POVERTY AND ECONOMIC POLICY (PEP) RESEARCH NETWORK

INTERIM RESEARCH REPORT No. **11321**

To:
PEP Research Network
Department of Economics
Université Laval
Ste. Foy, Québec
G1K 7P4
Tel: 1-418-656-5314

Fax: 1-418-656-7798
pep@ecn.ulaval.ca

Title of proposed research project:

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

Research Network: **PMMA**
Date of submission: **15/09/2009**

TEAM MEMBERS

Lead researcher

Last name: **Epo** First name: **Ngah Boniface**

Institution: **University of Yaoundé II**

Full mailing address: **FSEG, BP 1365 Yaoundé**

Email addresses: **epongahb@yahoo.fr**

Phone numbers: **(237) 99633797**

Other researchers

1. Last name: **Baye** First name: **Menjo Francis**

Institution: **University of Yaoundé II/Prime Minister's Office**

Email addresses: **bayemenjo@yahoo.com**

Phone numbers: **(237)7777 92 94**

2. Last name: **Nadine** First name: **Manga Angele. T**

Institution: **University of Yaoundé II/Ministry of Health**

Email addresses: **nadyn2002@yahoo.fr**

Phone numbers: **(237) 99004760**

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

Abstract
This study appeals to an alternative approach in explaining poverty and inequality trends in Cameroon, notably it blends regression analysis with traditional decomposition techniques to account for measured income inequality. We link up poverty and inequality; identify factor endowments that contribute to income inequality and discrimination along gender lines using regressed income sources. In this endeavour, use is made of a range of econometric approaches and potential endogeneity, unobserved heterogeneity and intra-cluster correlation are addressed. The ECAM I and ECAM II household surveys collected by the government's statistics office together with STATA 10 and DASP 2.0 softwares are used to generate results. We find that: (1) level of education, household size and type, age and experience, sector of activity and milieu of residence are among those that are significantly associated with household economic well-being; (2) educational level, age, location, health and infrastructural indicators largely accounted for inequality; (3) changes in Gini and Entropy coefficients of the estimated income sources are statistically significant; (4) within group components largely accounted for the marginal impacts on poverty and inequality, but varying trends are depicted for elasticities of poverty; and (5) gender-neutral and gender-bias expenditure characteristics show that level of education, age, experience, household size, increasing the number of active working adults in female headed households, working in the primary and secondary sectors largely account for spatial and inter-temporal household gender inequality. Education stands out as the main income/expenditure equalizing endowment between male and female headed households. In addition, age, experience, fraction of active adult household members, access to medical doctors and electricity all reduce inter-household gender inequality. These results shade some light on our understanding of factors that determine and account for inequality trends in the distribution of living standards and the extent to which inequality affects poverty in Cameroon, thus suggesting important orientations to the ongoing process of enhancing well-being, fostering growth and reducing poverty in Cameroon.
Keywords: Regression-based decomposition approach, Poverty, Inequality, ECAM I, ECAM II and Gender welfare.

Introduction

Cameroon with its estimated 18 million inhabitants is at crossroads. Despite its endowment with significant advantages, it faces major challenges - to diversify its economy, consolidate growth, reduce poverty, decrease inequality either within the population or among regions, consolidate the fragile asset endowments of rural households, reduce gender inequality and poverty, etc. - that could help improve the socioeconomic status or standards of living and foster development. Among Cameroon's main advantages we identify: a relatively stable macroeconomic framework - the result of sustained adjustment efforts coupled with the 1994 devaluation of the CFA franc; a relatively improved business environment that is conducive to private sector development; an enviable position as a potential development pole within the CEMAC sub-region which is increasingly being opened and integrated; a relatively young and well-educated population capable of absorbing new technologies and raising productivity; and a relatively stable political and institutional environment (Government of Cameroon, 2003).

