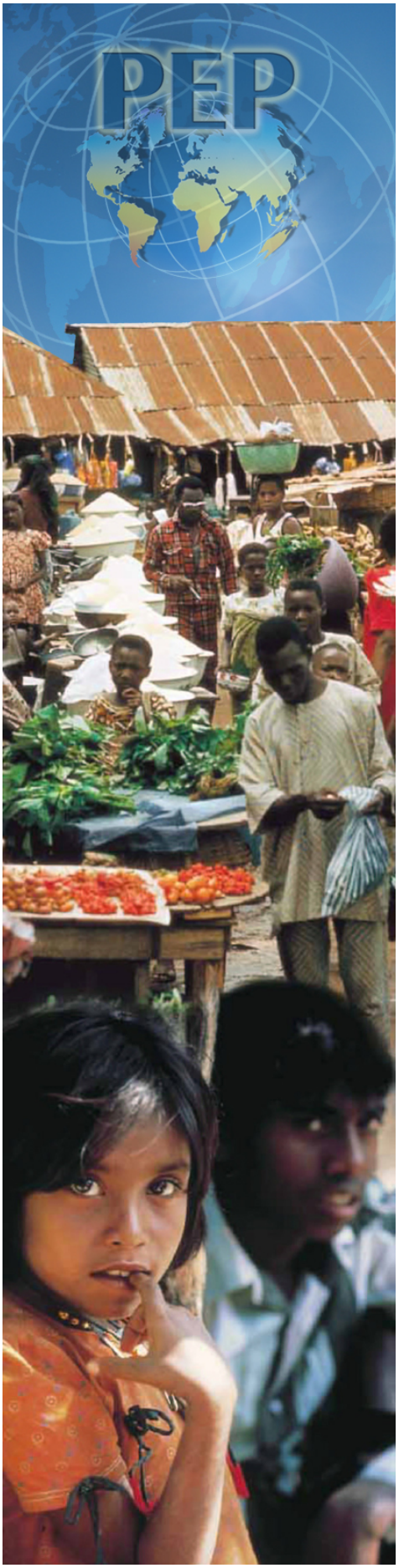

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Spatial and Inter-temporal Sources of Poverty, Inequality and Gender Disparities in Cameroon: A Regression-Based Decomposition Analysis

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Abstract

This study applies the regression-based inequality decomposition technique to explain poverty and inequality trends in Cameroon. We also identify gender related factors which explain income disparities and discrimination based on the 2001 and 2007 Cameroon household consumption surveys. The results show that education, health, employment in the formal sector, age cohorts, household size, gender, ownership of farmland and urban versus rural residence explain household economic wellbeing; disparities in income inequality between male- and female-headed households are largely explained by education, the share of active household members, employment in the formal sector, household size and health. The study concludes that public interventions which encourage education for all, employment and rural development in Cameroon have some prospects of addressing gender-based inequality in Cameroon.

Keywords: Regression-based decomposition, Poverty, Inequality, Gender and Oaxaca-Blinder decomposition.

JEL Classification: I30; I32; D39

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Introduction

In the 2009 Growth and Employment Strategy Paper (GESP), the government of Cameroon acknowledges that efforts to increase the standard of living in Cameroon must be strengthened. Unfortunately, despite the fall in the level of poverty from 53.3% in 1996 (ECAM I) to 40.2% in 2001 (ECAM II), progress on this front has been stagnant with 39.9% of Cameroonians estimated to be poor in 2007. This level of poverty is above the objective of 37.1% set by the government of Cameroon in its 2003 Poverty Reduction Strategy Paper (PRSP) (Government of Cameroon, 2003). In 1996, 59.6% of the poor lived in rural areas and 41.4% lived in urban areas. These numbers eased off to 49.9% in rural areas and 22.1% in urban areas in 2001. In 2007, urban poverty fell by 5.7% while rural poverty rose by 3 percentage points (Institue Nationale des Statistiques, 2008).

The Gini inequality coefficient decreased marginally from 0.408 in 2001 to 0.390 in 2007, retreating more in cities than in rural areas (Institue Nationale des Statistiques, 2008). Baye and Fambon (2002) and Baye (2008) decomposed poverty by subgroup and found that within-group differences accounted for more of inequality than between-group differences. These subgroups were urban, semi-urban and rural areas. However, the main shortcoming of such analyses is the failure to identify and quantify the fundamental determinants of the between-group and within-group components. The current paper thus analyzes factors which significantly explain household welfare and income redistribution in a developing country like Cameroon. Empirical studies which decompose inequality using Cameroonian household survey data are limited (Araar, 2009; Araar, 2006; Chameni, 2006). Even when these studies are undertaken, they do not *a priori* establish causal relationships underlying total inequality or observed gender-related income disparities and discrimination.

Understanding how much of total inequality is captured by the regressed sources is important for targeting the roots of inequality in Cameroon. As observed by Awoyemi and Adekanye (2003), a number of factors are at the root of inequality. One is the logical outcome of the market economy itself, which has various pathways for socio-economic segmentation. A second is the skewed developmental focus in favour of urban dwellers relative to rural populations in terms of access to education, health and other infrastructures. Inequality can also be aggravated by poor governance, corruption, poor institutions and administrative inertia. These factors account for inequality that affects income redistribution programs and poverty outcomes. It is important to determine correlates of household economic welfare and to assess the contribution of each correlate on measured inequality.

Another reason that living conditions have not improved despite a fall in monetary poverty can be found in Cameroon's economic history (Baye and Fambon, 2001). The situation in 1997 was one of both worsening poverty and improving macroeconomic conditions following consolidation of the

benefits of devaluation. This led the government to adopt the IMF and World Bank Enhanced Structural Adjustment Program that ultimately led to Cameroon's admission into the Heavily Indebted Poor Countries (HIPC) initiative. The government of Cameroon put together a PRSP between 2000 and 2003 to guide the fight against poverty. Efforts[1] paid off in April 2006 when Cameroon attained the completion point of the HIPC initiative.

The effects of the completion point have continued to be felt slowly by the population. Economic growth between 2001 and 2007 did not favour the poor, as Cameroon needed a pro-poor growth rate in excess of 5.7% from 2009 to be able to halve poverty by 2015 (Institue Nationale des Statistiques, 2008). This level of growth did not materialize. Indicators of human development which deteriorated considerably during the crisis years, particularly in education and health, have not improved sufficiently or sustainably enough to fully remedy the situation, despite the marginal decline in the incidence of poverty between 2001 and 2007.

The UN Millennium Development Goals (MDG) Report (2006) noted a failure to attain gender parity as per MDG3, which advocates the promotion of gender equality and women's empowerment (Department for International Development (DFID), 2007). The traditional sociocultural setting in most developing countries, including Cameroon, has evolved in favour of men, especially for land inheritance which only has a secondary role for women. This prevents them from acquiring and developing assets to fully participate in realizing growth potentials that can help households move out of poverty and inequality traps (World Bank, 2005; Endeley and Sikod, 2006). Gender-oriented differences that are skewed in favour of men affect supply responses and resource allocation at the household and aggregate levels (Sikod, 2007).

Empowering the citizenry is one of the main objectives of the government of Cameroon. Cameroon has ratified a number of international conventions relating to gender issues, one of which is The Convention on the Elimination of all Forms of Discrimination Against Women (CEDAW). Unfortunately, we still identify differences in access and returns to endowments which adversely affect women. Women's role in generating household income has become more important since the crisis of the 1980s. Many factors limit the economic growth of women and are particularly responsible for poverty in rural areas. These factors are associated to unequal access and control of the productive resources needed to participate fully in realizing growth aimed at reducing poverty in male- and female-headed households (Sikod, 2007).

[1] An outlay of the debt burden and the HIPC process is outlined in Epo and Baye (2008).

The incidence of poverty for men in 2001 was 39.9% compared to 40.5% for women (Government of Cameroon, 2003). In 2007, 4 in 10 households headed by men were poor, while this figure stood at 3 in 10 for households headed by women. Two possible reasons for this outcome are third party transfer payments to female-headed households and low expenditures by women outside their household setup (Institue Nationale des Statistiques, 2008).

Gender disparities can be viewed in terms of human capital between women and men. For example, the literacy rate was 63.7% for men and 40.7% for women in 1996; in 2001 these stood at 66.5% for men and 46.6% for women. In 2007, the literacy rate stood at 82.1% for men and 77.5% for women (Government of Cameroon, 2009). In Cameroon, fewer women own land than men due to socioeconomic and cultural constraints such as subordination of women within marriages and lack of wealth to cover land market prices. Widows who inherit land also often find their ownership of land to be challenged and encroached upon by men in many regions in Cameroon. Regarding access to credit facilities, men have much more access to credit than women because the former have assets that enable them borrow money. This pushes women to resort to the informal sector for their financial needs, constraining their ability to expand their economic activities (Government of Cameroon, 2003).

Gender analysts believe that women and children are more vulnerable[2] than men. This dampens opportunities associated with access to endowments (gender-neutral) and returns to these endowments (gender-bias) to undertake remunerative activities that will help them acquire their own assets, with the effect of limiting overall household and community welfare. According to the UNDP Cameroon Office (MDG progress reports, 2002 and 2003), the current state of progress suggests that it is unlikely that Cameroon will attain most of the MDG3 objectives before the deadlines. A government policymaking bias in favour of men can be explained by the weak position of women as a lobby group.

A substantial number of women carry out petty trading activities in the informal sector. These women generally trade local perishable food crops on the periphery of the market. This type of activity increased between 2001 and 2007, indirectly helping consolidate fragile household income (and expenditures) because the number of active household members increased and overall household income also increased. The figures for gender disparity reveal that Cameroon has been very slow to move forward the agenda of women's empowerment. It is thus very important to understand inequality and poverty along with how they relate to gender disparity and discrimination in order to effectively influence policy orientations.

[2] Vulnerability refers to defenselessness, insecurity and exposure to risk, and is considered in relation to assets. The more people are well endowed with assets, the less vulnerable they will be because they are more able to protect themselves from poverty (Moser and Felton, 2006).

This paper uses the regression-based decomposition framework to investigate sources of inequality. This incorporates a multidimensional aspect to analyzing household economic wellbeing and inequality. Firstly, this is because the regression-based decomposition establishes relationships between the dependent and independent variables that explain our welfare indicator. Secondly, after estimating the contributions of the explanatory factors to total income (wellbeing) we decompose inequality by a predetermined set of income sources. Whereas the regression-based-decomposition (RBD) approach has been routinely applied to investigate factors that explain income inequality, Wan (2002) observed some weaknesses associated with the functional specifications, the treatment of the error term and the exactness of the decomposition procedure. Although Wan (2002; 2004) outlined some orientations on how these shortcomings might be resolved, no study appears to have computed robust estimates that address these issues. The main difficulty pertains to the failure to carry out an exact decomposition of the estimated sources including the error term, putting aside the functional form or the adopted inequality index.

This paper attempts to fill some of these lacunas by decomposing measured household income inequality into the different estimated sources and the error term simultaneously, using the Shapley value (Shapley, 1953) procedure. In this regard, the marginal contributions of the estimated-income sources and the error term are computed based on the decomposition framework proposed by Shorrocks (1999). This procedure was implemented with the Distributive Analysis Stata Package (DASP 2.1) (Araar and Duclos, 2009) and STATA 10.

Inspired from Araar (2009), this paper makes use of the Multiple Correspondence Analysis to construct composite variables for education and health that capture multidimensional wellbeing. Furthermore, the variables are key constituents of human capital characteristics. These synthetic variables are used as regressors in the income generating function. This yields factors used to perform the inequality decomposition analysis. This gives a flavour of the multidimensional character of inequality. In reviewing recent advances in the measurement of inequality, Heshmanti (2004a) pays some attention to the interrelationship between income inequality and the non-income dimensions of inequality. He observes a bias in favour of the monetary measure of inequality compared to the non-income dimensions. Thus there is need to consider other dimensions associated with education, opportunities, assets, social mobility and health.

