970s and much of the 1980s earned the country the status of middle-income economy. However, for the past twenty years or so the country has been battling, with limited success, a severe socioeconomic crisis stemming from a terms-of-trade shock that hit the economy in the mid 1980s and the associated policy response. Our analysis shows poverty fell by about 13 percentage points between 1996 and 2001. But, between 2001 and 2007, growth weakened significantly due to the fact that it was driven by low productivity sectors in the informal segment of the economy. Poverty incidence fell only by 1 percentage point over that period.

A decomposition of changes in poverty outcomes over time shows that the pure growth effect dominates the inequality effect, except for the sub-period 2001-2007. Furthermore, the meager reduction in poverty observed in 2001-2007 is mostly due to a modest reduction in inequality. An application of the same methodology to deviations of regional poverty from the national level reveals a great deal of heterogeneity in the incidence of growth on poverty. Four regions out of 12 experienced significant increases in poverty between 2001 and 2007 while overall poverty tended to decline. We also find that, except for three regions, the real income effect dominates the inequality effect in explaining the divergence between regional and national poverty.

A generalized Oaxaca-Blinder decomposition of distributional changes between 2001 and 2007 reveals that the weak performance of the economy over that period was mainly driven by the negative effect of the returns to household endowments. This supports the view that growth did not occur in high productivity sectors of the formal economy. Looking closely at the pattern of these returns, we find that formal sector employment, access to credit, education and urban residence have highly positive and statistically significant impact on household welfare across quantiles. Male-headed households fared better than female-headed ones in 2007 but not in 2001. Similarly, having at least one migrant in the household made no difference in 2001, but in 2007 it had a positive and significant effect on welfare across quantiles.

One finding that stands out above all else is that *urban bias* and *regional disparity* are the hallmarks of the pattern of economic growth in Cameroon. The urban-rural differential is increasing across quantiles and is much steeper at the top of the distribution. In 2001 these differences were mostly explained by differences in the distribution of characteristics, but in 2007 it appears that the differential is driven by differences in returns to household endowments. In addition, we note that households engaged in smallholder agriculture are worse off across quantiles and across years. Yet agriculture once was the main engine of growth even though its contribution to poverty reduction is debatable.

Has economic growth been pro-poor in Cameroon? Pro-poorness is in the eyes of the beholder as it were. It depends on the value judgments underlying the evaluation. We considered two basic interpretations of pro-poorness. The first is fundamentally relative. It declares a pattern of growth pro-poor (for a given poverty index) if it reduces poverty more than would a distribution-neutral pattern. The second is absolute and considers a pattern of growth pro-poor if it reduces poverty more than a pattern where benefits are shared equally among all members of society (i.e. growth is absolutely distribution-neutral). Our results show that economic growth has not been pro-poor over the period 1996-2001 both in a relative and absolute sense. While there is indication that economic growth has been relatively and absolutely pro-poor between 2001 and 2007, there is little comfort in this given the fact that there was hardly any growth at all. Furthermore, a decomposition of the overall pattern of growth shows that household investment in human capital (health and education) took a serious hit. This observation combined with the urban bias and regional disparity noted above makes us conclude that overall, economic growth in Cameroon has been weakly pro-poor.

What is the policymaker to make of these findings? Fundamentally, the living standard achieved by an individual is an outcome of the interaction between opportunities offered by society and the readiness and ability of the individual to identify and exploit such opportunities. The perspective of development as opportunity equalization promotes a level playing field where individuals have equal opportunities to pursue freely chosen life plans and be spared from extreme deprivation in outcomes. A pro-poor growth pattern must therefore be opportunity-equalizing. As already noted, the pattern of economic growth in Cameroon is characterized by urban bias, regional disparity and a decline of the agricultural sector. This is evidence that opportunities are not equal and raises the issue of the effectiveness of the current Poverty Reduction Strategy. There is therefore a need to re-examine (and possibly reform) the mechanisms governing the allocation of public resources (e.g. investment in infrastructure, health and education) designed to support individuals' efforts to improve their standard of living.

Appendix A: Poverty and Inequality by Region

Table A1 Regional Distribution of Poverty in 2001

	Headcount	Poverty Gap	Squared Poverty Gap	Watts	Population Share
Douala	10.89	2.07	0.72	2.61	9.70
Yaoundé	13.34	2.66	0.86	3.27	8.72
Adamaoua	48.38	15.39	6.38	20.31	4.47
Center	48.18	14.97	6.63	21.05	7.85
East	43.98	15.37	6.75	20.85	4.81
Far North	56.29	18.84	8.18	25.34	17.74
Coast	35.48	10.09	4.17	13.43	4.88
North	50.08	15.50	6.36	20.43	7.26
North West	52.48	20.90	10.70	30.83	11.52
West	40.33	11.10	4.19	14.19	12.06
South	31.55	7.35	2.43	9.04	3.45
South West	33.83	10.50	4.51	14.13	7.53
Cameroon	40.18	12.79	5.55	17.38	100.00