These advantages constitute an important stock of resources that can help Cameroon boost and diversify its economic, social and political structures, in view of reducing poverty and inequality as expected by households. Cameroon urgently needs these endowments in order to overcome an important deficit in well-being, which if left unheeded, will weaken the foundations for sustainable development, undermining the country's social fabric, and act as a potential outlet for violence and disorder because of the highly unequal access to opportunities and asset endowments.

Unfortunately, despite the fall in levels of poverty from 53.3% in 1996 (ECAM I) to 40.2% in 2001 (ECAM II), and stagnated at 39.9% in 2007, clearly below the objective of 37.1% set by the government of Cameroon in its PRSP document (ECAM III), inequality instead augmented marginally or stagnated. 59.6% of the poor lived in rural areas as compared to 41.4% in urban areas in 1996. In 2001, this stood at 49.9% in rural areas and 22.1% in urban areas. In 2007 while urban poverty fell by 5.7%, rural poverty rose by 3 percentage points (INS, 2008). However, the rural areas remain most affected by the poverty situation, experiencing a lesser fall in poverty levels as compare to urban areas. This worsening of the situation in rural areas is partly accounted for by the observation that earned income by farmers has not grown enough to outplay the rise in prices of goods and services as well as inflationary trends observed in Cameroon. This is mostly accounted for by worrying disparities characterized in terms of gender inequality, regional inequality, policy inequality, asset endowment inequality, etc., that have slowed down the poverty reduction process. Justification for the relative fall in urban poverty despite high unemployment rate is attributable to the momentum experienced in the urban informal sector, which stood at 80.6% in 2007 despite the precarious and low paid nature of jobs in this sector (See: Survey on Employment and the Informal Sector) and payment of emolument to some categories of civil servants (INS, 2008).

Another apparent reason for explaining why despite a fall in monetary poverty there has not been a significant amelioration of the living conditions of the local population, resides in Cameroon's economic history, which has been characterized by ups and downs in its economic performance. Summarily, after having witnessed economic growth (on average) of 7% within the 1970s and early 1980s (IMF, 2003) doped by oil revenue and good international prices of agricultural commodities, this enviable economic situation collapsed in 1986 with the fall in world prices for oil and agricultural export commodities. This sent Cameroon's economy into crisis depicted by drastic drops in the GDP growth rate, investment, consumption, etc. (MINPLAT-DSCN, 1993). To make up for the revenue shortfalls, authorities accumulated domestic arrears and foreign borrowing (Mbanga and Sikod, 2002). In the course of downsizing public expenditures as conditioned by the donor community, fundamental sectors affecting the well-being of the population such as health and education were neglected (Khan and Noumba, 2001).

The Structural Adjustment Program with the IMF/World Bank from September 1988 embodied most of these cutbacks. This program was geared towards expenditure-reducing measures in terms of public finance.[1] Failure of this program culminated to the

[1] Various reforms were taken among which: Liquidating non-profit making and privatizing some marginal profit making enterprises; reducing expenditure and public investment; freezing salary increments of public sector workers; etc.

devaluation of the CFA franc by 50% in January 1994. This was aimed at rendering the economy more efficient through expenditure-switching measures and improving the macroeconomic situation (Baye and Fambon, 2001).

Though there was an increase in macroeconomic performance through a consolidation of the benefits of devaluation and the creation of a relatively favorable climate for private sector development, poverty alleviation remained a hard nut to crack. To resolve this poverty situation, the government in August 1997 adopted the Enhanced Structural Adjustment Program with the IMF/World Bank. A three year medium term economic and social program was adopted, and ended with the admission of Cameroon in October 2000 into the Heavily Indebted Poor Countries (HIPC) initiative. Between 2000 and 2003, the government of Cameroon formulated a Poverty Reduction Strategy Paper (PRSP), which documents guidelines for fighting poverty. Efforts[2] paid-off when in April 2006, Cameroon attained the Completion Point of this initiative. Appended to this point is a substantial reduction in bilateral and multilateral debt, enhanced credibility towards the international financial milieu, etc.