In this exercise, education and health are composite variables. Thus, in keeping with Sen's (1973 and 1980) concepts of capabilities and functionings, the synthetic variables capture more information on household attributes and thus may carry more policy implications. The multiple correspondence analysis is an application of the simple correspondence analysis to multivariate

categorical data, coded as an indicator matrix or a Burt matrix (Grenacre, 1993; Foko *et al*., 2007; Ningayé and Ndjanyou, 2007). Araar (2009) points out that many non-monetized goods can be found in developing countries and where the public sector provides a large share of collective goods. Furthermore, since the early works of Kolm (1977), and more recently Lugo (2005) and Araar (2009), multidimensional inequality analysis has been brought to the fore because of the need for an assessment of both income and non-income dimensions of inequality. In this context, understanding the non-monetary aspects of inequality can inform public policy on whether particular public programmes benefit local inhabitants.

This paper also uses the Oaxaca-Blinder (1973) method of decomposition to investigate disparities in endowments and returns to these endowments between male-and female-headed households in Cameroon, and to construct a discrimination index. It involves obtaining appropriate parameter estimates of income generating functions, and using them to derive the partial effects of regressed factor endowments as well as their returns on gender disparities in Cameroon. This is important because empirical studies on gender are still nascent in Cameroon in terms of evidence-based policy information. In this context, adequate information is essential because the role played by women in fighting poverty[3] and influencing development is significant (Boserup, 1970; Feldstein and Jiggins, 1994). Lachaud (1997) notes a high vulnerability of female-headed households in terms of wellbeing. Women are generally considered to be relatively more vulnerable than men in terms of money income, health, and education.

This paper adapts the Oaxaca-Blinder (1973) approach which was initially meant to investigate discrimination in earnings between men and women. We argue that in the absence of societal discrimination (considered as a source of inequality) the household income and expenditure structure faced by men also applies to women. Unfortunately, we observe that these endowments are sometimes distributed along gender lines, with women being discriminated against. Similarly, even if male- and female-headed household heads have equal access to these endowments, their returns to these endowments might differ. Thus, household expenditures are influenced by the gender of the household head. This scenario is evident in most underdeveloped countries and in Cameroon in particular. Such an analysis enables us to blend the twin issues of inequality and gender disparities.

In this context, a key question arises: Are variables that account for household economic wellbeing useful in explaining inequality and gender disparities in the distribution of standards of living?

[3] In most rural areas in less developed countries, women are the bread winners of most families, and issues that help consolidate their position need to be clearly incorporated into the Poverty Reduction Strategies (Mosse, 1994).

The associated key objective of this paper is therefore to empirically identify variables that determine income inequality and inter-household gender disparities in the distribution of living standards in Cameroon. The specific objectives are: (1) to evaluate the determinants of poverty and decompose inequality by regressed income sources; (2) to explore determinants of differences in endowments and returns to endowments observed between male- and female-headed households in Cameroon; and (3) to formulate policy implications on the basis of the findings. The rest of the paper is organized into six sections. Section 2 outlines a conceptual framework, section 3 gives a review of the relevant literature and section 4 dwells on the methodology and data. Section 5 presents the empirical results and section 6 concludes the paper.

Conceptual framework

The search for appropriate ways to link inequality, poverty and gender disparities offers important inputs into the policy debate and may help create an efficient mix of policies geared at increasing household welfare and reducing poverty. Inadequate human capital and household and societal characteristics (expressed in this paper as sources of inequality) may be causes of poverty. By the same token, uneven distribution of these characteristics is likely to fuel inequality. Furthermore, discrimination by gender will cause gender disparity in access to these key endowments (tangible and intangible human capital resources) as well as returns to these endowments.

Policies that enhance welfare may help households exit poverty if they encourage economic growth and reduce inequalities in accessing resources and opportunities. These resources and opportunities are reflected in human capital, individual and community characteristics. Unfortunately, efforts to reduce inequality and poverty through pro-poor growth can be stifled if there are gender disparities in access to and use of productive assets. Going beyond just identifying determinants of poverty and inequality to consider factors that explain gender disparity and discrimination may be of importance in understanding links between the concepts of inequality, gender disparities and poverty with a view to a better appreciation of pathways to attain the millennium development goals (MDGs).

Poverty, in its uni- and multi-dimensional forms, constitutes a key issue that must be resolved in order to foster welfare-enhancing development. Likewise, conceptually distinct as they may be, income inequality is often studied as part of broader analysis covering poverty and welfare. Inequality is a broader concept than poverty in that it is defined over the entire income distribution rather than a censored distribution of individuals or households below a certain poverty line. Therefore, understanding poverty and inequality is important when designing programs that instigate growth and enhance welfare. Despite the importance of poverty and inequality, no meaningful increase in welfare

can take place without incorporating the key role that considerations of gender play in developmental economics. The relationship between poverty, inequality and gender-related disparities thus need to be investigated, quantified and where possible used in public policy formulation.

Literature Review

Since Glewwe's (1991) study on the determinants of poverty and wellbeing, regression analyses of household expenditures have become widely used for empirical studies in developmental economics. These studies address issues such as ethnic discrimination of living standards (Van de Walle and Gunawardena, 2001); evaluation of land distribution (Ravallion and Van de Walle, 2001); spatial inequality (Hertberg, 2003); social and political determinants of poverty (Ruspasingha and Goetz, 2007); geographic determinants of poverty (Audet, Boccanfuso and Makdissi, 2006); determinants of child poverty (Mitrakos, 2008); and the determinants of inequality (Morduch and Sicular, 2002; Wan, 2004; Wan and Zhou, 2005). These developments identify both quantitative (Mwabu *et al*., 2009; Babatunde, Olorunsanya, Adejola, 2008; Oyekale, Adeoti and Oyekale, 2007; Akhtar and Ahmed, 1999) and qualitative (Nyugen *et al*., 2006; Alemayehu *et al*., 2005; and Oyugi, 2000) econometric methods. In Cameroon, very few studies have attempted to identify determinants of economic well-being. For example, Baye and Epo (2009) use a control function approach and the 1996 and 2001 household consumption surveys to tease out the determinants of gender disparities in Cameroon. These surveys indicate that the household head's level of education, household size and area of residence are the elements that account for gender disparities.

An overview of the literature indicates that a lot of research is being done to divide parametric and non-parametric inequality issues into subgroups, income sources, causal factors and other units or characteristics (Heshmati, 2004b). Until now, economists have attempted to develop a regression-based approach to decomposing inequality. The pioneers in this area of study are Oaxaca (1973) and Blinder (1973). They focus on the difference in mean income between two groups, attributing it to differences in their resource endowment as represented by sample averages of regression variables and in returns to the endowment as represented by parameter estimates of the regression equation. In the early 1990s, Juhn, Murphy and Pierce (1993) applied this approach to allow for decomposition of between-group differences over the entire distribution of wages rather than for mean income as done by Oaxaca (1973) and Blinder (1973). Bourguignon *et al*. (2001, 2008) relaxed the requirement of a linear income-generating function adopted by Juhn *et al*. (1993). Wan (2002) clearly finds that these efforts were devoted to explaining between-group differences in the income distribution rather than quantifying contributions of many individual determinants to total inequality.

DiNardo *et al*. (1996) and Deaton (1997) respectively proposed semi-parametric and non-parametric techniques that sought to model and compare the whole distribution of income in terms of density functions. However, as is the case with many semi-parametric or non-parametric methods, the results obtained were rather inconclusive and thus produced findings that fall short of expectations from both economists and policy makers. Fields (1995) recognized the link between the conventional OLS regression and the problem of decomposing income inequality by source. He also addressed the possibility of explaining changes observed through determinants of income inequality (Fields, 1998). Fields and Yoo (2000) and Morduch and Sicular (2002) develop a theoretical framework to decompose inequality. This structure is an extension of the approach used by Shorrocks (1980, 1982, 1984, 1999), which entirely relies on conventional regression equations. This approach was then upgraded by Wan (2004). It has a number of advantages due to its vast flexibility and accommodative characteristics. Compared with the unconditional approach, the regression-based methods, depending on the modeling strategy, provide possibilities to quantify the conditional roles of various characteristics in a multivariate context and allow for heterogeneity in responses. Furthermore, confidence intervals for disaggregated contributions to the inequality index have been constructed (Heshmati, 2004).

A range of different applications of the income inequality regression-based decomposition literature exist. These include: the extension of the Morduch and Sicular's (2002) approach to the case where the composition of income from different sources is observed (Adam, 2001); the case where different income sources are accounted for by different forms of earnings in farming household income (Bardham and Boucher, 1998; Yuko *et al*., 2006; Kimhi, 2007) by carrying out a regression-based decomposition by determinants of income.

Wan (2002, 2004), however, noted that most income inequality regression decompositions usually ignore or incorrectly treat the constant and residual terms. While encountering a constant as a source of income inequality in empirical analysis of income distribution is possible but rare, the presence of a constant is the rule, not the exception in regression equations. It is pertinent to question why the residual term is always assumed away in conventional decompositions (Wan, 2004). The residual is white noise by definition. In other words, it does not affect the mean of the dependent variable in the estimated regression equation and it does not affect the shape of the empirical Lorenz curve. Its presence or absence, however, does result in different income density functions and thus influences income inequality. The value of including the residual in the decomposition analysis is that it accounts for the relative contribution that the set of variables which are excluded from the model have on inequality. This means that the potential and real advantage of this approach will be undermined and further advances in this area might be hampered if the residual is not appropriately treated.

Despite growing research in this area, the amount of research on regression-based decomposition analysis of income inequality in Africa is limited. The work of Alayande (2003) and Oyekele *et al*., (2007) on Nigeria is notable for using this approach. To the best of our knowledge, the only attempt for Cameroon was made by Tabi (2009). Unfortunately, Tabi's (2009) regression-based decomposition does not include multidimensional or gender aspects of inequality. These gaps can be filled by estimating the shares of determinants of income using the Shapley value decomposition rule. This promising procedure is used in this paper.

In order to extend the regression-based decomposition technique to focus on gender-related disparity and discrimination, we explore the Oaxaca-Blinder decomposition approach. Many studies applying this approach mainly focus on determining the role of labour market discrimination between men and women (Lissenburgh, 2000; González *et al*., 2005; Wan and Cai, 2005; Chzhen, 2006). An overview of the literature on the welfare of female-headed households reveals a diversity of issues that have been addressed using this approach. These notably include concerns linked to gender and asset endowments along with the impact of these assets on rural welfare (Fafchamps and Quisumbing, 2002; Duflo, 2003; Cheryl, 2005), questions on intra-household inequality (Quisumbing, 2003) and issues linked to gender discrimination in sub-Saharan Africa using the Oaxaca-Blinder Decomposition (Grun, 2004; Shepherd, 2008 and Nordman *et al*., 2009). Despite the popularity of these techniques, to the best of our knowledge this approach has not been adapted to study differences in well-being between male- and female-headed households in Cameroon.