Source: Authors' Calculations

Table A2 Regional Distribution of Poverty in 2007

	Headcount	Poverty Gap	Squared Poverty Gap	Watts	Population Share
Douala	5.50	0.87	0.21	1.01	9.96
Yaoundé	5.94	0.97	0.24	1.13	9.60
Adamaoua	52.95	14.49	5.41	18.46	5.18
Center	41.19	9.48	3.10	11.68	7.63
East	50.40	15.69	6.22	20.25	4.66
Far North	65.87	24.58	11.21	33.35	18.11
Coast	31.08	7.65	2.71	9.60	3.50
North	63.66	20.99	8.58	27.43	9.85
North West	51.00	16.61	6.83	21.78	10.14
West	28.95	6.64	2.27	8.24	10.58
South	29.25	7.37	2.65	9.31	3.24
South West	27.51	6.87	2.47	8.65	7.55
Cameroon	39.90	12.31	5.03	16.11	100.00

Source: Authors' Calculations

Table A3 Regional Inequality in the Distribution of Welfare, 2001

	Gini	Atkinson-1	Atkinson-2	Mean Log Deviation	Theil
Douala	42.46	26.16	39.33	30.33	41.17
Yaoundé	42.59	26.00	39.88	30.11	37.79
Adamaoua	33.82	16.87	28.81	18.48	20.14
Center	34.62	18.55	34.61	20.52	22.06
East	34.21	17.66	31.33	19.43	20.26
Far North	32.97	16.05	27.77	17.49	18.69
Coast	34.19	17.62	31.36	19.39	20.24
North	36.16	19.23	31.11	21.36	25.62
North West	40.55	24.40	41.68	27.98	29.96
West	31.21	14.69	25.49	15.89	17.61
South	29.76	13.27	23.19	14.24	15.45
South West	38.02	21.41	35.88	24.09	26.81
Cameroon	40.41	24.00	38.82	27.45	33.75

Source: Authors' Calculations

TableA4 Regional Inequality in the Distribution of Welfare, 2007

	Gini	Atkinson-1	Atkinson-2	Mean Log Deviation	Theil
Douala	33.87	17.07	28.37	18.72	21.72
Yaoundé	33.15	16.60	28.02	18.15	21.07
Adamaoua	33.75	16.70	27.25	18.27	21.20
Center	28.07	11.91	20.72	12.68	14.13
East	32.88	15.79	26.63	17.19	18.99
Far North	36.52	19.14	30.28	21.24	25.07
Coast	31.86	15.33	25.71	16.64	19.26
North	35.33	18.22	28.57	20.12	24.65
North West	38.24	20.98	33.32	23.54	27.66
West	29.73	13.39	23.41	14.37	15.80
South	34.58	18.02	29.79	19.87	23.61
South West	33.24	16.54	28.67	18.08	19.69
Cameroon	38.96	21.94	35.82	24.77	27.88

Source: Authors' Calculations

Table A5 Shapley Decomposition of Urban- Rural Differences in 1996

		Difference	Scale	Inequality
Urban	Headcount	-11.87	-16.12	4.26
	Poverty Gap	-4.43	-8.51	4.09
	Squared Poverty Gap	-2.09	-4.96	2.87
	Watts	-6.12	-13.24	7.12
Rural	Headcount	6.36	13.12	-6.76
	Poverty Gap	2.37	6.91	-4.53
	Squared Poverty Gap	1.12	4.10	-2.98
	Watts	3.28	10.80	-7.52

Source: Authors' Calculations

Table A6 Shapley Decomposition Urban- Rural Differences in Poverty in 2001

		Difference	Scale	Inequality
	Headcount	-22.30	-22.25	-0.05
	Poverty Gap	-8.51	-8.20	-0.31
Urban	Squared Poverty Gap	-3.96	-3.80	-0.16
	Watts	-11.90	-11.39	-0.50
	Headcount	11.90	19.87	-7.97
	Poverty Gap	4.54	9.40	-4.86
Rural	Squared Poverty Gap	2.11	5.03	-2.91
	Watts	6.35	13.94	-7.59

Source: Authors' Calculations

Table A7 Shapley Decomposition Urban- Rural Differences in Poverty in 2007

		Difference	Scale	Inequality
	Headcount	-27.73	-22.05	-5.68
	Poverty Gap	-9.50	-7.69	-1.81
Urban	Squared Poverty Gap	-4.06	-3.44	-0.62
	Watts	-12.60	-10.42	-2.18
	Headcount	15.14	21.41	-6.27
	Poverty Gap	5.19	10.47	-5.28
Rural	Squared Poverty Gap	2.22	5.64	-3.42
	Watts	6.88	15.34	-8.46

