

Structure of Sectoral Decomposition of Aggregate Poverty Changes in Cameroon

By

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Abstract

This paper defines an exact decomposition rule based on the Shapley Value for assigning entitlements in distributive analysis and assesses the within- and between-sector contributions to changes in aggregate poverty. Between 1984 and 1996 poverty remained a rural phenomenon in Cameroon. It became more widespread, deeper and severer in both rural and urban areas, but more so in urban than rural areas. While the within-sector effects disproportionately accounted for the increase in poverty in the period 1984-1996, the between-sector contributions in both rural and semi-urban areas played a mitigating role on the worse effects of the increase in poverty. These findings indicate the potential positive feedback effects of migration and the associated remittances as an effective strategy used by migrants to left their families and villages out of the worse effects of poverty. The implication of this interpretation is that decision-makers need to better understand the factors that push or pull potential migrants. Rural-urban mobility could, therefore, be viewed as a strategy used by households to moderate the worse effects of poverty and a vector of shared growth. The implications for public policy, in terms of open unemployment and associated social and insecurity problems at the receiving end, point to the wisdom of addressing the push-factors via targeting more in favour of rural areas.

Keywords: Poverty Changes, Sectoral Decomposition, Shapley Value, Cameroon

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1. Introduction

Most developing countries are now pursuing growth objectives as well as addressing concerns for the poor as announced in their Poverty Reduction Strategy Papers (PRSPs). This development approach is an offshoot of the broadening of the initial objectives of structural adjustment to include social considerations, as governments and donors alike now agree that adjustment efforts can only be sustainable if they fully reflect concerns for the poor.¹ While social considerations may be blown-out of proportion by some civil society organisations and their NGO acolytes, it remains clear that the issue of poverty reduction must hinge on a sustained increase in average incomes.

Generally, we may think of poverty reduction as coming about through growth in mean incomes, income redistribution or both. Although long-term poverty reduction, in essence, invariably involves unrelenting increases in mean incomes and redistribution, which ideally should be pro-poor, or at least neutral, the induced positive feedback effects of migration such as remittances could be important in the debate because of their potential for alleviating or mitigating rural poverty. In this regard, to better understand the channels of shared growth, intra- and inter-sector contributions to changes in welfare are among the attention-grabbing aspects in distributive analysis in a period of substantive policy changes.

Overall poverty in Cameroon deepened in the period 1984-1996 and rural poverty remained more widespread, deeper and severer than urban poverty (Baye, 2004a;

¹ See Cornia et al. (1987) and Woodward (1992) for a discussion of this view as well as the conventional view frequently associated with the World Bank and the IMF by neo-liberal critics.

Fambon et al, 2004). As observed by Baye and Amungwa (2002), the increasing level of poverty in rural communities induced many young people to migrate into the two main cities and other large towns where they expected to find better conditions, but ended up in a network of relatives and friends who initially support them against the worse hardships; eventually some are exposed to unemployment or under-employment, crime and anti-social behaviour, which poses insecurity problems to the authorities and other city dwellers as well.

More generally, as argued by Baye and Fambon (2002), the economic crisis and the immediate effects of SAPs amalgamated and forced many Cameroonians to adopt coping devices such as moonlighting, seeking for survival in the informal sector, occupational and geographical mobility, changing regional patterns of activities and productivity, and adopting “behavioural innovations” like corruption and other malpractices for survival. These adaptations are thought to have modified the pattern of welfare among households in the different regions and sectors of activity. An evaluation of these changes in welfare and the investigation of the relative importance of mobility between sectors and sector-specific effects on measured poverty changes are of interest to both analysts and the political entrepreneurs, who want to better understand the dynamics of poverty and shared growth.

To better inform public debate in the aftermath of or during policy changes that affect living standards, it is necessary to measure the evolution of poverty and its components, notably the decomposition of observed changes, with a view to assessing the importance of factors explaining them. In the dynamic decomposition proposed by Ravallion and Huppi (1991) and applied by Balisacan (1995) among others, for instance,

the factors contributing to changes in poverty are variations in the within- and between-sector effects. Yet, these components in the standard decomposition do not form a partition since an interaction term is included to ensure the identity of the decomposition. This interaction term constitutes a “black box”, which needs to be opened and its contents attributed accordingly to meaningful components.