Studies tackling differences in endowments between male- and female-headed households include Blackden and Bhanu (1996), whose analysis of human assets finds that gender differentials in reproductive health in sub-Saharan Africa (SSA) disfavours women relative to men. Regarding social assets, precisely norms, DasGupta (1987) observes that cultural rights and obligations favour sons relative to daughters in rural India. Ahuja and Filmer (1996) identify disparities in male-female educational attainment and enrolment levels in developing countries. Studying the impact of gender inequality of pro-poor growth led Klasen (2005) to recognize that there is little information on the impact that gender gaps have on inequality. The DFID (2007) report indicates that women constitute about 17% of parliamentary representatives worldwide and remain severely under-represented in political and decision-making positions in many countries. This figure is considerably lower in countries such as Egypt, where just 2% of members of parliament are female. Less than 17% of parliamentarians in Cameroon are women.

There are very few empirical studies that address gender gaps of endowments in Cameroon. One example is Sikod (2007), who uses descriptive statistics to attempt to distinguish between assets

(private and public) that affect labour productivity and their influence on household decision making processes. Endeley and Sikod (2005) use graphs and tables to evaluate the impact of the Chad-Cameroon pipeline using data collected from a number of villages along the pipeline routes to investigate how this project affects gender relations, land resources and community livelihood. The study finds a bias in favour of men in terms of recruitment and benefits obtained from the construction of the pipeline in the communities that benefited from this process. Ngome (2003) used descriptive data collected from the Southwest Region to find the role of the gender division of labour and women's decision making in rural Cameroon. The study finds that in rural areas, socio-economic and cultural constraints steer women into secondary roles that impair their capacity to generate resources; this prevents them from bargaining adequately with their male counterparts in decision making processes.

Fonchingong (1999) looks into the effects of structural adjustment reforms on women and how this affects agricultural output in Cameroon. This study reveals that enhanced agricultural productivity could result from adequately strengthening government policies that empower women. Fonjong (2001) questions NGOs' role in enhancing women's participation in fostering development aimed at improving welfare. These studies seek to understand gender issues in Cameroon, but do not investigate the causal relationships that exist between endowments that may either affect the economic well-being of male-and-female headed households or the returns to these endowments. They also fail to use methodologies that go beyond descriptive analysis. To improve on this we obtain regression estimates and use the Oaxaca-Blinder approach to investigate differences in endowments along with differences in returns to these endowments for male- and female-headed households. This extension of our regression-based decomposition analysis verifies how these bases of welfare affect gender-related disparities in Cameroon.

Methodology and data

A) Methodology

Prior to regression-based decomposition analysis, Shorrocks (1982) established a weighted sum of income as a measure of inequality:

$$I\left(y\right)=\sum_{i}a_{i}\left(y\right)y_{i} \qquad (1)$$

where a_i are the income shares, y_i is the income of household i, y is total income, I(y) is the weighted sum of total household income corresponding to an inequality measure and $a_i\left(y\right)$ is the ethical weight attributed to individual i based on income vector *y*. Since income may be observed as the sum of

income from *M* sources or endowments, the inequality measure $y_i = \sum_{m=1}^{M} y_i^m$ can now be written as the sum-specific component S^m :

$$I(y) = \sum_i a_i(y) \sum_m y_i^m = \sum_m \left[\sum_i a_i(y) y_i^m \right] = \sum_m S^m \quad (2)$$

The proportional contribution of each income source is obtained by dividing the sum-specific component by $I(y)$. The proportional contribution of income source *m*, S^m , can then be written as:

$$S^m = \sum_i a_i(y) y_i^m \Big/ I(y) \quad (3)$$

According to Shorrocks (1982), the weight $a_i(y)$ may be chosen arbitrarily, implying an infinite number of possibilities. He then proposed a unique decomposition rule that satisfies the following: (a) if a new distribution is obtained by multiplying all incomes by a constant, measured inequality should be the same for both distributions; and (b) if total income is divided into two components whose factor distributions are permutations of each other, their contributions to total inequality are identical. Morduch and Sicular (2002) extended the decomposition rule (3) to a regression-based decomposition by determinants of household income as:

$$y = X\beta + \varepsilon \quad (4)$$

where X is a vector of explanatory variables. The first column is the n-vector $\alpha = (1,1,.....,1)$, β is a vector of parameters and ε is the error term. However, the adoption of the OLS approach may suffer from potential endogeneity or sample selection bias for some determinants of poverty that may be considered endogenous over longer time periods. For instance, education and health may be endogenous to household expenditures, or farmland ownership may reveal a need to control for sample selection. However, controlling for potential endogeneity and sample selection is beyond the scope of this paper.

Given the vector of consistently estimated parameters $\hat{\beta}$, income can be expressed as a sum of predicted income and predicted error as seen in equation (5). Income can then be considered as estimated flows of income source from the various (household) explanatory variables:

$$y = X\hat{\beta} + \hat{\varepsilon} \quad (5)$$

A vector of economic well-being as measured by the log of household expenditure per capita, y, to be accounted for by a set of factors that can be regrouped into individual, synthetic, household, community and regional characteristics and expressed by the vector X, a vector of the estimated coefficients $\hat{\beta}$, and the vector of the predicted error terms $\hat{\varepsilon}$. Since the econometric results yield estimates of the income flows attributed to household variables, they allow us to decompose income by source (or factor endowments). By construction, total income is the sum of these estimated sources of income flows (plus the error term):

$$y_i = \sum_{m=1}^{M+1} \hat{y}_i^m \qquad (6)$$

where $\hat{y}_i^m = \hat{\beta}_m x_i^m$ for m=1,……,M and $\hat{y}_i^m = \hat{\varepsilon}_i$ for m=M+1

Substituting equation (6) into equation (3) gives the share of inequality attributable to the estimated income flow associated with explanatory variable $\hat{y}_i^m$ as:

$$S^m = \hat{\beta}_m \sum_i a_i(y) x_i^m \Big/ I(y) \qquad (7)^4$$

$\hat{\beta}_m$ are the estimated coefficients, x_i^m is income source *m* attributable to household *i*, $\sum_i a_i(y)$ is the weight attributable to each household and $I(y)$ is the total income inequality index.

Adopting Wan's (2004) extension of this procedure, we assess income inequality as accounted for by each explanatory factor, the constant term and the share of unexplained total inequality as captured by the error term. Adopting the simple yet powerful procedure proposed by Wan (2002), we let the estimated income generating function (regression equation) be:

$$y = F(X) + \varepsilon = \alpha + y^*(X) + \varepsilon \qquad (8)$$

where *Y* is the income generating function (or its transformation) and *X* are determinants of income/expenditures (or their transformation), α is the constant term, ε is the error term and $y^*(X)$ is estimated income sources. F(*X*) allows for any form, with presence of a constant term indicating a linear form or an absence of this term indicating a highly non-linear form. Also, let

[4] Yuko *et al*., (2006) and Kimhi (2007) criticize Morduch and Sicular's (2002) claim that the standard error and residual computation is straightforward since the components are linear coefficients. Mordarres and Gastwith (2006) observes that, at least for the Gini inequality index, it is not straightforward to compute standard error of the index itself. It is thus logical to expect that determining standard errors of components of this index will not be straightforward either.

$y^*(X) = \sum_i \beta_i^m x_i^m = \sum_i y_i$ *where* $y_i = \beta_i^m x_i^m$ represents the flow of income from the m^{th} factor. Let the deterministic part of (8) be considered as $\hat{y} = \alpha + y^* \equiv \hat{y} = \hat{\alpha} + \sum_i y_i$.

Using $I(\bullet)$ as a measure of inequality, we compute the inequality measures for the error term $\hat{\varepsilon}$ following Wan (2002) as:

$$CO_\varepsilon = I(y) - I(\hat{y}) \qquad (9)$$

Decomposing equation (8) requires the disturbance term to be irrelevant and does not affect income inequality. This is not true because in addition to earlier discussions, one should note that $I(y) \neq I(\hat{y})$ unless all $\varepsilon = 0$. One way to treat error terms is to discard them altogether because they cannot be explained by the structural income generating function. This is not recommended. The error term is sometimes viewed in part as representing factors or determinants other than those included in the regression model. It is certainly unwise to ignore ε as it does contain useful information. Once its contribution is identified, policy makers and others can at least be informed about how much of overall inequality can be explained by the included factors.

Having identified the contribution of the residual term, the next task is to disentangle the contributions from the constant term and estimated income factors as:

$$CO_\alpha = I(\hat{y}) - I(y^*) \qquad (10),$$

and $$CO_{y^*(X)} = I(y^*) \qquad (11),$$

where all the contributions are simply attributed to the estimated factors used in the decomposition. In summary, $I(y)$ can be decomposed into CO_ε, CO_α and CO_{y^*} (which represents the estimated source factors) as well as their percentage contributions, which add to 100. We can calculate intertemporal changes of the estimated shares or proportion of the two periods (time t=1 for 2001 and t=2 for 2007), holding same the variable types as:

$$\Delta S_t^m = S_2^m - S_1^m \qquad (12)$$

This change between 2001 and 2007 is interpreted as the differences in the values of the absolute contribution to explaining change in inequality between the two periods.

We extend the regression-based decomposition to investigating gender disparity and discrimination by adopting an Oaxaca-Blinder framework. Let the male and female geometric mean of

household expenditures be denoted by $\overline{Y}_t^m$ and $\overline{Y}_t^f$. We decompose the log-differential of the geometric mean, Δ, as:

$$\Delta \equiv \log\left(\frac{\overline{Y}_t^m}{\overline{Y}_t^f}\right) = \left(\log\left(\overline{Y}_t^m\right) - \log \overline{Y}_t^{0f}\right) + \left(\log\left(\overline{Y}_t^{0f}\right) - \log \overline{Y}_t^f\right) \quad (13)$$

where $\overline{Y}_t^{0f}$ is the counterfactual distribution without accounting for differences between male- and female-headed households. The subscript t represents the year. Restating equation (5), the male and female subsamples can be estimated using equations 14 and 15:

$$Lny_{i,t,m} = X_t^i \beta_t^m + \varepsilon_{i,t} \quad (14)$$

and

$$Lny_{j,t,f} = X_t^j \beta_t^f + \varepsilon_{j,t} \quad (15)$$

where $y_{i,t,m}$ is the log of expenditures by male-headed household i in time *t,* $y_{j,t,f}$ is the log of expenditures by female-headed household *j* in time *t*; β_t^m and β_t^f are the coefficients that determine the effects of factor endowments on household wellbeing, and X_t^i and X_t^j are the personal endowment vectors relating to the characteristics of male i and female *j*. Since the regression function passes through the sample mean of X and y, the stochastic term ε is dropped when taking the arithmetic average of equations (14) and (15). Denoting the arithmetic mean as $\overline{y}_t^a$, where "a=m" or "a=f" respectively for men and women, then:

$$Ln\,\overline{y}_t^m = \overline{X}_t^m \hat{\beta}_t^m \quad (16)$$

and

$$Ln\,\overline{y}_t^f = \overline{X}_t^f \hat{\beta}_t^f \quad (17)$$

This simply implies that mean expenditures are predicted using mean characteristics, and $\hat{\beta}_t^f$ and $\hat{\beta}_t^m$ are the vectors of the estimated coefficients of the female and male groups. Since $\overline{y}_t$ is the mean of the log in time *t*, and $\overline{Y}_t$ is the log of the geometric means, we then plug equations (16) and (17) into (13). Taking the average across the entire spectrum of endowments gives the following for the male and female subgroups:

$$\Delta_t = \log\left(\frac{\overline{y}_{m,t}}{\overline{y}_{f,t}}\right) = \sum_{z=1}^{Z} 0.5\left(\hat{\beta}_{z,t}^{m} + \hat{\beta}_{z,t}^{f}\right)\left(\overline{X}_{z,t}^{m} - \overline{X}_{z,t}^{f}\right) + \sum_{z=1}^{Z} 0.5\left(\overline{X}_{z,t}^{m} + \overline{X}_{z,t}^{f}\right)\left(\hat{\beta}_{z,t}^{m} - \hat{\beta}_{z,t}^{f}\right) \quad (18)$$

For the general population between 2001 and 2007, we get:

$$\Delta = \log\left(\frac{\overline{y}_{t+1}}{\overline{y}_{t}}\right) = \sum_{z=1}^{Z} 0.5\left(\hat{\beta}_{z,t}\right)\left(\overline{X}_{z,t+1} - \overline{X}_{z,t}\right) + \sum_{z=1}^{Z} 0.5\left(\overline{X}_{z,t}\right)\left(\hat{\beta}_{z,t+1} - \hat{\beta}_{z}\right) \quad (19)$$

where z = 1,…..Z refers to endowments attributed to each household. Equation 18 and 19 is a decomposition of the effects of differences in average characteristics (the first term) and the effects of differences in returns to characteristics (the second term). Distinguishing between the contribution of different characteristics and the unexplained differential is done by using the structural form of equations (18) and (19), which resolves the critical issue of having to *a priori* define a reference structure for the base and/or final years used in the analysis. This structure (equation 18) uses the Shapley value approach to avoid arbitrariness in selecting the gender reference structure. The first term simply shows the part of the male-female log-expenditure differential that can be explained by various personal characteristics. The second term is the part of the differential that is not explained by differences in expenditure-determining personal characteristics, but is rather explained by returns to these characteristics as captured by the estimated coefficients. Similar to Takahashi (2007), we can estimate the partial effect that a particular individual endowment or characteristic has on differences observed between male- and female-headed households.