Source: Authors' Calculations

Appendix B: **Returns to Household Characteristics**

Table B1: Association between Household Welfare and Characteristics (OLS), 2001

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	13.51477	0.054986	245.7851	0.0000
Male	-0.252236	0.012708	-19.84878	0.0000
Age Head	-0.013132	0.002086	-6.294348	0.0000
Age Head Squared	0.000115	2.13E-05	5.364778	0.0000
Age <5 (% Household)	-0.010059	0.000376	-26.77648	0.0000
Age 5 to < 10 (% HH)	-0.011668	0.000384	-30.39831	0.0000
Age 10 to < 15 (% HH)	-0.012098	0.000386	-31.38033	0.0000
Age 15 to <20 (% HH)	-0.007770	0.000312	-24.90647	0.0000
Age 20 to <25 (%HH)	-0.002712	0.000284	-9.559997	0.0000
Schooling (years)	0.042913	0.001502	28.57954	0.0000
Land	0.000697	0.000255	2.730257	0.0063
Access to Credit	0.173503	0.024411	7.107560	0.0000
Has Migrant (s)	0.010560	0.012250	0.862027	0.3887
Distance Nearest Hospital	-0.002191	0.000940	-2.329860	0.0198
Distance Nearest Tarred Road	-0.000401	0.000178	-2.254167	0.0242
Public Sector	0.251825	0.026740	9.417647	0.0000
Private Sector Formal	0.229712	0.025264	9.092582	0.0000
Agriculture	-0.112104	0.022771	-4.923096	0.0000
Non-Agriculture Informal	0.043645	0.023147	1.885578	0.0594
Unemployed	-0.009947	0.030035	-0.331179	0.7405
Urban	0.147945	0.013763	10.74932	0.0000
Adamaoua	-0.037007	0.025103	-1.474206	0.1405
East	0.083856	0.024896	3.368302	0.0008
Far-North	0.011048	0.021435	0.515419	0.6063
Coast	-0.003824	0.017847	-0.214292	0.8303
North	0.103944	0.023954	4.339278	0.0000
North-West	-0.195854	0.022640	-8.650777	0.0000
West	-0.011768	0.021172	-0.555841	0.5783
South	-0.066760	0.023641	-2.823927	0.0048
South-West	-0.135006	0.024006	-5.623858	0.0000

Source: Authors' Calculations (R-Squared: 0.42)

Table B2: Association between Household Welfare and Characteristics (OLS), 2007

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	13.56208	0.048448	279.9298	0.0000
Male	0.267855	0.026378	10.15431	0.0000
Age Head	-0.016445	0.001826	-9.004842	0.0000
Age Head Squared	0.000139	1.86E-05	7.481732	0.0000
Age <5 (% Household)	-0.008335	0.000326	-25.58600	0.0000
Age 5 to < 10 (% HH)	-0.011623	0.000357	-32.53275	0.0000
Age 10 to < 15 (% HH)	-0.011045	0.000352	-31.36243	0.0000
Age 15 to <20 (% HH)	-0.006998	0.000278	-25.21718	0.0000
Age 20 to <25 (%HH)	-0.003273	0.000244	-13.40387	0.0000
Schooling (years)	0.034182	0.001391	24.56746	0.0000
Land	0.000597	0.000248	2.403839	0.0162
Access to Credit	0.126968	0.020147	6.301943	0.0000
Has Migrant (s)	0.082713	0.011060	7.478536	0.0000
Distance Nearest Hospital	-0.000531	0.000468	-1.135817	0.2561
Distance Nearest Tarred Road	-0.000296	0.000184	-1.613524	0.1067
Public Sector	0.166832	0.025839	6.456619	0.0000
Private Sector Formal	0.131884	0.025976	5.077098	0.0000
Agriculture	-0.176951	0.021780	-8.124541	0.0000
Non-Agriculture Informal	-0.041567	0.021050	-1.974723	0.0483
Unemployed	-0.012119	0.037286	-0.325021	0.7452
Urban	0.264181	0.012585	20.99248	0.0000
Adamaoua	0.020208	0.025173	0.802760	0.4221
East	-0.012617	0.024691	-0.510984	0.6094
Far-North	-0.047467	0.019496	-2.434630	0.0149
Coast	-0.188228	0.023752	-7.924789	0.0000
North	-0.072705	0.022931	-3.170551	0.0015
North-West	-0.030746	0.018423	-1.668934	0.0952
West	-0.016742	0.019021	-0.880175	0.3788
South	0.028901	0.025313	1.141725	0.2536
South-West	0.079206	0.019463	4.069534	0.0000

Source: Authors' calculations (R-Squared :0.46)