Knowledge on how poverty changes by socio-economic characteristics such as employment status, occupation, sector of activity, zone of residence and region of the country is vital for policy, but unfortunately still under-explored in Cameroon. The only studies that tackle some aspects of the dynamics of monetary poverty are Institute of Statistics (2002); Baye (2004a, 2004b) and Fambon et al (2004). Very little is known about the exact contributions of intra- and inter-sectoral components to changes in aggregate poverty using the 1984 and 1996 household surveys.

The determinants of changes in poverty are, therefore, still poorly understood by the decision-makers. Yet, such knowledge is required for public policy, especially in an era when poverty eradication is gaining prominence in the policy menu. The methodology we propose performs exact decomposition of changes in aggregate measured poverty into within- and between-sector components that hinge on the Shapley Value, which is a well-known solution concept in the theory of cooperative games. In such an analysis, migration and the associated remittances could be viewed by households as important channels by which share growth is transmitted.

Shorrocks (1999) proposes a general framework in decomposition analysis, whether static or dynamic, and whether concerning poverty or inequality in the distribution of living standards, which eliminates the “black box” that remains

unexplained in many conventional decomposition techniques. Essentially, let ΔI be an aggregate indicator of a change in welfare, and X_k , $k = 1, 2, \dots, m$ a set of factors contributing to the value ΔI . The goal of all decomposition techniques is to attribute contributions, ϕ_k , to each of the factors, X_k , so that, preferably the value of ΔI should equal the sum of the m contributions.

The main objectives of this study are to investigate how poverty changed, and to decompose the changes to mobility and sector-specific effects between 1984 and 1996. The specific objectives are: (1) to define the Shapley decomposition rule for assigning entitlements, (2) to assess the within- and between-sector contributions to changes in aggregate poverty, and (3) to derive policy implications on the basis of the analysis. The rest of this paper is in five main sections. Section 2 defines the Shapley Value. Section 3 applies the Shapley Value to derive expressions for the within- and between-sector contributions to aggregate poverty changes. Section 4 presents the data. Section 5 reports and discusses the results, and Section 6 outlines concluding remarks.

2. Definition of the Shapley Value

An important issue in distributive analysis would be how to assign weights to the factors that contribute to an observed level or change in a measure of living standards. For instance, a change in the incidence of poverty between two dates may be attributable to factors such as within-sector effects, between-sector effects or both, and analysts are interested in quantifying the relative importance of each component in this intra-inter-sector configuration. There are different methods for performing the attribution, all of which must have to deal with the intuition that the contribution of a factor depends on the

presence of the other factors. This issue is similar to problems that arise in cooperative game theory, and recent literature in distributive analysis is proposing an attribution according to the Shapley Value (see Shorrocks, 1999; Kabore, 2002; Rongve, 1995; Chantreuil and Trannoy, 1997; Araar, 2003, Baye 2004b). In what follows, appeal is made to the theory of cooperative games in defining the Shapley Value, before interpreting the solution set in distributive analysis in the next section.

A typical question to address is what might each player reasonably expect to receive (or pay) as his or her share of the reward (or cost) in a cooperative game? The solution concept widely used in the theory of cooperative games to answer such questions is the Shapley Value (see Owen, 1977, Moulin 1988). The Shapley Value provides a recommendation for the division of the joint profits or costs of a grand coalition of players and satisfies some reasonable properties. Shapley (1953) proposes three axioms that one might require for $\phi_k^S(K, v)$, players k 's expected share in a game with characteristic function v and $K = \{1, 2, \dots, k, \dots, m\}$ is a finite set of players. Non-empty sub-sets of K are called coalitions.

To accomplish the division process, the players may form coalitions and the strength of each coalition is expressed as a characteristic function v . For any coalition or sub-set $S \subseteq K$, $v(S)$ measures the share of the surplus or loss that the coalition, S , is capable of obtaining without resorting to agreements with players belonging to other coalitions. Shapley's axioms require that:

- The expression $\phi_k^S(K, v)$ should be symmetric (or anonymous), that is, it should be independent of the factor's label, $1, 2, \dots, m$;

- The decomposition should be efficient, that is, it should be exact and additive, so that,

for $\forall_k \in K$ and $\forall_{k+1} \in K$, $\phi_k^S(K, v) \cap \phi_{k+1}^S(K, v) = \emptyset$ and $\sum_{k=1}^m \phi_k^S(K, v) = v(K)$. That is to

say, the intuitively appealing contributing factors should form a partition, so that there is no need for vague concepts such as residual or interaction terms to secure the identity of the decomposition.²