Calculation of discrimination in terms of the endowment and treatment components between 2001 and 2007 hinges on the Shapley value decomposition framework. Equation (19) is then extended to:

$$Inter-Temporal_{2007-2001} = \sum_{z=1}^{Z} 0.25\left(\overline{\hat{\beta}}_{z,t+1} + \overline{\hat{\beta}}_{z,t}\right)\left(\Delta\overline{X}_{z,t+1} - \Delta\overline{X}_{z,t}\right) + \sum_{z=1}^{Z} 0.25\left(\Delta\overline{X}_{z,t+1} + \Delta\overline{X}_{z,t}\right)\left(\overline{\hat{\beta}}_{z,t+1} - \overline{\hat{\beta}}_{z,t}\right) \quad (20)$$
$$+\sum_{z=1}^{Z} 0.25\left(\overline{X}_{z,t+1} + \overline{X}_{z,t}\right)\left(\Delta\hat{\beta}_{z,t+1} - \Delta\hat{\beta}_{z,t}\right) + \sum_{z=1}^{Z} 0.25\left(\Delta\hat{\beta}_{z,t+1} + \Delta\hat{\beta}_{z,t}\right)\left(\overline{X}_{z,t+1} - \overline{X}_{z,t}\right)$$

Having stated gender disparities associated with endowments and returns to these endowments, we consider the rate of discrimination between males and females based on: (1) endowments and (2) the difference in treatment by constructing a discrimination index, defined below. Drawing inspiration from Lissenburgh (2000), let us denote the disparity index for endowment as:

$$DISC_{endowments,f,t} = \left\{\exp\left[\left(\overline{X}_{t}^{m} - \overline{X}_{t}^{f}\right)\hat{\beta}_{t}^{f}\right] - 1\right\} \times 100 \quad (21)$$

Here $DISC_{endowments,f,t}$ is the percentage change in the welfare that female household heads would achieve if they had the same attributes as their male counterparts. The disparity coefficient or index similarly takes the form:

$$DISC_{treatment\ f,t} = \left\{ \exp\left[\left(\hat{\beta}_t^m - \hat{\beta}_t^f \right) \overline{X}_t^f \right] - 1 \right\} \times 100 \qquad (22)$$

Here, $DISC_{treatment,f,t}$ is the percentage change in the welfare female heads would achieve if they had the same returns to characteristics as their male counterparts.

B) Data description and some descriptive statistics

In this report we use the ECAM II (2001) and ECAM III (2007) Cameroon household consumption surveys. The ECAM II survey was carried out over September to December 2001 (National Institute of Statistics, 2002a). This household survey was carried out to remedy mistakes made in the first household survey and enhance information that relates to poverty profiles. This survey was comprised of about 12 300 households, 10 992 of whom (about 90%) were actually visited. A few points can be made about the survey: (1) It was conducted to propose a methodology for calculating poverty lines and profiles that is acceptable to major development partners and which serves as a reference for further analysis; (2) It analyzes monetary poverty in terms of most household's living conditions and potential poverty and establishes the correlation between them; (3) It consolidates previous analysis at national and regional levels, while also isolating the two large towns (Douala and Yaoundé) and specifying urban and rural residence; and (4) The survey produced an adequate database to improve various statistics relating to the population, notably by bringing household consumption into national accounts and updating data used in calculating price indices (National Institute of Statistics, 2002a; 2002b).

The methodology adopted in ECAM II can be explained by the following points. First the objective with respect to stratification was to obtain a representative sample of the whole country. Yaoundé and Douala were considered as two different strata. Two strata were also constructed for each of the 10 regions, one urban and one rural. The urban stratum was divided into two substrata, one of which is towns with at least 50 000 inhabitants and the other includes towns with between 10 000 and 50 000 inhabitants. In all, we constructed 22 strata: 10 rural and 12 urban. The second goal was to have a consistent sampling base. This was tackled by updating the database used for the 1987 survey. In this regard, the average size for each primary sampling unit was 200 households, as opposed to 400 in 1987, for each chosen division. Towns with at least 200 000 inhabitants were cartographically reconsidered to account for possible changes in population structure and urban expansion. For

example, we assume that certain areas in Yaoundé and Douala became urban. Lastly, the total number of primary sampling units was 612, of which 362 were in urban areas and 250 in rural areas.

The third point relating to the methodology has to do with the unit of observation, so the choices of households and individuals were clearly defined. The fourth and fifth points relate to sampling techniques and correcting for non-responses. An additional 5-10% (depending on the level of non-response) was added as estimations linked to non-response in order to obtain the minimal size for each stratum to be interviewed. Yaoundé and Douala were special cases because they constitute the two principal metro-poles of the country.

The ECAM III survey was carried out between May and July of 2007 and covered 11 391 households. Its aim was to upgrade knowledge on the status of poverty and welfare in Cameroon by providing indicators that capture the living standards of the local population through poverty profiles. It also aimed to follow up on implementation of the PRSP and attainment of the MDG objectives. According to the National Institute of Statistics, this data can be used to: (1) study all aspects of poverty at national and regional levels (monetary poverty, household poverty and poverty in terms of potential and subjective poverty), as well as to establish correlations between these different types of poverty; (2) study the dynamics of poverty between 2001 and 2007, with the aim of evaluating the effects of macroeconomic policies over the last five years on household wellbeing; (3) evaluate demand for education and identify its principal determinants; (4) evaluate internal tourism in Cameroon; and (5) collect data on child labour in Cameroon (National Institute of Statistics, 2007 and 2008).

In order to have relatively homogenous strata to establish the poverty profiles, the two principal cities – Yaoundé and Douala – were considered as separate strata. Each of the 10 regions was divided into three strata: urban (large towns with at least 50 000 inhabitants), semi-urban (small towns with between 10 000 and 50 000 inhabitants) and rural (settlements with less than 10 000 inhabitants). In all, 32 strata were established for this survey. This includes 12 urban strata (Yaoundé, Douala and the urban strata in each of the 10 regions of Cameroon) along with semi-urban and rural strata for each of the 10 regions.

The primary sampling units were chosen on the basis of the number of people residing in a particular area. Primary sampling units for urban areas were numbered 001 to 699. Numbering in rural areas went from 700 to 900. This survey was administered as follows: 12 households were visited in each primary sampling unit in Yaoundé and Douala and 18 households were visited in each primary sampling unit in the 10 other regions of the country. This size was then adjusted by 5-to-10 percentage points to account for non-responses in the respective regions.

Data used for this analysis includes both observed and synthetic variables. A number of variables were selected on the basis of data obtained from the ECAM II and ECAM III household surveys. The dependent variable considered is per capita household expenditures. This variable is derived by dividing household expenditures by the number of individuals living in a household. The assumption with this variable is that there are no economies of scale at the household level. A number of independent variables are also considered. Household size, for example, simply indicates the number of people living in a particular house at a given point in time. The age of the household head shows the age of the household head at the time of the survey. The age groups considered were 20-29, 30-39, 40-49, 50-59, and 60+. The share of active household members was generated as the proportion of working adults living in the household. The variable constructed for formal sector employment indicates that the household head is employed in the formal sector. The variable relating to farmland ownership refers to households in which the household head owns exploitable farmland. In terms of geography, urban and rural areas were chosen, while semi-urban areas were excluded to avoid perfect collinearity.

We constructed the synthetic variables for education and health using the multiple correspondence analysis method to capture the multidimensionality of household economic wellbeing. We pooled the ECAM II and ECAM III household surveys. Modalities used to construct these synthetic variables are expressed in appendix 2. Variables selected for our empirical work along with their descriptive statistics are presented in tables 1-3 in appendix 1.

Empirical results

Descriptive statistics

The descriptive statistics for 2001 reveal that 75 percent of those interviewed were men. About 12% of households interviewed in urban areas were headed by a female. This percentage was less than 10 percent in rural areas. On average, most household heads are in the 40--49 year old age cohort. The average household in 2001 had 5 members, and households headed by men tended to be larger than those headed by women. About 5% of interviewees working in the formal sector were women, while women comprised 30% of workers in the formal sector. Regarding being married, 10% of female household heads are married, leading to the observation that most female household heads are single parents. Having just one parent may expose these households to external shocks because their limited ability to respond to shocks makes them more vulnerable. Regarding land ownership, 21% of households that own or exploit farmland are households headed by women. This percentage is about 80% in rural areas. On average, the share of active household members within a household was 0.28

for the general population and about 0.5 for both male- and female-headed households. Considered together, the variables indicate that male-headed households are marginally better endowed than female-headed households. Some exceptions are noted for the health and age variables, with female households registering marginally higher average values than their male counterparts. These trends are also observed for 2007.

Descriptive statistics for the 2007 survey indicate that 73 percent of interviewed households were male. Of the total population interviewed, 34% live in rural areas. In rural areas, 20 percent of interviewed households were headed by women. 45% of the total population owned or otherwise exploited farmland and 26% of the total population was made up of women owning or exploiting farmland. Of total number of interviewees in the rural areas, the female group constituted 20% 75% of these households owned farmland. Of the total population interviewed in urban areas, 26% were women. In 2007, 10% of women who headed households were married. The age cohort with the highest number of household heads was the 40-49 year old group. Average household size in 2007 was 4 members, with an average of 5 members in male-headed households and 4 members in female-headed households. The average share of active household members was 0.3 across the population and for each gender.

Regression-based decomposition results

Table 1 indicates the weighted estimates obtained from the OLS regression of household economic wellbeing for 2001 and 2007 as well as parameter estimates for the male and female subsamples. Table 2 indicates decomposition results for the OLS estimates of income sources. Estimates for both synthetic and non synthetic variables for 2001 (table 1, column 1) reveal that the synthetic variables for education and health are positively associated with per capita expenditures. Evidently, access to better education tends to imply enhanced knowledge of employment opportunities and choices, and even how income is spent in the household with a view to ensuring household welfare. Education reflects potential for decent employment and thus the capacity to generate income and the related per capita household expenditures. In terms of health, improving access to nearby district health centres and quality services implies a potential to better treat diseases that can prevent individuals from engaging in income generating activities. Economies of scale are also generated from good health in the form of labour market participation and the resulting income which enhances per capita expenditures. This finding corroborates the result obtained by Awoyemi (2003) for Nigeria and Datt and Jolliffe (2005) for Mozambique. This finding supports the view that health is an important aspect of human capital (Grossman, 1972).