Figure B1 Returns to Education of Household Head

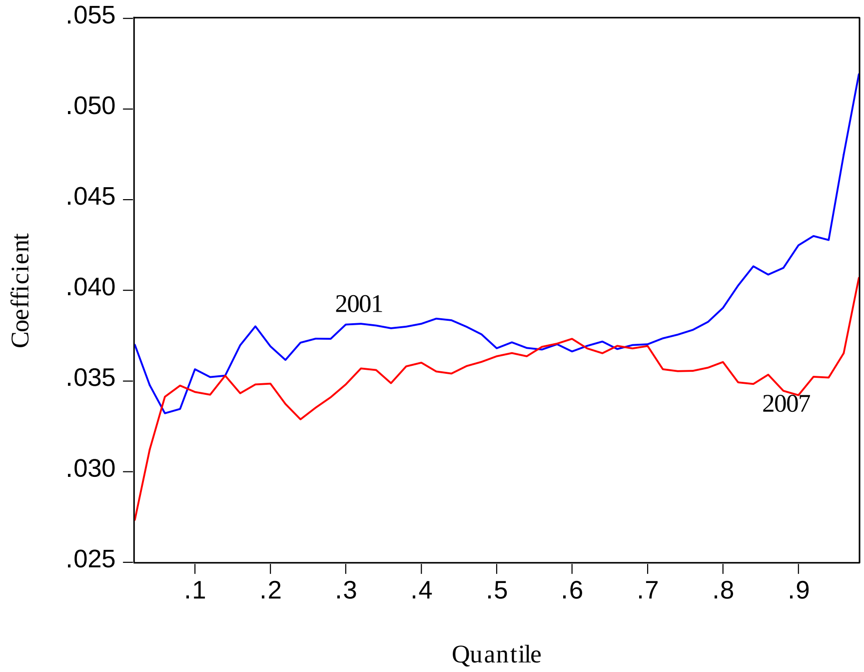


Figure B2 Returns to Access to Credit

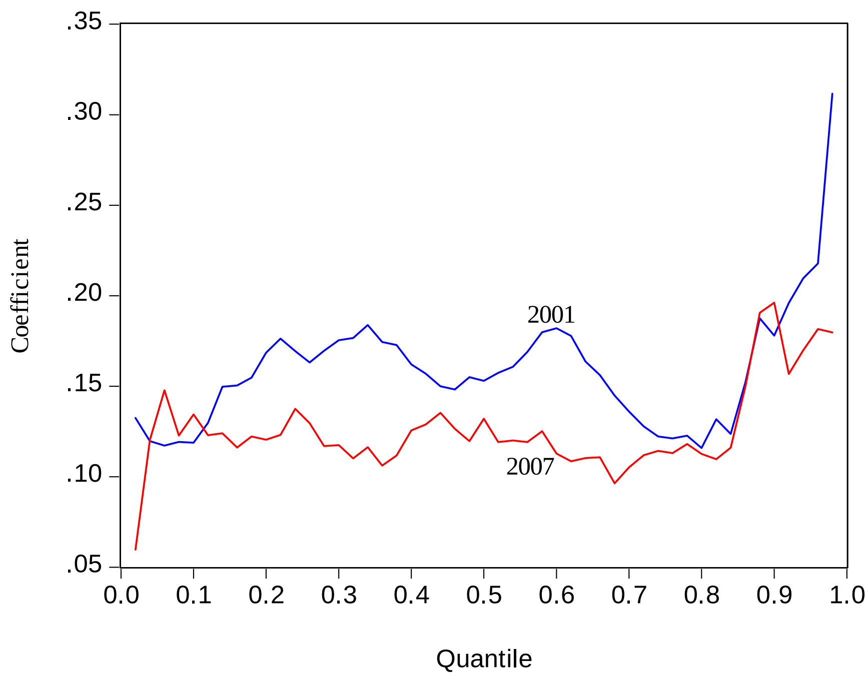


Figure B3 Returns to Migration

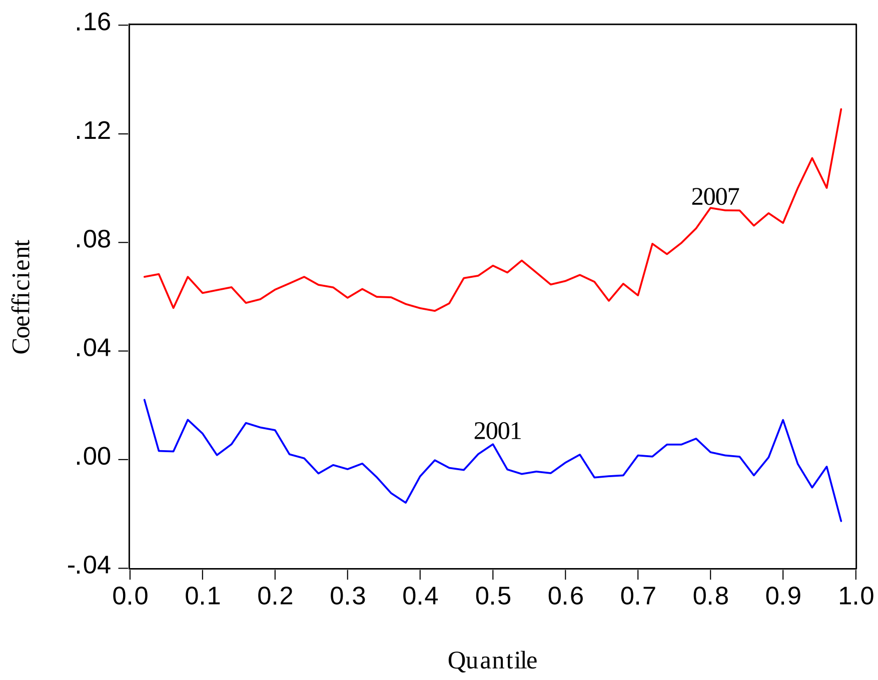


Figure B4. Returns to Employment in Agriculture