The only function that satisfies the Shapley's axioms is given by the Shapely Value (Shapley, 1953; Young, 1985):

$$\phi_k^S(K, v) = \sum_{s=0}^{m-1} \sum_{\substack{S \subseteq K \\ k \in S \\ |S|=s \\ |K|=m}} \frac{(s-1)!(m-s)!}{m!} [v(S) - v(S - \{k\})] \quad (1)$$

where by convention, $0! = 1$ and $v(\emptyset) = 0$.³ The Shapley Value in Equation 1 arises by imaging that players join the game in a random order. Player k receives the extra amount that he brings to the existing coalition of players $S - \{k\}$, that is, $v(S) - v(S - \{k\})$ - the marginal contribution of player k to the coalition S . This implies that when player k joins the forming grand coalition, he and the players who have already joined make up some coalition S , of size s , which contains player k .

The Shapley value of player k , $\phi_k^S(K, v)$, is the weighted average of the marginal contributions of this player over the set of coalitions $\{S: k \in S \subseteq K\}$. The weight associated with each coalition S is equal to the probability to obtain, in a random partitioning of $K - \{k\}$ between sequence 1 and sequence 2, the set $S - \{k\}$ in sequence 1

² For a proof of these shapely's axioms in the context of distributive analysis, see Shorrocks (1999, p. 5-6)

³ The Shapley value can also be interpreted as the expected marginal contribution made by the player (or factor) to the value of a coalition, where the distribution of coalitions is such that any ordering of the players (or factors) is equally likely.

and the set $K-S$ in sequence 2. Marginal contributions such as $v(S)-v(S-\{k\})$ occur for exactly those orderings in which k is preceded by the $s-1$ other players in S , and followed by the $m-s$ players not in S . The number of orderings (or permutations) in which this happens is $(s-1)!(m-s)!$. The total number of possible orderings is given by $m!$, which is the number of permutations of m players taken m at a time. The weighting scheme is, therefore, given by $(s-1)!(m-s)!/m!$ (see Equation 1).

3. Sectoral Decomposition of Changes in Poverty

To apply the Shapley Value in distributive analysis, instead of considering m players as in cooperative game theory, we now consider m factors that contribute to account for an observed phenomenon. The P_α class of poverty measures have the desirable property of sub-group consistency. The implication of this property is that overall level of poverty would fall, *ceteris paribus*, whenever poverty decreases within some sub-groups of the population and is unchanged outside that group (Balisacan, 1995; Foster and Schorrocks 1991). This class of poverty measures is additively decomposable in the sense that aggregate poverty level is simply a weighted average of sub-group poverty levels, the weights being their population shares.

Used is hereby made of the P_α class of poverty measures to identify the factors underlying the observed changes in aggregate poverty between two dates, t and $t+n$. The factors explored here are the intra- and inter-sub-group contributions to any observed changes in poverty. If f_k and $P_{\alpha k}$ represent the population share and poverty level of sub-group $k \in K$, the property of sub-group decomposability of the P_α class of poverty

measures enables us to write the expression $P_{\alpha,t} = \sum_{k \in K} f_{k,t} P_{\alpha k,t}$. The aggregate change in poverty between period t and $t+n$ yields:

$$\Delta P_{\alpha} = P_{\alpha k,t+n} - P_{\alpha k,t} = \sum_{k \in K} [f_{k,t+n} P_{\alpha k,t+n} - f_{k,t} P_{\alpha k,t}] \quad (2)$$

The goal here is to account for the overall change in poverty, ΔP_{α} , in terms of changes in poverty within sub-groups, $\Delta P_{\alpha k} = P_{\alpha k,t+n} - P_{\alpha k,t}$, $k \in K$, and the population shifts between sub-groups, $\Delta f_k = f_{k,t+n} - f_{k,t}$, $k \in K$. In the rest of this section, a discussion of the Shapley approach to sectoral decomposition is followed by the standard approach due to Ravallion and Huppi (1991).

3.1. The Shapley Approach to Sectoral Decomposition

Let us for a while denote the within-sector effects by W and the between sector population shift effects by B . This implies that Equation 2 can also be expressed using the characteristic function v as $\Delta P_{\alpha} = v(W,B)$. Here we have only two factors and the two elimination sequences are given by $\{W, B\}$ and $\{B, W\}$. The weight and marginal contributions of the within-sector effects, W , to ΔP_{α} are given in panel (a) of Table 1 and the weight and marginal contributions of the between-sector population shift effects, B , are given in panel (b).