Non-synthetic variables that are positively correlated with per capita household expenditures are: the age of the household head, the share of active household members, employment in the formal sector, owning farmland and gender. Working in the formal sector implies a steady source of income as well as other advantages like being able to borrow money and an adequate insurance policy. These tend to positively impact household economic wellbeing. The share of active household members contributes positively to per capita household expenditures. It is reasonable to suppose that a household with more individuals generating income will generate more total income, with a resulting tendency to increase expenditures. This result is similar to that obtained by Yuko *et al*. (2006) for farm households in Korea. For the full 2001 sample, owning land contributes to higher per capita expenditures due to the household's potential to generate extra income from the sale of farm products or to save money by consuming cultivated goods. The money saved can be redirected to other expenditures, increasing household economic well-being. Households living in urban areas generally have more income generating opportunities than rural dwellers, which may explain why poverty levels appear low in urban regions.

In 2007 (table 1, column 2), the synthetic variables for education and health contributed to an increase in household wellbeing. Non synthetic variables that increase household wellbeing included the age of the household head, the share of active household members, employment in the formal sector and male gender. Also along gender lines, male-headed household tend to have higher household income/ expenditures because men are likely to obtain jobs or the discrimination bias in favour of men in the job market. Alayande (2003) finds similar results.

Variables that are negatively linked to household expenditures are household size and ownership of farmland. Unlike 2001, the coefficient of the farmland ownership variable was negative. Other things being equal, farm ownership is expected to positively impact household economic welfare. The negative and significant sign of farmland ownership is perhaps attributable to low quality techniques in exploiting farmland and the absence of formal safety nets for small scale agriculturalists in Cameroon. Agricultural lands may not operate profitably. Most Cameroonian farms, especially in rural settings, are operated on a safety-first basis to guarantee the survival of the farming household as a matter of priority. This entails that these households have as priority, produce goods that they consume immediately. Households might not be profitably operating their farm holdings, but the absence of formal safety nets like insurance, unemployment benefits and old age pensions in the informal sector in Cameroon means that they might sensibly continue to decide to produce even when they are economically unprofitable. Farm ownership may thus negatively impact household economic wellbeing. We verified this unusual behaviour by looking for the weighted correlation between farmland

ownership and household per capita expenditure. This correlation is negative, as is the case for correlation between household size and household expenditures. This is because a higher number of dependents or individuals in a household weigh on the meagre income generated by the household head, leading to a net reduction in wellbeing. Similar reasons led to better wellbeing for residents of urban areas in both 2001 and 2007, while rural residency tended to have the opposite effect.

Examining the determinants of wellbeing along gender lines for 2001 (table 1, columns 3 and 5) and 2007 (table 1, columns 4 and 6), we note that in 2001 and 2007 both synthetic and non-synthetic variables behaved similarly in the complete sample except for age in the female subgroup (column 5), which is not significant. Estimated models were generally significant, with a 0.47 to 0.53 range of r-squared.

Table 1: Determinants of household economic wellbeing by ordinary least squares - dependent variable is log of household expenditure per head: 2001 and 2007

	Complete sample		Male subgroups		Female subgroups	
Income sources	**2001** (1)	**2007** (2)	**2001** (3)	**2007** (4)	**2001** (5)	**2007** (6)
Education*	0.1658***	0.2609***	0.1697***	0.2235***	0.1347***	0.4496***
	(8.81)	(15.88)	(7.98)	(11.85)	(3.24)	(13.28)
Health*	0.1902***	0.1801***	0.1513***	0.1679***	0.3734***	0.2202***
	(4.88)	(14.41)	(3.38)	(11.41)	(4.75)	(9.62)
Age cohorts	0.0125**	0.0111***	0.0149***	0.0091*	0.0081	0.0309***
	(2.56)	(2.76)	(2.66)	(1.92)	(0.79)	(4.12)
Household size	-0.025***	-0.0161***	-0.026***	-0.0140***	-0.0127**	-0.0415***
	(-12.83)	(-10.59)	(-11.97)	(-8.42)	(-2.25)	(-8.56)
Share of active household members	1.264***	1.2442***	1.2960***	1.320***	1.3055***	0.9040***
	(27.18)	(38.35)	(23.01)	(33.81)	(15.19)	(14.20)
Gender(1=male and 0=otherwise)	0.1107***	0.0701***				
	(7.05)	(5.76)				
Formal sector (1=working in the formal sector and 0=otherwise)	0.3863***	0.3816***	0.3867***	0.3748***	0.4168***	0.4569***
	(25.11)	(27.50)	(22.29)	(24.00)	(11.92)	(14.23)
Household own farmland (1=own farmland and 0=otherwise)	0.0586***	-0.063***	0.0591***	-0.066***	0.0662**	-0.0367*
	(3.51)	(-5.13)	(3.02)	(-4.55)	(2.16)	(-1.69)
Regions capturing spatial sources						
Urban area	0.2738***	0.3159***	0.2553***	0.3119***	0.3470***	0.3135***
	(11.96)	(17.82)	(9.50)	(14.75)	(8.32)	(10.07)
Rural area	-0.321***	-0.1844***	-0.319***	-0.2006***	-0.3228***	-0.1322***
	(-13.92)	(-10.44)	(-11.84)	(-9.49)	(-7.56)	(-4.25)
Constant	11.40***	11.741***	11.56***	11.84***	11.07***	11.62***
	(165.7)	(333.1)	(151.2)	(302.5)	(79.75)	(164.2)
R-squared	0.4727	0.5255	0.4735	0.5315	0.4770	0.5132
Fisher(df; p-value)	824; 0.00	1141; 0.00	711; 0.00	970; 0.00	209; 0.00	304; 0.00
Total number of observations	9202	10317	7127	7710	2075	2607

Source: Computed by authors using STATA 10 and the DASP 2.1 Software developed by Araar and Duclos (2009).
Notes: Income sources with stars are synthetic variables obtained from the MCA approach. ***, ** and * represent 1%, 5% and 10% significance levels.

The regression-based decomposition results (tables 2 and 3) yield the contributions of the different estimated sources that explain household economic well-being using the Gini index, the coefficient of variation and the generalized entropy for theta respectively equal 0.5 and 2. The Gini index measures the ratio of the area between the Lorenz Curve and the line of equality to the area of maximum inequality. This index is sensitive to changes in the middle income range. The coefficient of variation measures inequality as the standard deviation of a distribution divided by its mean. The generalized entropy (GE) class of measures – GE (0), GE (1) and GE (2) – are distinguished by the different weights attributed to distances between income in different parts of the income distributions. The GE (0) gives more weight to distances at the lower end of the distribution, GE (1) gives equal weights across the distribution and GE (2) gives more weight to distances in the upper part of the distribution. This makes the GE measures particularly useful for subgroup decomposition analysis. We adopt the Gini decomposition results because it is the most popular index in inequality measures and is suitable for source decomposition (Araar, 2006; Kimhi, 2007).

We decompose measured income inequality by calculating the contributions of the various estimated factors using the analytical and Shapley value approaches for both 2001 (table 2) and 2007 (table 3). The difference between the analytical approach and the Shapley value approach is that the former calculates the Gini index as the product of the income shares and the coefficients of concentration, while the latter is based on a set of axioms (Shorrocks, 1999) and has the merit of computing the weighted marginal contributions of the estimated factors for various combinations of factors. These weighted contributions precisely add up to the measure of inequality used.

According to the analytic decomposition of the Gini index as characterized by the absolute contributions of the estimated income sources for 2001 (column 2, table 2), employment in the formal sector, the share of active household members, household size and education all contributed to observed inequality. Workers fare better in the formal sector than in the informal sector, so labour formality thus contributes to income inequality. The ratio of active household members to household size is positively related to the odds of labour market participation, which thus also exacerbates inequality of living standards and income inequality. Household size and education also explained some of household income inequality in 2001. Ownership of a farmland registered the lowest absolute Gini value. The age cohort and health variables both negatively contribute to absolute income inequality. The residual term explained a substantial share of income inequality for both years under review. In 2001, although urban areas had a negative value, it contributed more in explaining income inequality than rural areas.

Table 2: Total inequality decomposition by estimated income sources: 2001

Income sources	Analytical approach		Shapley value approach			
	Income Shares (1)	Gini Index (2)	Gini Index (3)	Coeffecient of variation (4)	Generalized entropy Theta=0.5 (5)	Generalized entropy Theta=2 (6)
Education*	0.1509	0.0170	0.0221	0.0346	0.0113	0.0277
		(0.0400)	(0.0521)	(0.0248)	(0.0323)	(0.0285)
Health*	-0.0497	-0.0002	0.0037	-0.0006	0.0009	-0.0029
		(-0.0004)	(0.0087)	(-0.0004)	(0.0025)	(-0.0030)
Age cohorts	0.0880	-0.0055	0.0001	-0.0008	-0.0010	0.0005
		(-0.0130)	(0.0001)	(-0.0006)	(-0.0030)	(0.0005)
Household size	-0.1125	0.0141	0.0144	0.0450	0.0142	0.0390
		(0.0332)	(0.0340)	(0.0323)	(0.0405)	(0.0401)
Share of active household members	0.3048	0.0877	0.0322	0.1578	0.0362	0.0769
		(0.2070)	(0.0759)	(0.1131)	(0.1036)	(0.0791)
Sex(1=male and 0=otherwise)	0.1181	0.0005	0.0010	0.0017	0.0002	0.0015
		(0.0011)	(0.0023)	(0.0012)	(0.0005)	(0.0016)
Formal sector (1=working in the formal sector and 0=otherwise)	0.1428	0.0997	0.0465	0.1598	0.0372	0.1316
		(0.2353)	(0.1098)	(0.1145)	(0.1065)	(0.1352)
Household own farmland (1=own farmland and 0=otherwise)	0.1266	0.0108	0.0136	0.0181	0.0057	0.0148
		(0.0254)	(0.0320)	(0.0129)	(0.0162)	(0.0152)
Regions capturing spatial sources						
Urban area	0.1726	0.0644	0.0386	0.1093	0.0311	0.0987
		(0.1520)	(0.0911)	(0.0783)	(0.0888)	(0.1014)
Rural area	-0.1076	0.0276	0.0499	0.1236	0.0367	0.1045
		(0.0650)	(0.1176)	(0.0886)	(0.1049)	(0.1074)
Residual	0.0000	0.0878	0.2054	0.7819	0.1911	0.5435
		(0.2072)	(0.4846)	(0.5604)	(0.5464)	(0.5585)
Constant term	0.1327	-0.0526				
		(-0.1241)				
Total value	1.000	0.4238	0.4238	1.3952	0.3498	0.9732
		(1.000)	(1.000)	(1.000)	(1.000)	(1.000)

Source: Computed by authors using STATA 10 and the DASP 2.1 Software developed by Araar and Duclos (2009).
Notes: Income sources with stars are synthetic variables obtained from the MCA approach. Values in brackets are the relative contributions.

Decomposing the Gini index shows that the highest absolute contributions are from the share of active household members, employment in the formal sector and education. The estimated effect of education on income increased between 2001 and 2007 (tables 3; columns 2), revealing the key role of education in enhancing wellbeing and/or exacerbating inequality over time. This result is similar to the findings by Oyakale *et al.* (2007). The measure of health also explained some of inequality in 2007.