These effects are still slow to be felt by the grassroots populations despite an average annual growth rate in GDP of 4.5% since 2000 (INS, 2005). Average household income has also deteriorated and the purchasing power of the average household is yet to be ameliorated. Overall, indicators of human development that deteriorated considerably during the crisis years, particularly in education[3] and health[4], have not been ameliorated sufficiently or sustainable enough to fully remedy the situation, despite the retreat in the incidence of poverty. Thus, economic growth between 2001 and 2007 can be described as impoverishing in terms of poverty reduction, with Cameroon needing a pro-poor growth rate in excess of 5.7% from 2009 to be able to half poverty by 2015 relative to 1996. Regional poverty took three shapes in 2007. The first group (West, Yaoundé, the Centre excluding Yaoundé and the South West) recorded a significant fall in poverty rates. The second group (Douala, the coastline excluding Douala, the South and Northwest) underwent a moderate retreat in poverty rates. The last group (North, Far North, East and Adamawa) rather has increments in poverty rates. Reasons for the slump in poverty in the first and second group are accounted for by the momentum prevailing in both urban and rural areas (INS, 2008).
In addition to this, another visible aspect is gender disparities. In this context, the government of Cameroon has as one of its main objectives the fight against poverty and bridging the inequality gaps between regions, population sub-groups and gender, with the aim of increasing development and grassroots welfare through efficient and effective policies. At the national level, Cameroon has ratified a number of international conventions and instruments related to gender issues, one of which is The Convention on the Elimination of all Forms of Discrimination Against Women (CEDAW). Unfortunately, we still identify gender-bias and gender neutral behaviours that discriminate and violate women rights. Since the crisis period of the mid 1980s,

[2] An outlay of the Debt Burden and the HIPC process is outlined in Epo and Baye (2008).
[3] As concerns education, despite rendering primary schooling free of charge, several issues plague the education system such as weak completion rates, inadequate schools and personnel, etc.
[4] As for health, the crisis period caused a drastic cut in both infrastructure and personnel, causing a relative increase in infant mortality, poor sanitary, etc.

household income generating activities have been restructured, giving women a more important role in different activities to ensure the availability of goods and services for family consumption. Although the role of women in understanding poverty is significant, many factors limit the economic growth of women, and are responsible for poverty, especially in the rural areas. Thus, at the root of gender dimension of inequality and poverty is unequal access and control of productive resources by men and women. Micro-level analysis portrays a picture of gender-based income inequality that discriminates upon women in terms of accessing assets and resources needed to participate fully in realizing growth aimed at poverty reduction (Sikod, 2007).

The regression-based decomposition approach incorporates a multidimensional aspect to analysing poverty and inequality because it permits us regress well-being on a wide range of explanatory variables. This is vital for two reasons: firstly, the regression-based decomposition, using appropriate econometric techniques, establishes behavioural relationships between the regressand and regressors clearly underpinning specificities of variables that actually explain our welfare indicator. Secondly, after establishing the behavioural relationships, this approach then decomposes our welfare indicator into various income sources, using different decomposition procedures to account for overall income inequality. Lastly, an analysis will be undertaken to inter-temporally evaluate the behaviour of these sources. In addition, we tease-out factors that contribute more to inequality between male and female headed households via the Oaxaca- Blinder (1973) method of decomposition.

Research Questions

Main research Question: Which are those variables that account for income inequality trends in Cameroon, and how useful are they in better understanding poverty and gender issues? In other words, how will a regression-based decomposition approach inform us on differences in poverty, inequality and gender well-being between two periods and the factor contributions? The specific questions are: (1) which factors significantly explain poverty and account for inequality? (2) Which factors contribute more to income inequality within and between male-and-female headed households? (3) How will gender inequality traits aid in better explaining poverty? (4) Are policies that stress on redistribution more important for increasing rural welfare and enhance long-term poverty reduction?