Table 1: Application of Equation 1 for within-sector effects and between-sector population shift effects

	S	s	$\frac{(s-1)!(m-s)!}{m!}$	$v(S)-v(S-\{k\})$ (marginal contributions)
Panel (a)				

N ^o of factors in S before eliminating W	2	{W,B}	2	0.5	V(W+B)-v(W+B-W)= V(W,B)-v(B)
	1	{W}	1	0.5	v(W)-v(W-W) = v(W)-v(∅)= v(W)
Panel (b)					
N ^o of factors in S before eliminating B	2	{W,B}	2	0.5	V(W+B)-v(W+B-B)= V(W,B)-v(W)
	1	{B}	1	0.5	v(B)-v(B-B) = v(B) -v(∅)= v(B)

Table 1 gives us the Shapley contributions of the within-sector effects (W) (Equation 3) and between-sector population shift effects (B) (Equation 4) as the weighted means of their marginal contributions to ΔP_α :

$$\phi_W^S(2, v) = 0.5[v(W,B) - v(B) + v(W)] \quad (3)$$

$$\phi_B^S(2, v) = 0.5[v(W,B) - v(W) + v(B)] \quad (4)$$

When the within-sector effects are absent, W takes the value 0, and the change in poverty from Equation 2 becomes:

$$v(B) = \sum_{k \in K} (f_{k,t+n} - f_{k,t}) P_{\alpha k,t} \quad (5)$$

Eliminating the between-sector population shift effects is tantamount to setting B = 0 and the change in poverty becomes:

$$v(W) = \sum_{k \in K} (P_{\alpha k,t+n} - P_{\alpha k,t}) f_{k,t} \quad (6)$$

The full expressions of the Shapley contributions for W and B are given as Equations 7 and 8.

$$\begin{aligned}
\phi_W^S(2, \nu) &= 0.5 \left[\sum_{k \in K} [f_{k,t+n} P_{ak,t+n} - f_{k,t} P_{ak,t}] - \left\{ \sum_{k \in K} (f_{k,t+n} - f_{k,t}) P_{ak,t} \right\} \right. \\
&\quad \left. + \left\{ \sum_{k \in K} (P_{ak,t+n} - P_{ak,t}) f_{k,t} \right\} \right] \\
&= 0.5 \sum_{k \in K} [f_{k,t+n} P_{ak,t+n} - f_{k,t+n} P_{ak,t} + f_{k,t} P_{ak,t+n} - f_{k,t} P_{ak,t}] \\
&= 0.5 \sum_{k \in K} [f_{k,t+n} (P_{ak,t+n} - P_{ak,t}) + f_{k,t} (P_{ak,t+n} - P_{ak,t})] \\
&= 0.5 \sum_{k \in K} [f_{k,t} + f_{k,t+n}] \Delta P_{ak} \tag{7}
\end{aligned}$$

Following the same procedure for the contributions of the factor B we have

$$\begin{aligned}
\phi_B^S(2, \nu) &= 0.5 \left[\sum_{k \in K} [f_{k,t+n} P_{ak,t+n} - f_{k,t} P_{ak,t}] - \left\{ \sum_{k \in K} (P_{ak,t+n} - P_{ak,t}) f_{k,t} \right\} \right. \\
&\quad \left. + \left\{ \sum_{k \in K} (f_{k,t+n} - f_{k,t}) P_{ak,t} \right\} \right] \\
&= 0.5 \sum_{k \in K} [P_{ak,t} + P_{ak,t+n}] \Delta f_k \tag{8}
\end{aligned}$$

Equation 2 explaining the aggregate change in poverty can now be rewritten in terms of changes in poverty within-sub-groups and the between-group population shift effects as:

$$\begin{aligned}
\Delta P_\alpha &= \phi_W^S(2, \nu) + \phi_B^S(2, \nu) \\
&= 0.5 \sum_{k \in K} [f_{k,t} + f_{k,t+n}] \Delta P_{ak} + 0.5 \sum_{k \in K} [P_{ak,t} + P_{ak,t+n}] \Delta f_k \tag{9} \\
&= \text{Within-Sector Effects} \quad + \quad \text{Between-Sector Population Shift Effects}
\end{aligned}$$

3.2. The Standard Sectoral Decomposition due to Ravallion and Huppi (1991)

Ravallion and Huppi (1991) exploit the additive decomposability of the P_α class of poverty measures to illustrate the relative importance of changes within-sectors versus changes between them, such as due to the between-sector population or work-force shifts.