Table 3: Total inequality decomposition by estimated determinant of income: 2007

Income Sources	Analytical approach		Shapley value approach			
	Income Shares (1)	Gini Index (2)	Gini Index (3)	Coefficient of variation (4)	Generalized entropy	
					Theta=0.5 (5)	Theta= 2 (6)
Education*	0.1749	0.0192	0.0290	0.0448	0.0168	0.0249
		(0.0471)	(0.0712)	(0.0443)	(0.0604)	(0.0486)
Health*	0.1220	0.0074	0.0117	0.0160	0.0048	0.0090
		(0.0182)	(0.0288)	(0.0158)	(0.0173)	(0.0176)
Age cohorts	0.0254	-0.0014	0.0001	-0.0020	-0.0008	-0.0012
		(-0.0034)	(0.0001)	(-0.0020)	(-0.0030)	(-0.0023)
Household size	-0.0100	0.0014	0.0138	0.0245	0.0086	0.0160
		(0.0034)	(0.0338)	(0.0242)	(0.0307)	(0.0314)
Share of active household members	0.4096	0.1210	0.0621	0.1987	0.0436	0.0845
		(0.2969)	(0.1524)	(0.1965)	(0.1562)	(0.1654)
Sex(1=male and 0=otherwise)	0.0812	0.0004	0.0013	0.0002	-0.0001	(0.0001)
		(0.0010)	(0.0031)	(0.0002)	(-0.0004)	(0.0001)
Formal sector (1=working in the formal sector and 0=otherwise)	0.0959	0.0672	0.0347	0.0824	0.0236	0.0472
		(0.1649)	(0.0852)	(0.0815)	(0.0846)	(0.0924)
Household own farmland (1=own farmland and 0=otherwise)	-0.0132	0.0024	0.0079	0.0141	0.0049	0.0078
		(0.0058)	(0.0193)	(0.0140)	(0.0176)	(0.0153)
Regions capturing spatial sources						
Urban area	0.1609	0.0681	0.0466	0.0919	0.0304	0.0512
		(0.1670)	(0.1143)	(0.0909)	(0.1088)	(0.1002)
Rural area	-0.0723	0.0191	0.0279	0.0501	0.0177	0.0284
		(0.0469)	(0.0684)	(0.0495)	(0.0635)	(0.0556)
Residual	0.0000	0.0775	0.1711	0.4641	0.1316	0.2308
		(0.1902)	(0.4196)	(0.4590)	(0.4716)	(0.4515)
Constant term	-0.0126	0.0042				
		(0.0103)				
Total value	1.000	0.4077	0.4077	1.0111	0.2791	0.5112
		(1.000)	(1.000)	(1.000)	(1.000)	(1.000)

Source: Computed by authors using STATA 10 and the DASP 2.1 (Araar and Duclos, 2009).
Notes: Income sources with stars are synthetic variables obtained from the MCA approach. Values in brackets are the relative contributions.

Household size contributed positively to inequality and negatively impacted wellbeing. Farmland ownership contributed the least in explaining inequality in 2001. In 2007, urban areas had both a higher share and absolute contribution to income inequality than rural areas. This implies that urban-rural disparities contributed to overall income inequality.

The Gini decomposition for 2001 (column 3, table 2) was found using the Shapley value decomposition approach. It indicates that formal sector employment, the share of active household members, education and household size contribute the most to inequality, for a total of 27% of explained inequality. Morduch and Sicular (2000) also find that education has one of the highest contributions to inequality. Estimated determinants of income, land ownership, the health index and gender all marginally contributed to observed inequality in household expenditures. Rural residence

explained more of observed inequality (11%) than urban residency (9%). A remaining 48% of inequality was linked to the residual and the Gini was 0.4238.

The Gini results for 2007 (table 3) also show that the share of active household heads, employment in the formal sector, the education indicator and household size explained inequality. The source with the highest contribution in 2007, however, was the share of active household members. The relative contributions of these factors sum to 34%. Age was the factor with the least contribution, with a relative share of less than one percentage point. Urban areas accounted for twice as much of income inequality (11%) as rural areas (6%) in 2007. These results are similar to Wan and Zhou (2005) and show that the magnitude of this source of inequality is linked to geography due to “non removable” resources as well as market access, infrastructure and local culture. The residual term explained 42% of income inequality, while the Gini index retreated by about 2 percentage points by 2007 to sit at 0.4077.

The marginal contributions of the estimated income sources using the Gini approach are reported on the basis of the Shapley value concept developed by Shorrocks (1999), where players (in this case determinants of income) join a coalition and the marginal impact (gain or loss) is calculated. The values of these contributions are generated by the DASP 2.1 software package. Looking at the marginal contributions of estimated income sources for 2001 (table 4 in appendix 3) shows that the share of active household members has the highest marginal contribution (0.0062) when no other economic policies which aim to increase household economic well-being are put into place (first combination, see appendix). This implies that policies which encourage employment and self-employment via the progressive formalization of the informal sector and the encouragement of small and medium size enterprises would be associated with less inequality. Kimhi (2007) also finds that the number of active household members has the highest (negative) marginal impact on inequality, even when other dimensions of wellbeing are accounted for.

Looking at employment in the formal sector, for instance, the marginal impact is second largest looking at the first combination (level 1), indicating a high degree of inequality for this dimension of well-being. Inequality progressively declines as we incorporate policies that target other dimensions of wellbeing. These policies encourage employment and improve income in the informal sector by restructuring and formalizing these sectors, which will help bridge disparities in expenditures between household heads working in the primary and informal sectors. The variables education, household size, farmland ownership and the residual had an identical behaviour to employment.

The above trend is not observed for estimated effects of gender (male) and age cohort on income. The effects of inequality along gender lines decreases with the inclusion of other determinants

of wellbeing. Combining policies that reduce inequality by gender with other policies which target other determinants causes inequality to reduce or equalize its effects. Concerning age cohort, inequality starts falling when the combination of determinants is at least made up of four sources. Rural areas have the highest marginal contributions compared to urban areas. This indicates that regional development should not bypass rural areas.

The marginal contributions of the various dimensions of wellbeing for 2007 (table 5, appendix 3) are similar to the results for 2001, with the share of active household members having the highest marginal contribution when considering the first combination (0.0099). This factor's marginal contributions are also highest when policies which target other dimensions of wellbeing are included. The contribution of the other three estimated significant sources of inequality (employment in the formal sector, education and household size) also behaved similarly to 2001. The marginal contribution of education to welfare decreases as other sources of wellbeing are added. This shows that policies which help reduce observed inequality in relation to education should be combined with other policies because bridging educational inequalities will not substantially decrease inequality in the distribution of household income. This will constitute an increase in the current and future stock of human capital.

The estimated factors – gender (male) and age cohorts – begin to experience a fall in inequality with the inclusion of at least five and four other determinants respectively. Unlike in 2001, urban areas had the highest marginal contributions for all levels compared to rural areas in 2007. This indicates that urban areas are accounting for more of inequality than rural areas over time (twice the values of rural areas). Including policies that target some dimensions of wellbeing such as education, health, etc., as well as policies to improve both living standards in rural areas an infrastructure in urban areas should be undertaken to reduce inequality.

Table 4 (column 1) shows changes in the absolute contributions of determinants of income using the analytical approach between 2001 and 2007. Regressed determinants of income such as household size, employment in the formal sector, farmland ownership, residence in rural areas, and factors captured by the predicted residual term each tend to reduce inequality. Determinants of income such as the share of active household members, education, health and residence in the urban areas had the tendency of increasing inequality between 2001 and 2007. The Gini index results from the Shapley value approach are presented in column 2 of table 4. The trends of regressed determinants of income are similar to those generated by the analytical approach. Total inequality shown by the first of these methods retreated by 2 percentage points between 2001 and 2007.

Table 4: Changes in estimated determinants of income: 2001-2007

Determinant of income	Analytical approach	Shapley value approach			
	Change in Gini Index (1)	Change in Gini Index (2)	Change in coefficient of variation (3)	Change in generalized entropy	
				Theta=0.5 (4)	Theta=2 (5)
Education*	0.0022	0.0068	0.0102	0.0055	-0.0028
Health*	0.0076	0.0080	0.0166	0.0039	0.0119
Age cohorts	0.0041	0.0000	-0.0012	0.0002	-0.0017
Household size	-0.0127	-0.0006	-0.0205	-0.0056	-0.023
Share of active household members	0.0333	0.0299	0.0409	0.0074	0.0076
Sex(1=male and 0=otherwise)	-0.0001	0.0003	-0.0015	-0.0003	-0.0016
Formal sector (1=working in the formal sector and 0=otherwise)	-0.0325	-0.0118	-0.0774	-0.0136	-0.0844
Household own farmland (1=own farmland and 0=otherwise)	-0.0084	-0.0057	-0.004	-0.0008	-0.007
Regions capturing spatial sources					
Urban area	0.0037	0.0080	-0.0174	-0.0007	-0.0475
Rural area	-0.0085	-0.0220	-0.0735	-0.019	-0.0761
Residual	-0.0103	-0.3443	-0.3178	-0.0595	-0.3127
Constant	0.0568				
Total value	-0.0168	-0.0168	-0.3841	-0.0707	-0.462

Source: Computed by the authors using STATA 10 and the DASP 2.1 software developed by Araar and Duclos (2009).
Notes: Income sources with stars are synthetic variables obtained from the MCA approach.

Gender-related disparity and discrimination were identified to complete the regression-based decomposition analysis of poverty and inequality in Cameroon. The complete 2001 and 2007 samples (columns 1 and 2 in table 5) show that the returns to household endowments and access to household endowments that fuel disparities in household economic well-being between 2001 and 2007 are education, household size, share of active household members, working in the formal sector and ownership of farmland, as well as urban versus rural residence to a small extent. Household returns to endowments that are inclined to worsen inter-household disparities are education, household size and residency (column, 2).

Undertaking an analysis of access and returns to endowments for 2001 (table 5, column 3 & 4), we observe that in 2001 endowments that exacerbated inter-household gender disparities are education, working in the formal sector and farmland ownership. Returns to endowments that fuelled inter-household disparities are education, age cohorts and residence in rural areas. In terms of gender-neutral characteristics, both urban and rural localities contributed in reducing gender disparities. In terms of returns to endowments, while urban localities curbed household gender differences, rural areas exacerbate the observed difference. In 2007 (table 5), sources such as health, household size, age cohorts and share of active adult members were gender-neutral characteristics with the tendency to scale down inter-household gender inequality (column 5). Individual characteristics that reduce inter-

household gender gaps were education, health, age cohorts, working in the formal sector, owning farmland, and urban versus rural residency (column 6).

Table 5: Gender-neutral and gender-biased characteristics by determinant of income

Variables	Complete survey		2001 male and female subsample survey		2007 male and female subsample survey	
	Neutral (1)	Biased (2)	Gender neutral (3)	Gender biased (4)	Gender neutral (5)	Gender biased (6)
Education*	0.02010	0.20585	0.00371	0.03602	0.01801	-0.25250
Health*	-0.1255	-0.0212	-0.00795	-0.3100	-0.0250	-0.03875
Age cohorts	-0.0012	-0.0077	-0.00360	0.01968	-0.0085	-0.06122
Household size	0.01314	0.08473	-0.02504	-0.0619	-0.0247	0.1178
Share of active household members	0.06333	-0.0122	-0.01275	-0.0047	-0.0019	0.14073
Sex(1=male and 0=otherwise)	-0.0021	-0.0605				
Formal sector (1=working in the formal sector and 0=otherwise)	0.05115	-0.0006	0.00088	-0.0046	0.00229	-0.01096
Household own farmland (1=own farmland and 0=otherwise)	0.00018	-0.0471	0.00160	-0.0016	0.00038	-0.00449
Regions						
Urban	0.0281	0.04213	-0.00602	-0.0420	0.00763	-0.0009
Rural	0.0038	0.09415	-0.12085	0.00137	0.00100	-0.0232

Source: Computed by authors using regressed-income sources for 2001 and 2007 in table 1 and descriptive statistics reported in appendix 1. The variables with stars are synthetic variables.