Research Objectives

The main objective is to empirically identify variables that determine and account for income inequality, poverty and gender disparity trends in Cameroon. The specific objectives are: (1) to evaluate determinants of poverty; (2) to assess the sources of income inequality by regressed attributes; (3) tease-out the contribution of inequality in explaining changes in poverty; (4) to investigate gender income inequality and discrimination indices using the regressed characteristics in the distribution of living standards [5]; and (5) to formulate policy implications on the basis of the findings.

[5] In addition to this decomposition we will attempt to determine which household’s characteristics explain more inequality within and between male-headed or female-headed households.

II. Conceptual Framework
a) The Concept of Inequality

Income distribution topics within the discipline of economics, echoing the call by Atkinson (1997) to bring the study of the income distribution 'in from the cold' is not a far cry. As Atkinson and Bourguignon have pointed out, this is not a new idea. David Ricardo himself stated that 'to determine the laws which regulate this distribution is the principal problem in Political Economy' (cited by Atkinson and Bourguignon 2000: 2). The large literature about the 'measurement' of inequality has remained rather separate from theoretical modelling of income determinants and the substantial increase in the analysis of wage inequality in the 1980s by labour economists made little reference to the substantial literature on the measurement of household income inequality. It is commonly agreed that better understanding patterns of inequality is essential to efficiently comprehend the nature of economic growth and development.

Most studies that attempt to discuss policies for poverty alleviation tend to stress on income growth rather than the potential role of redistribution. A number of authors have tried to show how inequality affects poverty reduction (Bourguignon 2002 and 2004; Cling et. al., 2003; Ibrahim and Gray, 2005; Araar and Awoyemi, 2006; Araar and Duclos, 2007; etc.). In this regard, Ali (2005) remarks that efficient development policies having as goal poverty reduction will cause a fall in the incidence of poverty and poverty gap attributable to a percentage point reduction in the GINI coefficient. In Cameroon, despite the predominance of growth in accounting for poverty trends, the role of inequality should not be underestimated (Fambon, 2005; Baye, 2006; Epo and Baye, 2007; etc.). This observation is in line with the works of Mckay (1997), Buccanfuso and Kaboré (2002), Kolenikov and Shorrocks, (2001), etc. who also make similar remarks when accounting for poverty changes. Thus, as noted by Okunmaweda (1999), poverty and inequality are often measured to assess how social and economic policies affect programmes geared towards increasing the standards of living of the local population.

Sen (1973, 1976) highlighted certain axiomatic requirement[6] raised in the measure of inequality. These are: (1) the mean independence condition which holds that multiplying all the incomes by a constant leaves the inequality measure unchanged; (2) the population size independence condition which holds that if increasing or decreasing the population by the same amount across all income classes does not affect the inequality measure; (3) the Pigou-Dalton transfer sensitivity condition which states that, an income transfer from a wealthier person to a poorer person without reversing the direction of richness brings about a decrease in the measure of inequality and (4) the symmetry condition which requires that he inequality measure is independent of any characteristics of household other than the well being indicator; and (5) the decomposition condition which can be divided into source, population sub-group and household earnings decomposition (Foster et al, 1984). These conditions according to Fields (1997b) permit us to obtain the Gini concentration ratio (G), Theil's two measures, and the coefficient of variation, etc.

[6]Other authors include Glowwe, 1986; Shorrocks 1984; Theil 1979; Litchfield, 1999; etc.