This decomposition of the aggregate poverty change is not exact because it requires an interaction term to establish its identity. Using the same notation as above, the standard Ravallion-Huppi decomposition of an aggregate change in poverty can be expressed as:

$$\begin{aligned}
P_{\alpha,t+n} - P_{\alpha,t} &= \sum_{k \in K} (P_{\alpha k,t+n} - P_{\alpha k,t}) f_{k,t} \quad (\text{Within-sector effects}) \\
&+ \sum_{k \in K} (f_{k,t+n} - f_{k,t}) P_{\alpha k,t} \quad (\text{Between-sector population shift effects}) \\
&+ \sum_{k \in K} (P_{\alpha k,t+n} - P_{\alpha k,t})(f_{k,t+n} - f_{k,t}) \quad (\text{Interaction effects}) \quad (12)
\end{aligned}$$

The within-sector effects are simply the contribution of poverty changes within sectors, controlling for their base period population shares. The between-group population shift effects are the contribution of changes in base period poverty due to changes in the distribution of the population across sectors between the based and terminal periods. The residual or interaction effects arise from the possible correlation between population shifts and within-sector changes in poverty. This interaction element is what the Shapley decomposition eliminates by re-attributing more meaningfully.

4. Data and Other Requirements

4.1 Presentation of Household Data

The analysis of poverty in this paper is based on two household surveys – the 1984 budgetary and consumption survey (BCS) (DSCN, 1984), September 1983 – September 1984, and the 1996 Cameroon Households Consumption Survey (CHCS) (DSCN, 1996), February – April 1996, carried out by the government’s Statistics Office. These snapshots represent points before and during SAP in which household surveys are available.

These surveys vary in duration – one year for the first survey and three months for the second - and in sample size – 5474 households for the first and 1731 for the second. They are similar in (1) the partitioning of the various regions - in the sense that the 1984

survey could easily be regrouped to mimic the structure of the 1996 survey - and (2) the sampling techniques used.⁴

The 1984 total expenditures per adult equivalent per day were scaled up, employing the consumer price index to express them in terms of 1996 prices to allow the use of the poverty line computed from the 1996 survey for the two periods. For all practical purposes, these surveys are considered approximately suitable for the present analysis. The welfare indicator used is expenditure per adult equivalent per day. Since the composition of households by age was captured by the surveys, we followed previous studies in Cameroon to attribute adult equivalent scales of 1 to all adults (15 years old and above) and 0.5 to children (less than 15 years old).

4.2 Poverty Measures and Poverty Line

The poverty indices used belong to the P_α class of poverty measures, specifically P_0 , P_1 and P_2 , which represent the headcount, the poverty-gap and the squared poverty-gap indices, respectively (using the terminology of Foster, Greer and Thorbecke, 1984). The headcount index measures the incidence of poverty, the poverty-gap index measures the depth of poverty and the squared poverty-gap index measures the severity of poverty.⁵

A national poverty line of 508.19 CFA francs per adult equivalent per day was calculated by the government's statistics office from the 1996 Households Consumption Survey using the traditional cost-of-basics-needs approach. A food poverty line was calculated from a typical household food basket composed of 61 food items, yielding

⁴ More detailed description of the content of 1996 data, their sampling properties and other features can be found in Fambon *et al.* (2000).

⁵ For the implications and shortcomings of these measures, see Baye (1998).

2900 kcal per adult per day, representative of consumer choices as revealed by the survey was priced and to it was added an allowance for non-food basic needs evaluated at one-third of the cost of the food items (Government of Cameroon, 2003: 10). This poverty line is used in what follows without questioning its validity since our main focus is to evaluate the exact configuration of mobility and sector-specific factors in accounting for aggregate poverty changes and not to set poverty lines. The software used in the analysis is DAD4.3-R: A Software for Distributive Analysis (see Duclos, 2003).

5. Empirical Results and Discussion

It is useful to examine how poverty rates vary across different areas and over time because this helps in guiding public policy on targeting anti-poverty programmes to meet the needs of the poor more effectively, especially in the context of budgetary constraints.

With the poverty line of 508.19 CFA francs per adult equivalent per day, Zonal poverty comparisons between 1984 and 1996 are computed and presented in Tables 1, 3 and 5 for the incidence, depth and severity of poverty, respectively. These tables show the P_{α} class of poverty indices for Cameroon as a whole and for the urban, semi-urban and rural areas. All the poverty indices (incidence, depth and severity) show a highly significant increase during the period 1984-1996. The head-count index rose by 28.8 percentage points during this period, while the depth and severity of poverty rose by 13.2 and 6.9 percentage points, respectively (Tables 1, 3 and 5).