Table 6 shows the Oaxaca-Blinder decomposition for the complete samples for both years and the change in the decomposition of gender disparity between 2001 and 2007. For the whole samples (column 1), education accounts for 69% of inter-household gender differences. This is followed by rural residency, household size, urban residency, share of active household members and employment in the formal sector. Health, age cohort, gender and farmland ownership all increased the welfare gap between 2001 and 2007. The policy implication is that balanced regional development reduces disparities.

Column 2 in table 6 shows the Oaxaca-Blinder decomposition between male- and female-headed households for 2001. In this case, factors which reduce welfare gaps between male and female headed household in 2001 include health (60%), age cohorts, household size (16%), share of active household members, employment in the formal sector and owning farmland. Both urban and rural residency had the tendency to reduce gender disparity, with the share of rural areas twice that of urban residency. As a whole, the regression estimates of the determinants income in 2001 tended to reduce disparities between male- and female-headed households. In 2007 (column 3), household size, the share of active household members and urban residence explained differences in wellbeing between male- and female-headed households. Education played an overwhelming role in reducing inter-household gender disparities in 2007.

The inter-temporal decomposition (column 4) indicates that gender gaps with respect to education, age cohort, employment in the formal sector and farmland ownership became lower between 2001 and 2007, with beneficial effects on overall welfare. Gender gaps between male and female headed households for health, household size and share of active household members increased over time. Both urban and rural areas saw inter-household gender disparities get worse during the period under review.

Table 6: Welfare gaps between male- and female-headed households by determinant of income – an Oaxaca-Blinder decomposition

Variables	Complete survey for 2001 and 2007 (1)	2001 survey (2)	2007survey(3)	Inter-temporal decomposition (4)
Education*	0.22596 (68.77%)	0.03973 (-7.38%)	-0.23449 (142.83%)	-0.28137 (-92.54%)
Health*	-0.14666 (-44.64%)	-0.31798 (59.12%)	-0.06377 (38.85%)	0.26275 (86.42%)
Age cohort	-0.00896 (-2.73%)	0.01607 (-2.99%)	-0.06972 (42.47%)	-0.08335 (-27.42%)
Household size	0.09788 (29.79%)	-0.08697 (16.17%)	0.09316 (-56.74%)	0.17997 (59.19%)
Share of active household members	0.05109 (15.55%)	-0.01745 (3.25%)	0.13887 (-84.59%)	0.15088 (49.62%)
Sex(1=male and 0=otherwise)	-0.06254 (-19.04%)			
Formal sector (1=working in the formal sector and 0=otherwise)	0.05050 (15.37%)	-0.00372 (0.69%)	-0.00867 (5.28%)	-0.00565 (-1.85%)
Household owns farmland (1=own farmland and 0=otherwise)	-0.04690 (-14.27%)	-0.00004 (0.01%)	-0.00410 (2.50%)	-0.00345 (-1.14%)
Regions				
Urban	0.07025 (21.38%)	-0.04799 (8.92%)	0.00676 (-4.11%)	0.04793 (15.76%)
Rural	0.0979 (29.81%)	-0.119472 (22.21%)	-0.02220 (13.52%)	0.03634 (11.95%)
Total share of estimated sources of welfare gap/ discrimination index	0.32855 (100%)	-0.53782 (100%)	-0.16417 (100%)	0.30405 (100%)

Source: Computed by authors, from determinants of income for 2001 and 2007 in table 1 and descriptive statistics reported in appendix 1.
Notes: The values in brackets are the percentage contributions.

Discrimination coefficients that captured differences explained by both endowments and returns on endowments are presented in table 7. For the complete samples, column 1 shows that changes in returns to factor endowments increased household differences.

Table 7: Discrimination coefficient for treatment and endowments

Variables	Complete survey		2001 male and female subsample survey		2007 male and female subsample survey	
	Disc. in treatment (1)	Disc. in endowments (2)	Disc. in treatment (3)	Disc. in endowments (4)	Disc. in treatment (5)	Disc in endowments (6)
Education*	40.5938 (10.88%)	1.5741 (30.27%)	3.62288 (-11.48%)	0.32921 (-2.07%)	-21.8429 (227.24%)	2.4345 (-43.05%)
Health*	36.2757 (9.73%)	-12.0887 (-232.5%)	-26.9046 (85.28%)	-1.12502 (7.10%)	-4.12476 (42.91%)	-2.79868 (49.49%)
Age cohort	36.6433 (9.82%)	-0.13016 (-2.50%)	2.09586 (-6.64%)	-0.25345 (1.59%)	-6.37360 (66.30%)	-1.30527 (23.08%)
Household size	38.4884 (10.32%)	1.60915 (30.94%)	-5.21125 (16.52%)	-1.64269 (10.37%)	11.1441 (-115.94%)	-3.62252 (64.06%)
Share of active household members	36.5817 (9.81%)	6.59133 (126.76%)	-0.47406 (1.50%)	-1.27124 (8.02%)	15.5098 (-161.4%)	-1.48943 (26.33%)
Sex(1=male & 0=otherwise)	35.6757 (9.56%)	-0.25527 -(4.90%)				
Formal sector (1=working in the formal sector and 0=otherwise)	36.7876 (9.86%)	5.28019 (101.54%)	-0.45587 (1.45%)	0.09173 (-0.58%)	-1.06731 (11.10%)	0.25161 (-4.45%)
Household own farmland(1=own farmland and 0=otherwise)	35.7424 (9.58%)	-0.50910 (-9.79%)	-0.15480 (0.49%)	0.16962 (-1.07%)	-0.45855 (4.77%)	0.02727 (-0.48%)
Regions						
Urban	37.4956 (10.05%)	2.64562 (50.88%)	-4.19814 (13.30%)	-0.69125 (4.36%)	-0.08476 (0.88%)	0.76787 (-13.58%)
Rural	38.6007 (10.35%)	0.48253 (9.27%)	0.12988 (-0.412%)	-11.4496 (72.27%)	-2.31413 (24.07%)	0.07988 (-1.41%)
Discrimination index	372.885 (100%)	5.19970 (100%)	-31.5501 (100%)	-15.8427 (100%)	-9.61202 (100%)	-5.65476 (100%)

Source: Computed by authors from determinants of income for 2001 and 2007 in table 1 and descriptive statistics reported in appendix 1.
Note: the values in brackets are the percentage contributions.

In terms of discrimination in access to endowments (column 2, table 7), education, household size, the share of active household members and locality account for the gaps in welfare between 2001 and 2007. For 2001 (columns 3 and 4 in table 7), policies to bring returns to education for women up to the level of men by bridging inequality in education and schooling would result in a 12% increase in average income for women. Bridging rural disparities would similarly result in a marginal increase in average income for women and reduce income disparities along gender lines. For discrimination in access to endowments, referring to gender differentials, the determinants education, farm ownership and employment in the formal sector differential would curb differences between male- and female-headed households. In contrast, the share of active household members, household size, health, gender type, and urban and rural residency are associated with higher gender gaps that increase discrimination against female-headed households. In 2007 (columns 5 and 6, table 7), household size and the share of active household members reduced gender gaps. Living in urban and rural areas increased gender gap in terms of returns on endowments. Endowments that lead to an increase in gender disparity were health, age, household size and the share of active household members.

Policy recommendations and general conclusions

Policy recommendations

The estimation results point to a fair number of policy conclusions, a few of which stand out in particular. Activities or policies that facilitate a shift from the informal sector to more formal sectors could reduce inequality. One strategy to do this would be to encourage the creation of small and medium enterprises in rural areas. Fortunately, the government of Cameroon has modernized the procedure for creating enterprises in Cameroon, starting with two pilot cases of one-stop-shops to formally create an enterprise. Unfortunately, administrative inertia, corruption and lack of mastery of the procedures reduce both the impact of this policy and the possibility that these one-stop-shops be extended from Yaoundé and Douala to other regions of the country. If the government of Cameroon could implement efficient administrative procedures that reduce administrative bureaucracy and improve the tracking of procedures and documents, the creation and development of small and medium enterprises would increase job opportunities. This will indirectly increase the number of active household members and thus increase household incomes. Encouraging women to switch from the informal sector to more formal sectors has the twin effects of (1) empowering women in terms of decision making and (2) securing surer sources of income for poor households. These two effects would increase household economic wellbeing. This is because the number of individuals who are employed or who are performing income generating activities determines the profiles of both wellbeing and inequality.

Educational schemes should favour rural areas and should favour women in order to bridge disparities. These educational schemes will create opportunities for rural residents and women to empower themselves in terms of employment and decision making. The government of Cameroon has decreed that primary education should be free, but practices which drive up the cost of sending a child to public primary school have stifled outcomes. These practices include corruption, indirect primary school registration fees, parent-teacher association fees, poorly trained and poorly paid teachers and late arrival of the “minimum package” of financial resources to effectively run these primary schools. The concept of education for all in this study encompasses a wide range of policies and monitoring of implementation. Empowering women through efficient educational schemes also increases their odds of increasing their incomes. Improving access to education and training will also empower women and rural dwellers by enabling them to accumulate assets or increase returns on existing assets. This reduces their vulnerability to external shocks. Empowering household heads brings intergenerational transmission of welfare, particularly if the household head is a woman, because the children are more likely to be educated, which leads to better standards of living when they start to work in the future.

Access to family planning schemes should be improved to encourage family planning regarding the attainment of optimal family sizes in order to enable adequate human capital investments into education, health and a sound life style. These investments would enhance capabilities such as education and health that household heads or their offspring may use to positively impact future wellbeing. In spite the government of Cameroon's efforts to make the population aware of the benefits of contraception and birth control programs, the rate of demographic growth has not changed significantly for decades. Programs to efficiently inform the public about family planning should be communicated in a culturally aware manner that is specific to each locality. Encouraging girls to get an education also increases their awareness of the benefits of adequate birth control, which they can then explain to their husbands and communities. In this context, it is particularly important for impoverished areas be informed of the benefits of family planning.

Health is a key component of human capital which can be viewed as a consumption commodity. Good health makes people happy because they feel better. This directly influences household utility. Improved health across the economy implies an increase in market and nonmarket productivity. Since good health increases the number of healthy days at work and the related earnings and expenditures, consumption of health services can also act as an investment commodity. Healthier household heads have higher average household income (and thus expenditures). Policies that promote good health and healthy practices should thus be encouraged. The working conditions of health personnel also need to be improved, while rural health services and equipment need to be upgraded. Affordable health insurance systems for informal sector workers need to be provided. Premiums for such systems could be structured flexibly to allow a large number of informal sector and rural workers to participate.

Farming is the mainstay of the rural economy. Primary assets such as land are needed to carry out this activity. Linking good farmland to credit access and know-how will increase productivity. This may generate more income and improve household welfare. Improving access to farmland is required in this context. Some level of educational campaigning is required to relax cultural barriers that prevent women from acquiring land, while the family code that is currently being developed in Cameroon could include clauses to improve access to land and resources for all. Otherwise stated, the authorities are urged to continue adhering to international conventions which promote the emancipation of the woman.