However, to these methods of inequality analysis, many new approaches have been developed to incorporate new patterns and dimensions to inequality analysis. This includes methods such as the regression-based inequality decomposition method, which allows the contribution of the regressed variables to total inequality to be quantified (Wan, 2004, Morduch and Sicular, 2002, Wan and Zhou, 2005). Concluding this sub-section, it is important to observe that, the concept and notion of inequality is critical for understanding income patterns, effects of economic growth, globalisation, institutions and poverty. Critical analysis of inequality impacts, causes and trends need to be further investigated with the aim of enhancing development.

b) Linking Inequality Sources to Poverty Reduction

An in-depth understanding of the dynamic relationships between inequality and poverty reduction will assist in informing public policies put in place by the government to enhance the welfare of its population. Accounting for sources of inequality may either address poverty issues directly through progressive redistribution schemes or can indirectly address poverty reduction by increasing the opportunities of the marginalized. Thus, these "social" optimal paths can structure governmental strategizing as putting in place policies and program interventions in terms of redistribution or investment in human capital or in basic infrastructure (Araar and Awoyemi, 2006). The WIDER (2000) report argues that structural inequalities especially in income and input distributions are manifested as strong causes of poverty. Related to this, is the remark made in Kimalu et al, (2001), which recognizes that as economic growth increases, poverty decreases, and as inequality in income increases the incidence of poverty increases. This observation is in line with case studies and simulations, which suggest that policies that do not incorporate issues of inequality are not likely to significantly reduce poverty.

In linking poverty and inequality, despite controversies over the role of growth versus inequality (redistribution) the role of inequality cannot be underestimated as a powerful weapon in the fight against poverty for a given size of economic resources and at given endowments. While at predetermined economic resources at a given point in time translate that redistribution may be the sole option for reducing poverty (Wan, 2006), overtime (dynamic circumstance)[7], growth may occur leading to the expansion of the economic resources, implying that this growth may be the bearing of poverty. Thus, an equitable growth process or a fair redistribution of extra resources or welfare generated by growth is needed to ensure that poverty does not increase over time. This means to reduce poverty requires progressive redistribution of the initial and/or expanded resources. Cling et al, (2003) observed that if poverty reduction measures do not include inequality-reducing strategies, then it is unlikely that poverty levels will be reduced to the MDG targets. Policies enacted by government must be focused towards reducing inequality, especially in highly unequal economies because these policies intended to address and alleviate poverty must accommodate the elasticity of poverty with respect to inequality (Ibrahim and Graay, 2005).

---

[7] While there is growing consensus concerning the link between average income, inequality and poverty in the static circumstance, the dynamic link and its optimal path raise's another set of issues. Araar and Awoyemi (2006) observe that this "social" optimal path can shape the temporal governmental interventions in terms of redistribution or investment in the human capital or in the basic infrastructures.

c) Gender Welfare and Inequality

In this study, an analysis of gender welfare, particularly income inequality and its determinants is undertaken. Thus, understanding certain issues of gender disparities will permit us investigate why women are more likely to be affected by poverty and inequality than men in Cameroon. Studies on inequality in Cameroon is pending as regards to the following domains: the urgency to effectuate analysis that reveal the impact of incomplete reforms on inequality and poverty; consequences of rising inequality given the increasing coverage of inequality-related incidence by public media (e.g. during the February 2008 hunger strikes); impact of middle class families and the dynamics on inequality in Cameroon; and policy measures and the dynamics of grassroots inequality in Cameroon within the development strategy set up by the government since 2007.

In 2001, the incidence of poverty for men was 39.9% compared to 40.5% for women, with women being more affected by poverty than men (Government of Cameroon, 2003). In 2007, while out of 10 households headed by men at least 4 were poor, this ratio for women stood at 3 out of 10. To some extend this observation is accounted for by the smaller number of households headed by women, transfer payments received from third parties and low levels of expenditure by women outside their household setup (INS, 2008). Gender inequality can be perceived relative to the levels of human capital between women and men. Analyzing these levels, we observe that human capital among women remain inferior to men. For instance, the rate of literacy between men and women stood at 63.7% for men against 40.7% among women in 1996; and in 2001 this stood at 66.5% among men and 46.6% among women. Despite a global increase in the rate of literacy, gender inequality that disfavours woman in terms of literacy rates is still rampant. This is akin to the observation that women are usually in situations where they are incapable of generating adequate income (Government of Cameroon, 2003). In Cameroon, for instance, fewer women compared to men own land because of certain socio-economic and cultural constraints, particularly, subordination of women within marriages and inadequate economic power to pay land market prices.