Table 2 submits a sectoral decomposition of the 28.8 percentage points' increase in the head count index between 1984 and 1996. Both the standard and Shapley decompositions are presented. The standard approach due to Ravallion and Huppi (1991)

shows interaction effects that are non-negligible (Table 2). The magnitude of the interaction terms relative to those of the other components tends to buttress the need for an exact decomposition. In what follows, we report only the results emanating from the exact decomposition. Of the 28.8 percentage points' increase in poverty in the period under review, rural areas account for 20.8 points, which are over-accounted for by within-sector effects (24.0 points). The between-sector effects tend to reduce the worse effects of poverty in the rural areas by allowing poverty to decline by 3.2 points. This drop in poverty due to inter-zonal effects is attributable to the importance of migration in the fight against poverty by the poor themselves. The transmission channel is through remittances made by rural-urban migrants, who generally leave part of their family in rural areas and maintain active ties with them. This observation is supported by the decline in the population share of rural areas from about 71 % in 1984 to 65 % in 1996, which signify a net out-migration from rural areas (Table 1). Table 1 also shows the contraction of the semi-urban population from 18 % to 5 % over the same period. This apparent depopulation of the semi-urban areas is attributed to net migration to the main cities between 1984 and 1996.

As indicated in Table 2, semi-urban areas as a whole accounted for -2 percentage points to the aggregate change in the head count index. While the intra-zonal effects were 3.7 points, effects of mobility were -5.7 points. This also confirms the importance of semi-urban to urban migration as a strategy that could be used by households to fight against poverty.

The impact on the urban areas of the increase in the head count index of 28.8 percentage points is 9.9 points. Of these, both the within-zone and between-zone effects

contribute to increase urban poverty. The observation in Table 1 that the share of the urban population increased from about 11 % to 29 % between 1984 and 1996 and the observation in Table 2 that between-zone effects in the urban areas contributed positively to poverty (3.2 points) are indications that urban migrants tend to fuel urban poverty.

Results presented in Tables 3 to 6 for the poverty-gap and squared poverty-gap indices and the associated sectoral decompositions are basically tracing the same story line as revealed by the analysis of the head count index. Between 1984 and 1996 poverty remained a rural phenomenon. It became more widespread, deeper and severer for both rural and urban areas, but more so for urban than rural areas (Tables 1, 3 and 5). The aggregate poverty-gap by which the average expenditures of poor households fell below the poverty line also deteriorated, increasing from 11.7 per cent in 1984 to 24.9 per cent in 1996 (Table 3). This indicates that in 1984 it required a daily supplementary transfer (assuming perfect targeting) of about 60 CFA francs per day on the average to lift an individual out of poverty, compared with about 127 CFA francs per day in 1996. For rural areas about, 72 CFA francs per day was needed to lift a rural dweller out of poverty in 1984 and up to 332 CFA francs per day was needed for the same purpose in 1996. The amount needed to life an urban dweller out of poverty was less than 2 CFA francs per day in 1984 and 53 CFA francs per day in 1996.

Table 1: Evolution of the Head Count Index (P_0)					
Zone	Estimate ($P_{0,t}$)	Population Share ($f_{k,t}$)	Estimate ($P_{0,t+n}$)	Population Share ($f_{k,t+n}$)	Difference (ΔP_{0k})
	1984		1996		1984vs1996
Urban	0.011 (0.004)	0.112 (0.006)	0.341 (0.030)	0.294 (0.027)	0.330** (0.031)
Semi-Urban	0.275 (0.029)	0.182 (0.028)	0.593 (0.117)	0.052 (0.024)	0.318** (0.120)
Rural	0.443	0.706	0.796	0.654	0.354**

	(0.024)	(0.029)	(0.038)	(0.043)	(0.044)
National	0.364	1	0.652	1	0.288 ^{**}
	(0.019)		(0.032)		(0.037)

Source: Computed by the author from BCS 1984 and CHCS 1996 Survey Data

Note: Overall poverty line = 508.19 CFA francs per adult equivalent. Figures in parentheses represent standard errors. Stratification and clustering in the surveys were taken into consideration when setting the sample designs. ** and * indicate significance at the 1% and 5% levels, respectively.