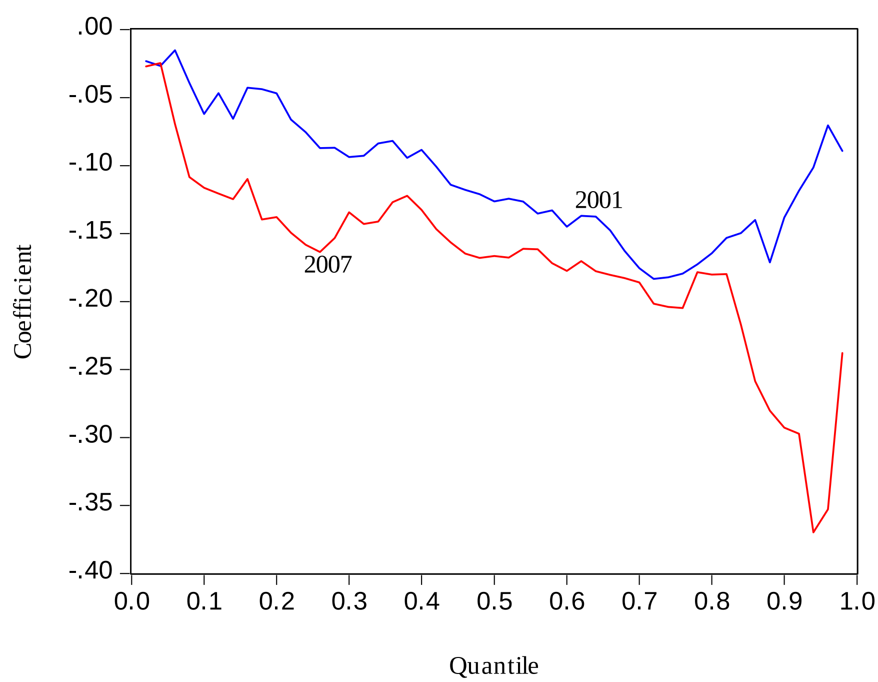


Figure B5 Public-Private Differential, 2001

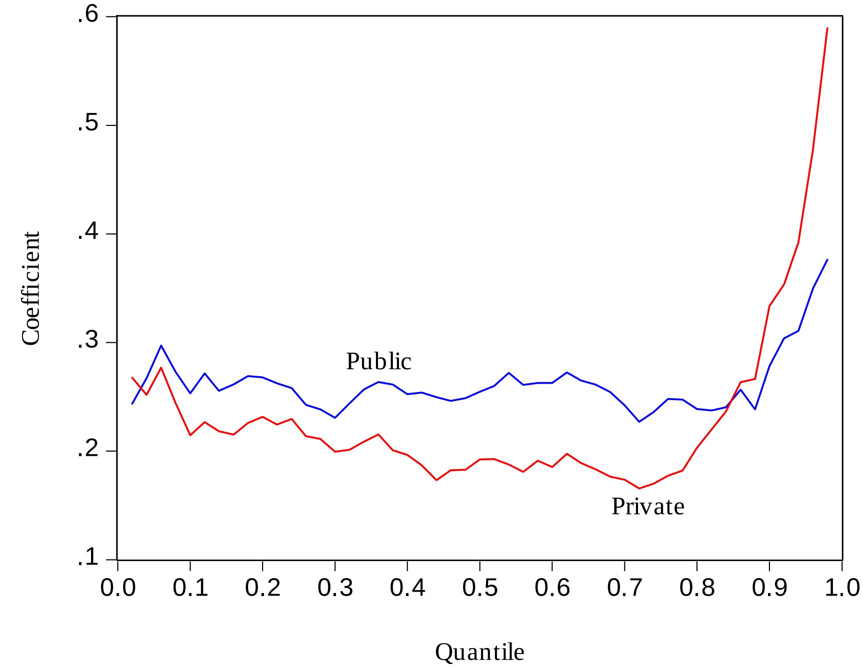


Figure B6 Public-Private Differential, 2007

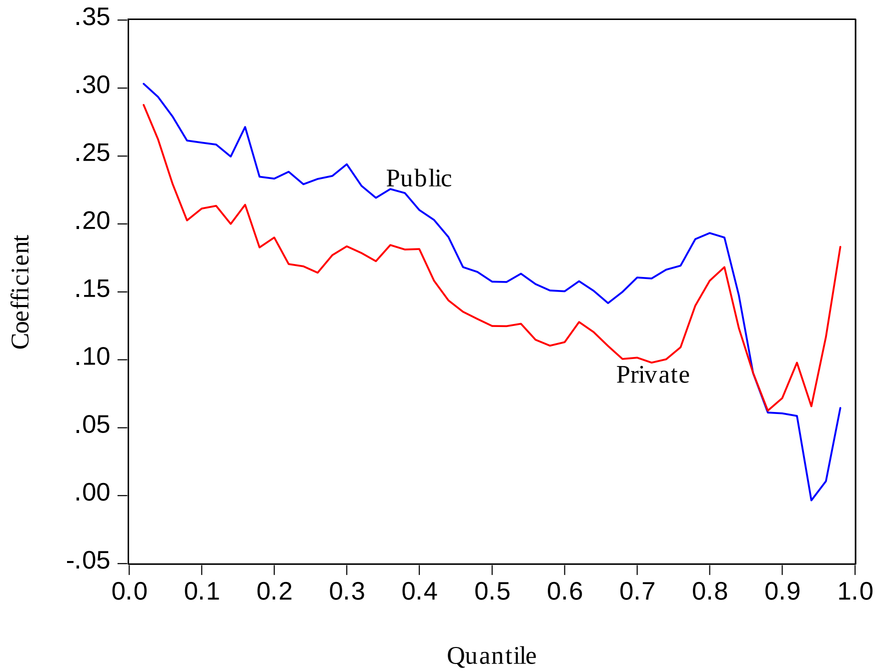
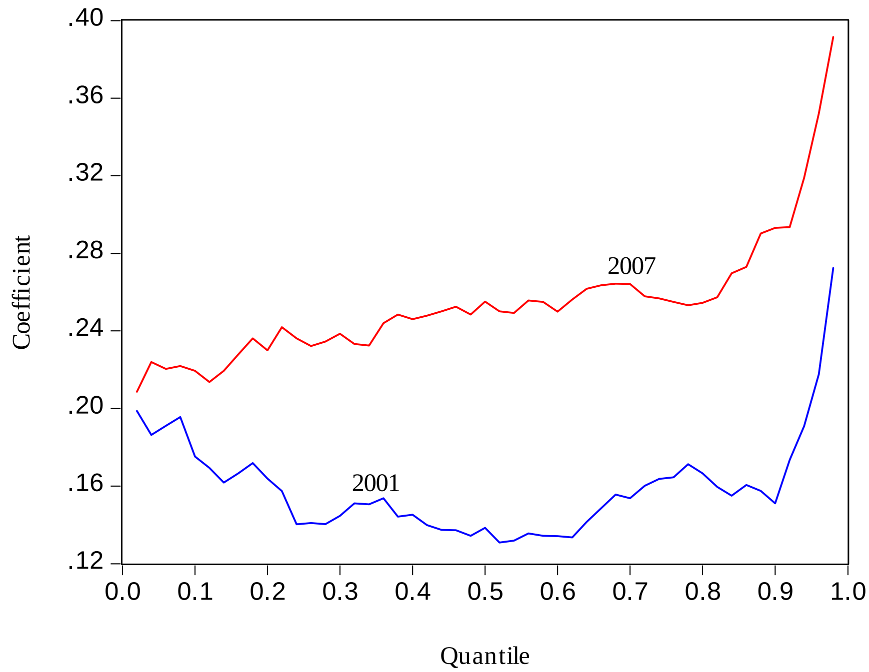


Figure B7 Returns to Urban Residence



References

Appleton Simon. 2002. 'The Rich Are Just Like Us, Only Richer': Poverty Functions or Consumption Functions? Journal of African Economies, Vol. 10, No.4: 433-469.

Angrist Joshua D. and Pischke Jörn-Steffen. 2009. Mostly Harmless Econometrics: An Empiricist's Companion. Princeton: Princeton University Press.