As per access to credit facilities, men overwhelmingly have access to these facilities than women because the former are endowed with assets that can enable them borrow money. As concerns access to formal credit, 3.5% of those living in households headed by women had access to credit against 5.5% for those in household headed by men in Cameroon (Government of Cameroon, 2003). The reason being that women face gender-specific barriers in accessing financial services, including lack of collateral, low levels of literacy, and low bargaining powers. Credit institutions also discriminate against women by complaining of the high transaction cost for the very small amount women usually demand. This pushes women to resort to informal sectors for their financial needs, constraining their ability to expand their economic activities. These gender disparity traits reveal that Cameroon has been very slow in moving women empowerment forward. Thus, it is important to understand inequality and poverty along gender lines to effectively influence policy orientations.

d) Linking the Regression-Based Decomposition approach with the Poverty-Inequality Analysis as well as Gender welfare and Disparity Analysis

Understanding determinants of economic well-being indicator via adequate econometric techniques that purge issues as endogeneity or unobserved heterogeneity in view of better complementing poverty and inequality outcomes for welfare enhancement is crucial. This study using parameters estimates from our econometric welfare equation computes estimated income sources that are used to (1) analyze the link between poverty and inequality, as well as the contribution of the estimated sources in explain gender welfare; and (2) analyze inter-household gender disparities, as well as a discrimination that exist between male-and-female headed households. Thus, going beyond conventional procedures observed in the literature, this study established a conceptual linkage where by well-being regression equations and are used as inputs or components to understand the link between poverty-and-inequality, teasing out: (a) their marginal contributions; and (b) the contributions of each estimated income source to gender welfare. Computing the marginal impact of these sources which can be grouped into key components constitute one of the key aspects of this research where estimated sources may be grouped into key welfare indicators like health, geography, infrastructure, etc. and used to appropriately evaluate their contribution to poverty and inequality welfare outcomes. These estimated incomes sources are further used to assess inter-household gender disparities and discrimination suffered by gender type in Cameroon. The scientific contribution of this research is revealed in what follows.

2 Scientific Contributions of the Research and Review of Key Literature Gaps

To better stimulate public debate and awareness in the aftermath of policy changes that affect living standards, it is value added to use recently developed regression-based decomposition techniques to evaluate the impacts, their significance, and decomposition of the relative importance of factors explaining poverty and accounting for aggregate inequality trends. In this regard, it is expected that this study will contribute to scientific knowledge in the following ways:

The Regression-Based Decomposition approach will inform us on specificities of inequality measures undertaken when trying to capture income sources used in explaining the inequality situation of a country. In this vein, Morduch and Sicular (2002) remark that basing ourselves on the uniform addition property, not all the inequality measures respect this property. Additionally, Wan (2007) highlights a series of shortcomings that we append to these traditional measures. The scientific contribution in this vein will be to show these controversies in results, when using the traditional measures and reveal the advantages that reside in using the recently popularized approach. Also disentangling the contribution of the estimated sources of income flows, the constant term, residual terms as well as the ability to include either proxies or dummies when trying to quantify certain variables (which normal inequality measures cannot capture) will enhance the pertinence of this approach over other measures in providing effective empirical results. This study is set to review and employ added-value measures to perform decomposition of inequality trends by various estimated income source flows, through a more efficient method-the Regression-Based Decomposition approach into various key variables that account for inequality.

Despite growing applications of the RBD approach, the past procedures have highlighted a series of shortcomings which have become increasingly evident as more econometric scrutiny are brought to bear in these analysis. Precisely, issues related to endogeneity, unobserved heterogeneity and intra-cluster correlation between certain key independent variables captured at the community level, and the dependent variable have been identified as potentially biasing OLS results reported by most studies. This study undertakes a comparison of different regression methods, particularly the Ordinary Least Squares, Instrumental Variable Two-Stage-Least-Squares and the Control Function approach to identify the best econometric technique that purges potential endogeneity and unobserved heterogeneity bias OLS estimates.