Table 2: Sectoral Decomposition of $\Delta P_0 = 0.288$

Zone	Standard Approach due to Ravallion-Huppi Reference period t				Shapley Approach		
	Intra-sector effects	Inter-sector effects	Interaction	Impact on ΔP_0	Intra-sector effects	Inter-sector effects	Impact on ΔP_0
Urban	0.037	0.002	0.060	0.099	0.067	0.032	0.099
	(0.004)	(0.004)	(0.011)	(0.014)	(0.000)	(0.000)	(0.014)
Semi-Urban	0.058	-0.036	-0.042	-0.019	0.037	-0.057	-0.019
	(0.024)	(0.009)	(0.019)	(0.019)	(0.000)	(0.000)	(0.019)
Rural	0.250	-0.023	-0.018	0.208	0.240	-0.032	0.208
	(0.033)	(0.035)	(0.018)	0.099	(0.000)	(0.000)	(0.050)

Source: Computed by the author from BCS 1984 and CHCS 1996 Survey Data

Note: Overall poverty line = 508.19 CFA francs per adult equivalent

Table 3: Evolution of the Poverty-Gap Index (P_1)

Zone	Estimate ($P_{1,t}$)	Population Share ($f_{k,t}$)	Estimate ($P_{1,t+n}$)	Population Share ($f_{k,t+n}$)	Difference (ΔP_{1k})
	1984		1996		1984vs1996
Urban	0.002	0.112	0.104	0.294	0.102 ^{**}
	(0.001)	(0.006)	(0.012)	(0.027)	(0.012)
Semi-Urban	0.090	0.182	0.190	0.052	0.100 [*]
	(0.012)	(0.028)	(0.049)	(0.024)	(0.051)
Rural	0.142	0.706	0.319	0.654	0.176 ^{**}
	(0.011)	(0.029)	(0.024)	(0.043)	(0.027)
National	0.117	1	0.249	1	0.132 ^{**}
	(0.008)		(0.018)		(0.020)

Source: Computed by the author from BCS 1984 and CHCS 1996 Survey Data

Note: Overall poverty line = 508.19 CFA francs per adult equivalent. Figures in parentheses represent standard errors. Stratification and clustering in the surveys were taken into consideration when setting the sample designs. ** and * indicate significance at the 1% and 5% levels, respectively.

Table 4: Sectoral Decomposition of $\Delta P_1 = 0.132$

Zone	Standard Approach due to Ravallion-Huppi Reference period t				Shapley Approach		
	Intra-sector effects	Inter-sector effects	Interaction	Impact on ΔP_1	Intra-sector effects	Inter-sector effects	Impact on ΔP_1
Urban	0.011 (0.001)	0.000 (0.003)	0.019 (0.004)	0.030 (0.005)	0.021 (0.000)	0.010 (0.000)	0.030 (0.005)
Semi-Urban	0.018 (0.010)	-0.012 (0.005)	-0.013 (0.007)	-0.007 (0.006)	0.012 (0.000)	-0.018 (0.000)	-0.007 (0.006)
Rural	0.124 (0.019)	-0.007 (0.034)	-0.009 (0.009)	0.108 (0.030)	0.120 (0.000)	-0.012 (0.000)	0.108 (0.023)

Source: Computed by the author from BCS 1984 and CHCS 1996 Survey Data

Note: Overall poverty line = 508.19 CFA francs per adult equivalent

Table 5: Evolution of the Squared Poverty-Gap Index (P_2)

Zone	Estimate ($P_{2,t}$)	Population Share ($f_{k,t}$)	Estimate ($P_{2,t+n}$)	Population Share ($f_{k,t+n}$)	Difference (ΔP_{2k})
	1984		1996		1984vs1996
Urban	0.001 (0.000)	0.112 (0.006)	0.045 (0.006)	0.294 (0.027)	0.044 ^{**} (0.006)
Semi-Urban	0.042 (0.006)	0.182 (0.028)	0.084 (0.025)	0.052 (0.024)	0.042 (0.025)
Rural	0.063 (0.006)	0.706 (0.029)	0.159 (0.016)	0.654 (0.043)	0.096 ^{**} (0.017)
National	0.052 (0.004)	1	0.121 (0.011)	1	0.069 ^{**} (0.012)

Source: Computed by the author from BCS 1984 and CHCS 1996 Survey Data

Note: Overall poverty line = 508.19 CFA francs per adult equivalent. Figures in parentheses represent standard errors. Stratification and clustering in the surveys were taken into consideration when setting the sample designs. ** and * indicate significance at the 1% and 5% levels, respectively.