Bauer Thomas K. and Sinning Mathias. 2008. An Extension of the Blinder-Oaxaca Decomposition to Nonlinear Models. Advances in Statistical Analysis, Vol. 92, No. 2 :197-206.

Baye Menjo Francis. 2006. Growth, Redistribution and Poverty Changes in Cameroon: A Shapley Decomposition Analysis. Journal of African Economies, Vol. 15, No.4: 543-570.

Benjamin Nancy C. and Devarajan Shantayanan. 1986. Oil Revenues and the Cameroonian Economy. In Michael G. Schatzberg and I William Zartman (eds), *The Political Economy of Cameroon.* New York: Praeger.

Benjamin Nancy C. and Devarajan Shantayanan. 1985. Oil Revenues and Economic Policy in Cameroon: Results from a Computable General Equilibrium Model. World Bank Staff Working Papers No. 745. Washington, D.C.: The World Bank.

Blandford David, Friedman Deborah, Lynch Sarah, Mukherjee Natasha and Sahn David E. 1994. Oil Boom and Bust: The Harsh Realities of Adjustment in Camerroon. In David E. Sahn (ed), *Adjusting to Policy Failure in African Economies*. Ithaca: Cornel University Press.

Bourguignon François, Ferreira Francisco H. G. and Leite Phillippe. 2008. Beyond Oaxaca-Blinder: Accounting for Differences in Household Income Distributions. Journal of Economic Inequality, Vol. 6, No.2: 117-148.

Bourguignon François, Ferreira Francisco H. G. 2005. Decomposing Changes in the Distribution of Household Incomes : Methodological Aspects. In François Bourguignon, Francisco H.G. Ferreira and Nora Lustig (eds), *The Microeconomics of Income Distribution Dynamics in East Asia and Latin America*. Washington, D.C.: The World Bank.

Coulombe Harold and McKay Andrew. 1996. Modeling Determinants of Poverty in Mauritania. World Development, Vol. 24. No.6: 1015-1031.

Datt Gaurav and Ravallion Martin. 1992. Growth and Redistribution Components of Changes in Poverty Measures: a Decomposition with Applications to Brazil and India in the 1980s. Journal of Development Economics, 38: 275-296.

Direction de la Statistique et de la Comptabilité Nationale. 2002. Conditions de Vie des Populations et Profil de la Pauvreté au Cameroun en 2001: Rapport Principal de l'ECAM II. Yaoundé : Ministère de l'Economie et des Finances.

Emini Christian Arnault, Cockburn John and Decaluwé Bernard. 2005. The Poverty Impacts of the Doha Round in Cameroon: The Role of Tax Policy. World Bank Policy Research Working Paper N. 3746.

Essama-Nssah B. 2007. A Poverty-Focused Evaluation of Commodity Tax Options. Journal of International Development, 19: 1114-1130.

Essama-Nssah B. 2005. A Unified Framework for Pro-Poor Growth Analysis. Economics Letters, 89:216-221.

Essama-Nssah B. 1997. Impact of Growth and Distribution on Poverty in Madagascar. Review of Income and Wealth, Series 43, No. 2: 239-252.

Essama-Nssah, B. and P.J. Lambert (2009). Measuring Pro-Poorness: a Unifying Approach with New Results. *Review of Income and Wealth*, Series 55, No.3: 752-778.

Freund John E. and Williams Frank J. 1991. Dictionary/Outline of Basic Statistics. New York. Dover.

Froelich Markus and Melly Blaise. 2008. Estimation of Quantile Treatment Effects with STATA (mimeo); http://www.alexandria.unisg.ch/Publikationen/46580.

Institut National de la Statistique (National Statistical Office). 2008. Troisième Enquête Camerounaise auprès des Ménages (ECAM3) : Tendances, Profil et Déterminants de la Pauvreté au Cameroun entre 2001-2007. Yaoundé : République du Cameroun.

Institut National de la Statistique. 2002. Evolution de la Pauvreté au Cameroun enter 1996 et 2001. Yaoundé : République du Cameroun.

Government of Cameroon. 2003. Poverty Reduction Strategy Paper. Yaoundé: Republic of Cameroon.

Jann Ben. 2008. The Blinder-Oaxaca Decomposition for Linear Regression Models. The Stata Journal, Vol. 8, No.4: 453-479

Jenkins, S.P. and P.J. Lambert (1997). "Three 'I's of poverty" curves, with an analysis of U.K. poverty trends. *Oxford Economic Papers*, vol. 49, pp. 317-327

Kakwani Nanak and Son Huyn H. 2008. Poverty Equivalent Growth Rate. Review of Income and Wealth Series 54, No. 4: 643-655.

Kakwani, N.C., S. Khandker and H.H. Son (2004). Pro-Poor Growth: Concepts and Measurement with Country Case Studies. *Working Paper Number 2004-1*, International Poverty Center, Brazil.