This work will provide empirical evidence by investigating the issue of gender inequality via the Oaxaca (1973) and Blinder (1973) approach. This will help to scientifically show the impact of gender inequality on variables that explain a particular gender type on overall poverty. Additionally, we compute a discrimination index and the partial effects of particular endowments on gender inequality. Also, a within-and-between group gender inequality is undertaken, in order to evaluate how a particular gender group accounts for total inequality and also which income sources belonging to a particular gender group determine disparities on gender lines.

This study also investigates the link between factors that influence inequality and poverty reduction. This implies verifying if the same factors that explain poverty also account for inequality via a welfare regression function that captures behavioral relationships between the given variables and the indicator considered, tracing the transmission mechanisms. In this endeavor, we identify contributions of inequalities by regressed income sources, disparities in factors, and the within-and-between group inequality in explaining poverty (Araar and Awoyemi, 2006; Araar and Duclos, 2007). This will help consolidate our understanding of poverty and inequality linkages in Cameroon. Summarily, the expected contribution of this study is its empirical blending of a range of methodologies and its relevance resides in the scarcity of works devoted in the studying of issues raised in this paper in Cameroon. Finally, the study is consistent with comments made by Sokoloff and Engerman (2000) that, resource endowments are central determinants of inequality and inequality in turns is affected by bad institutions and redistributive policies, low human capital investment and underdevelopment.

This research expected to help in enriching our understanding of poverty, inequality trends and gender disparities via regressed income sources that explain household economic well-being in Cameroon. However, there continue to be a limited amount of analytical works (Araar[8], 2006; Chameni[9], 2006; Baye[10], 2006; 2007; Baye and

[8] Araar (2006) uses an exact Gini decomposition approach to study inequality in Cameroon.

[9] Chameni (2006) proposes a new decomposition approach of the squared coefficient of variation via the comparison of the Entropy and Dagum's method of inequality decomposition analysis.

[10] Baye (2007) evaluates the role of poverty, inequality and polarization on welfare trends in Cameroon.

Fambon[11], 2002) on sources or causes of inequality in Cameroon. Despite the abundant speculations, few of these assertions have been substantiated by modern methods of analysis that provide empirical evidence. In Cameroon, no attempt has been made to apply the regression-based decomposition approach in evaluating income inequality decomposition using Cameroon data, let alone the extensions we propose in this paper.

3. Policy Relevance

In welfare analysis, scholars' and policy makers agree that reducing inequality and poverty are ingredients for sustainable growth and development. Despite this recommendation, still 4 out of 10 Cameroonians are poor, and inequality is still a serious issue. This potentially worrisome situation may lead to civil unrest and rebellions even to a scale that surpasses the February 2008 upheavals against rising costs of living in major towns in Cameroon. Understanding behavioral sources of income inequality would be instrumental in informing policy debate aimed at reducing the gap between the poor and non-poor, and male and female.

Thus, this study underwrites its policy relevance in a developing economy like Cameroon, which is highly unequal in terms of access to resources. Since the government of Cameroon is embarking on a review of the PRSP in view of further enhancing objectives that have as aim poverty reduction, the findings from this research will complement strategies earmarked by the government in this endeavor. The apparently new approaches and measures applied in this study will help fine-tune and suggest orientations to existing policy discussions. The decomposition of regressed sources will inform public policy on the potential effects of income factors in influencing deprivation. In addition, the analysis of gender issues is still at an embryonic state in Cameroon. This is because very limited empirical studies address this issue. The government of Cameroon has embarked on an ambitious campaign to emancipate and empower women. However, these measures have failed to produce the desired effects. The Ministry of Women Affairs leading this fight acknowledges that, some of these strategies have been inappropriately implemented due to inadequate policy information, causing poverty among women to stagnate or increase. Thus, results emanating from this research will help supply data that can inform the government on gender related issues. More precisely, looking at disparities between men and women will help address key aspects of women empowerment. Moreover, highlighting gender issues will help shed more light in government's effort in establishing a new *family code*. This is fundamental because 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.