To bridge urban/rural disparities, we recommend that government development policies should (a) enhance hard and soft infrastructure in rural areas and (b) increase inter-rural business networking and communication facilities in rural areas. It is evident that development policies are skewed in favour of urban areas. This is understandable when considering the demographic pressures faced by these localities. The rural exodus adds to pressures on urban infrastructure and favours the development of

sociocultural problems such as robbery and social insecurity. The pressure on urban infrastructure dents the economic and cultural performance of these areas in general and the country in particular. Improving hard and soft infrastructure in rural areas is likely to curb the rural exodus. Welfare gaps would be lower if rural communities were linked by good roads to allow rural residents to transport their produce to urban markets or urban residents to access rural markets. Moreover, rural agricultural production is largely cultivated by women, who would be financially empowered if they could more easily sell their products.

Conclusion

This study used the 2001 ECAM II and 2007 ECAM III household surveys together with the multiple correspondence analysis method to produce observed and synthetic variables. The study then: (1) identified determinants of household economic wellbeing for both 2001 and 2007; (2) computed the contributions of estimated determinants of income to explained inequality by a regression-based decomposition analysis; and (3) investigated the determinants of welfare gaps and discrimination between male- and female-headed households in Cameroon.

Parameter estimates were generally consistent with the economic literature and were statistically significant in establishing the determinants of income as generated by a weighted OLS. Variables that explain household economic wellbeing also contributed to observed income inequality. The variables education, health, the share of active household members, employment in the formal sector, age, living in urban areas and being a male-headed household were positively associated with household economic wellbeing in both 2001 and 2007. Variables such as household size and rural residence were negatively related to household economic welfare. The sign of farmland ownership changed between 2001 and 2007.

The estimated household income generating functions were used to spatially and inter-temporally decompose the Gini index for 2001 and 2007 using the analytical and Shapley value approaches. Variables such as the share of active household members, employment in the formal sector, education and household size accounted for most of inequality in 2001 and 2007. Other relevant variables included health, owning farmland and age. Higher employment in the formal sector, adequate household size, gender, living in rural areas and changes in other unobserved variables led to lower income inequality in 2007 than in 2001. The Gini index did not show urban areas to be inequality reducing in the period under review. The synthetic variables for education and health and the share of active household members fuelled inequality over 2001-2007.

According to the Gini index computed by the Shapley value approach the share of active household members, employment in the formal sector, education and household size were the determinants of income that played an important role in explaining inequality. Inequality was higher in urban areas in 2007, whereas it was somewhat higher in rural areas in 2001.

We also investigated inter-household gender disparity and discrimination in terms of access and returns to these endowments between male- and female-headed households for both years, using the Oaxaca-Blinder approach. The results showed that variables such as education, the share of active household members, employment in the formal sector and household size accounted for gender disparities in terms of access and returns to endowments. Generally, access to endowments by household and returns to endowments by gender affect inequality and observed welfare gaps.

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Appendix 1:

Table 1: Summary of descriptive statistics of variables for the complete samples

Complete sample								
	Year: 2001				Year: 2007			
Variable	**Mean**	**SD**	**Min**	**Max**	**Mean**	**SD**	**Min**	**Max**
Outcome variables								
Log total expenditures per head	12.473	0.7822	9.5488	16.666	12.775	0.7378	11.1851	16.244
Educational *	1.0352	0.3686	$1.7e^{-16}$	1.5154	1.1294	0.3422	0.04123	1.5352
Health*	1.3883	0.1529	0.5592	1.656	0.7109	0.3889	0	1.4839
Gender (1=male and 0=otherwise)	0.7561	0.4295	0	1	0.73303	0.44239	0	1
Age cohorts	2.8135	1.3649	1	5	2.7093	1.3555	1	5
Household size	5.1349	3.5188	1	38	4.4938	3.068	1	43
Share of active household members	0.2839	0.2816	0	1	0.3344	0.3050	0	1
Formal sector (1= yes and 0=otherwise)	0.3067	0.4612	0	1	0.1988	0.3992	0	1
Own farmland (1= yes and 0=otherwise)	0.4801	0.4996	0	1	0.4552	0.4980	0	1
Regions								
Pure urban	0.4526	0.4977	0	1	0.5479	0.4977	0	1
Pure rural	0.3529	0.4779	0	1	0.3379	0. 4730	0	1

Source: Computed by authors using STATA 10. Variables with stars are synthetic variables obtained from the MCA approach.

Table 2: Summary of descriptive statistics by gender for 2001

YEAR 2001								
Variable	Sub sample male				Sub sample female			
	Mean	**SD**	**Min**	**Max**	**Mean**	**SD**	**Min**	**Max**
Outcome variables								
Log total expenditure per head	12.465	0.7875	9.548	16.66	12.499	0.7648	10.275	15.941
Educational *	1.0412	0.3685	$1.7e^{-16}$	1.515	1.0168	0.3684	$1.7e^{-16}$	1.5154
Health*	1.3808	0.1528	0.5592	1.656	1.4111	0.1510	0.6974	1.6569
Age cohorts	2.7370	1.3439	1	5	3.0503	1.4023	1	5
Household size	5.453	3.658	1	38	4.1488	2.826	1	28
Fraction of active household members	0.2766	0.2735	0	1	0.3065	0.3040	0	1
Formal sector (1= yes and 0=otherwise)	0.3403	0.4738	0	1	0.1903	0.3926	0	1
Own farmland (1= yes and 0=otherwise)	1.4999	0.5000	0	1	1.5818	0.4933	0	1
Regions								
Pure urban	0.4477	0.4972	0	1	0.4677	0.4990	0	1
Pure rural	0.3622	0.4807	0	1	0.3245	0.46827	0	1

Source: Computed by Authors using STATA 10. Variables with stars are synthetic variables obtained from the MCA approach.

Table 3: Summary of descriptive statistics by gender for 2007

Variable	Sub sample male				Sub sample female			
	Mean	**SD**	**Min**	**Max**	**Mean**	**SD**	**Min**	**Max**
Outcome variables								
Log total expenditure per head	12.780	0.7459	11.19	16.25	12.761	0.7149	11.187	15.76
Educational *	1.1435	0.3380	0.041	1.535	1.090	0.3505	0.04123	1.535
Health*	0.6765	0.3818	0	1.480	0.8054	0.3925	0.0284	1.483
Age cohorts	2.5958	1.3187	1	5	3.0210	1.4058	1	5
Household size	4.7312	3.2099	1	43	3.8421	2.5306	1	22
Share of active household members	0.3300	0.3033	0	1	0.3466	0.3094	0	1
Formal sector (1= yes and 0=otherwise)	0.2264	0.4186	0	1	0.1174	0.3219	0	1
Own farmland (1= yes and 0=otherwise)	0.4586	0.4983	0	1	0.4456	0.4971	0	1
Regions								
Pure urban	0.5544	0.4970	0	1	0.5300	0.4991	0	1
Pure rural	0.33628	0.4724	0	1	0.3423	0.47456	0	1

Source: Computed by Authors using STATA 10. Variables with stars are synthetic variables obtained from the MCA approach.

Appendix 2: Basic indicators of the non-monetary dimensions of wellbeing

Dimension 1: ***Education and basic Infrastructure***
Can read and write
Already attended school
First reason for dissatisfaction regarding closest public primary school
First reason for dissatisfaction regarding closest private primary school
Distance to nearest public primary school (0, 1, 2, 3, 4, 5 or 6km and more)
Distance to nearest private primary school (0, 1, 2, 3, 4, 5 or 6km and more)
Time to get to nearest primary public school (0-5min, 6-15min, 16-25min, 26-35min, 36-45min, 46min or more)
Time to get to nearest private public school (0-5min, 6-15min, 16-25min, 26-35min, 36-45min, 46min or more)

Dimension 2: ***Health and basic Infrastructures***
Sector of consultation
Type of health centre
Perception of health status
First reason for dissatisfaction regarding the closest sanitary centre
Distance to nearest health centre (0, 1, 2, 3, 4, 5 or 6km and more)
Time to get to nearest sanitary centre (0-5min, 6-15min, 16-25min, 26-35min, 36-45min, 46min or more)

Appendix 3: Table 4: Marginal contributions of the various estimated income sources based on the Shapley value approach for 2001

Estimated income sources	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9	Level 10	Level 11	Level 12
Education*	0.0034	0.0026	0.0021	0.0019	0.0017	0.0016	0.0015	0.0015	0.0015	0.0014	0.0014	0.0013
Health*	0.0012	0.0007	0.0004	0.0003	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001
Age cohorts	0.0001	0.0000	0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
Household size	0.0030	0.0020	0.0015	0.0012	0.0010	0.0009	0.0009	0.0008	0.0008	0.0008	0.0008	0.0007
Share of active household members	0.0062	0.0046	0.0037	0.0030	0.0026	0.0023	0.0020	0.0018	0.0017	0.0015	0.0014	0.0013
Sex(1=male & 0=otherwise)	0.0007	0.0003	0.0001	0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
Formal sector (1=working in the formal sector and 0=otherwise)	0.0060	0.0051	0.0045	0.0041	0.0038	0.0036	0.0035	0.0033	0.0032	0.0031	0.0031	0.0031
Household own farmland (1=own farmland and 0=otherwise)	0.0018	0.0014	0.0012	0.0011	0.0011	0.0010	0.0010	0.0010	0.0010	0.0010	0.0009	0.0009
Urban area	0.0047	0.0039	0.0035	0.0032	0.0031	0.0030	0.0029	0.0039	0.0029	0.0028	0.0028	0.0027
Rural area	0.0062	0.0053	0.0047	0.0043	0.0041	0.0039	0.0038	0.0037	0.0036	0.0035	0.0034	0.0033
Residual	0.0251	0.0226	0.0207	0.0192	0.0179	0.0168	0.0158	0.0149	0.0141	0.0134	0.0127	0.0121

Source: computed using the DASP 2.1 distributive software. Software developed by Araar, A and Duclos, J. Y. (University of Laval, CIPREE & the Poverty Economic and Policy Research Network). Levels indicate the place of entry of the other estimated factors. Results are reported in four decimal places.

Appendix 3: Table 5: Marginal contributions of the various estimated income sources based on the Shapley value approach for 2007

Estimated income sources	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9	Level 10	Level 11	Level 12
Education*	0.0046	0.0034	0.0028	0.0025	0.0023	0.0021	0.0020	0.0020	0.0020	0.0018	0.0018	0.0017
Health*	0.0032	0.0019	0.0013	0.0010	0.0008	0.0007	0.0006	0.0005	0.0005	0.0004	0.0004	0.0004
Age cohorts	0.0006	0.0002	0.0000	-0.0000	-0.0000	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001
Household size	0.0025	0.0016	0.0012	0.0011	0.0010	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009
Share of active household members	0.0099	0.0080	0.00678	0.0059	0.0053	0.0047	0.0043	0.0040	0.0037	0.0034	0.0032	0.0030
Sex(1=male & 0=otherwise)	0.0009	0.0004	0.0001	0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
Formal sector (1=working in the formal sector and 0=otherwise)	0.0048	0.0040	0.0035	0.0032	0.0029	0.0027	0.0025	0.0024	0.0023	0.0022	0.0022	0.0021
Household own farmland (1=own farmland and 0=otherwise)	0.0012	0.0008	0.0007	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006
Urban area	0.0060	0.0050	0.0045	0.0041	0.0038	0.0036	0.0035	0.0034	0.0033	0.0032	0.0031	0.0031
Rural area	0.0038	0.0029	0.0026	0.0024	0.0022	0.0021	0.0021	0.0020	0.0020	0.0020	0.0019	0.0019
Residual	0.0228	0.0199	0.0180	0.0164	0.0150	0.0137	0.0128	0.0119	0.0111	0.0104	0.0097	0.0091

Source: computed using the DASP 2.1 distributive software. Software developed by Araar, A and Duclos, J. Y. (University of Laval, CIPREE & the Poverty Economic and Policy Research Network). Levels indicate the place of entry of the other estimated factors. Results are reported in four decimal places.