Table 6: Sectoral Decomposition of $\Delta P_2 = 0.069$

Zone	Standard Approach due to Ravallion-Huppi Reference period t				Shapley Approach		
	Intra-sector effects	Inter-sector effects	Interaction	Impact on ΔP_2	Intra-sector effects	Inter-sector effects	Impact on ΔP_2
Urban	0.005 (0.001)	0.000 (0.004)	0.008 (0.002)	0.013 (0.002)	0.009 (0.000)	0.004 (0.000)	0.013 (0.002)
Semi-Urban	0.008 (0.005)	-0.005 (0.004)	-0.006 (0.004)	-0.003 (0.003)	0.005 (0.000)	-0.008 (0.000)	-0.003 (0.003)
Rural	0.068	-0.003	-0.005	0.059	0.065	-0.006	0.059

	(0.012)	(0.035)	(0.005)	(0.013)	(0.000)	(0.000)	(0.013)
Source: Computed by the author from BCS 1984 and CHCS 1996 Survey Data							
Note: Overall poverty line = 508.19 CFA francs per adult equivalent							

The significant increase in the poverty rate between 1984 and 1996 can be traced to the collapse in world commodity prices in the mid 1980s, the overvaluation of the CFA franc against the US dollar, and structural deficiencies that plunged Cameroon into unprecedented economic crisis. The immediate response to the crisis was the adoption of the IMF/World Bank (medium-term) structural adjustment programmes (SAPs) from 1988. The SAP measures designed to achieve macro-economic stability also compounded the effects of the crises on the welfare of households.

As noted by Baye *et al.* (2002), Cameroonian authorities tried to cope with the budget deficits engendered by the crisis by down-sizing public expenditures through: (1) restructuring of public and semi-public enterprises in the early 1990s, which led to staff redundancies and increased unemployment, (2) slashing public expenditures on education, road infrastructure, extension services, rural water supply and electrification, and health care services, (3) freezing recruitment in the public service, and (4) public sector salary cuts amounting to an average of about 60 per cent.

The marketing of traditional export commodities was liberalized in 1992-1994, thus exposing farmers to the unpredictability of world market prices. These moves were, however, judged by the decision-makers, subjected to the conditionalities of the donor community, to be too slow to effect the much-needed adjustment. The authorities resorted to policies that included an expenditure-switching component. For instance, the 1994 devaluation of the CFA franc was intended to reduce expenditure on imports as well as

re-allocate resources away from non-tradable to tradable commodities with a view to propping up the global competitiveness of the economy.

Subsequent to the 1994 devaluation Cameroon achieved macro-economic stability. Yet the implementation of the post-devaluation reforms was at first non-committal, and the government failed to capitalise on the window of opportunities opened by the currency devaluation.⁶ Rural incomes were also slow to improve because much of the acreage under coffee and cocoa had been abandoned, in addition to the typically low short-run elasticities of supply of these commodities. Moreover, salary cuts, the devaluation of the CFA franc with its short-term inflationary effects, and the retrenchment of public sector workers, eroded the real purchasing power of Cameroonians.

6. Concluding Remarks

The main objectives of this paper were to investigate how poverty changed, and to decompose the changes to mobility and sector-specific effects between 1984 and 1996. In particular, we defined an exact decomposition rule for assigning entitlements in distributive analysis and assessed the within- and between-sector contributions to changes in aggregate poverty. Between 1984 and 1996 poverty remained a rural phenomenon. It became more widespread, deeper and severer for both rural and urban areas, but more so for urban than rural areas.

The between-sector contributions in both rural and semi-urban areas played a mitigating role on the worse effects of the increase in poverty. These positive feedback

⁶ It was only in 1996 that the government gave a firm mandate to a new team to work with the international community, notably the IMF and the World Bank, to tackle the structural problems affecting the economy.

inter-zonal effects were attributed, at least in part, to the importance of migration in the fight against poverty by the poor themselves. The main transmission mechanism was thought to be through remittances made by rural-urban migrants, who generally leave part of their family in rural areas and maintain active ties with them. This observation was supported by the decline in the population shares of both rural and semi-urban areas in the period 1984-1996. The apparent depopulation of these areas could, however, be more generally connected to changing demographic structure due to natural factors and/or net migration to the main cities during the period 1984-1996.

These results point to the potential positive feedback effects of migration and the associated remittances as a potent strategy used by rural households to left their families and villages out of the worse effects of poverty. The implication of this interpretation is that decision-makers need to better understand the factors that push or pull migrants. Although rural-urban migration may appear as a rational strategy used by households to mitigate the worse effects of poverty (implying that household mobility could assist in shared growth), the implications for public policy at a more macro-level in terms of open unemployment and associated social and insecurity problems at the receiving end may point to the wisdom of addressing the push-factors by targeting more in favour of rural areas.

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