Kakwani N. C. and Pernia E.M. 2000. What is Pro-Poor Growth? Asian Development Review, Vol. 18: 1-16.

Kakwani Nanak. 2000. On Measuring Growth and Inequality Components of Poverty with Application to Thailand. Journal of Quantitative Economics, Vol. 16, No.1: 67-79.

Kakwani Nanak. 1993. Poverty and Economic Growth with Application to Côte d'Ivoire. Review of Income and Wealth, Series 39, No. 2: 121-139.

Koenker Roger. 2005. Quantile Regression. Cambridge: Cambridge University Press.

Kolenikov Stanislav and Shorrocks Anthony. 2005. A Decomposition Analysis of Regional Poverty in Russia. Review of Development Economics, 9(1): 25-46.

Lambert Peter J. 2001. The Distribution and Redistribution of Income. Manchester: Manchester University Press.

Lambert Peter J. and Aronson J. Richard. 1993. Inequality Decomposition and the Gini Coefficient Revisited. The Economic Journal, Volume 103, No. 420: 1221-1227.

Maitra Pushkar and Vahid Farshid. 2006. The Effect of Household Characteristics on Living Standards in South Africa 1993-1998: A Quantile Regression Analysis with Sample Attrition. Journal of Applied Econometrics, 21: 999-1018.

Manski Charles F. 1991. Regression. Journal of Economic Literature. Vol. 29, No.1: 34-50.

Melly Blaise. 2006. Estimation of Counterfactual Distributions Using Quantile Regression. http://www.alexandria.unisg.ch/publikationen/22644

Melly Blaise. 2005a. Decomposition of Differences in Distribution Using Quantile Regression. Labour Economics, 12: 577-590.

Melly Blaise. 2005b. Public-Private Sector Wage Differentials in Germany: Evidence from Quantile Regression. Empirical Economics, 30: 505-520.

Nguyen Binh T., Albrecht James W., Vroman Susan B. and Westbrook M. Daniel. 2007. A Quantile Regression Decomposition of Urban-Rural Inequality in Vietnam. Journal of Development Economics 83: 466-490.

Nkama Arsene Honore Gideon. 2006. Analysing the Poverty Impact of the HIPC Initiative in Cameroon. African Development Review, Vol. 18, No. 3 :330-352.

Osmani, S. (2005). Defining pro-poor growth. *One Pager Number 9,* International Poverty Center, Brasil.

Ravallion Martin and Chen Shaohua. 2003. Measuring Pro-Poor Growth. Economics Letters 78: 93-99.

Ravallion Martin. 2001. Growth, Inequality and Poverty: Looking Beyond Averages. World Development, Vol 29: No. 11: 1803-1815.

Ravallion Martin. 2000. On Decomposing Changes in Poverty Into "Growth" and "Redistribution" Components. Journal of Quantitative Economics, Vol. 16, No. 1: 105-118.

Silber Jacques and Weber Michal. 1999. Labour Market Discrimination: are there Significant Differences between the Various Decomposition Procedures? Applied Economics, **31**: 359-365.

Sinning Mathias, Hahn Markus and Bauer Thomas K. 2008. The Blinder-Oaxaca Decomposition for Nonlinear Models. The Stata Journal, Vol. 8, No.4: 480-92.

Skoufias Emmanuel and Katayama Roy Shuji. 2008. Sources of Welfare Disparities across and within Regions of Brazil: Evidence from the 2002-03 Household Survey. World Bank Policy Research Paper No. 4803. Washington,D.C.: The World Bank.

United Nations. 2000. *United Nations Millennium Declaration*. Resolution adopted by the General Assembly, September. United Nations, New York.

Willame Jean-Claude. 1986. The Practices of a Liberal Political Economy: Import and Export Substitution in Cameroon (1975-1981). In Michael G. Schatzberg and I William Zartman (eds), *The Political Economy of Cameroon.* New York: Praeger.

World Bank. 2005. World Development Report 2006: Equity and Development. Washington, D.C. The World Bank and Oxford University Press.

World Bank. 1995. Cameroon: Diversity, Growth and Poverty Reduction. Report No. 13167-CM. Washington D.C. The World Bank.

World Bank . 1990. World Development Report 1990: Poverty. Washington, D.C.: The World Bank.

World Bank . 1988. World Development Report 1988: Public Finance and Development. Oxford: Oxford University Press.

World Bank. 1978. World Development Report, 1978. Washington, D.C.: The World Bank.

Yitzhaki Shlomo. 1994. On the Progressivity of Commodity Taxation. In Wolfgang Eichhorn (ed) "*Models and Measurement of Welfare and Inequality*". Heidelberg: Springer-Verlag.