Another relevance of this study complements analysis on public budget formulation through a gender lens. Balmori (2003) asserts that budget initiatives worldwide (Cameroon inclusive) have inherited the gender-blindness of macroeconomic models which lack adequate data, transparency and participation, and inappropriate projections, etc. Likewise, Cagatay et al. (2000) takes this issue further by questioning how the design

[11] Fambon and Baye (2002) examine the characteristics and decompose inequality in Cameroon using the Generalized Entropy class indices.

of macroeconomic frameworks and policies take into account the voices and interest of women and poor people with a provision for democratizing decision making processes.

Another key policy relevance of this study is based on the role played by Cameroon within the Central African region. Understanding inequality, its structure, and how it affects poverty in Cameroon will have an impact on a regional scale. Cameroon's leading and strategic role–demographical, economical and political- cannot be denied. So what happens in Cameroon in terms of development efforts aimed at enhancing welfare will likely have a spill-over effect among the countries of the Sub-region. Finally, the findings of this study will indicate whether policies put in place by the government are well-being-equalizing or poverty reducing or otherwise. This is crucial because knowing if factors that account for inequality also account for poverty reduction will be vital in harmonizing government efforts aimed at targeting the fight against inequality and poverty. This study will permit scientists, analysts, policy-makers and international institutions to have a more precise vision on how inequality issues in Cameroon may be tackled both quantitatively and qualitatively.

4. Methodologies, Literature Reviews and Empirical Results

We structure the next four subsections by taking the specific questions addressed as the main background pattern. Specifically, we organized material around issues and introduce: introduction, literature review, method and indices, use of data, empirical results and conclusion as needed per subsection. This forces a more focused writing and a sharper presentation of the issues. Following this format, the econometric analysis is performed in 4.1; basic regression-based income inequality decomposition analysis is undertaken in 4.2; the linkage between poverty and inequality is done in 4.3; and analysis of inter-household gender disparity in tackled in 4.4.

4.1 Econometric Analysis of Household Determinants of Economic Well-being

4.1.0 Introduction

Acknowledging that understanding the causes of poverty, its context and content, in order to peg policy implication constitutes one of the most important problems that hamper development in most developing countries. Evidence is observed because most countries in collaboration with international institutions- World Bank, International Monetary Fund (IMF), United Nations, African Union, etc- are strategizing on how to ameliorate well-being by increasing the living standards of the local inhabitants. In this regard, it is important to effectuate value-added econometric analyses that identify behavioural relationships between economic well-being and its determinants.

We consider economic well-being as measured by the log of household income expenditure per adult to be accounted for by a set of factors as made explicit in the literature and can be regrouped into individual, household community and regional characteristics. This form can indicate percentage change in the log of household income expenditure per adult resulting from a unit change in the considered explanatory variables, everything else being constant. Lack of care in the modelling of determinants of well-being may reflect the worrisome situation why most economic strategies which put poverty issues at the center of development programs fail to produce expected outcomes. According to Sen (1998), for poverty programs to succeed: (1) an in depth quantitative and qualitative analysis of poverty correlates need to be carried out; and (2) concerting with the extreme poor is needed to put in place sustainable strategies where these groups actually play a more active role. The starting point in this direction is to model determinants of well-being that will be used subsequently to conduct decomposition exercises.

In this context, this subsection attempts to answer the following question: which econometric approach parsimoniously yields the best behavioral pattern between our welfare indicator and its determinants. To answer the question we set as main objective to empirically determine characteristics (variables) that explain economic well-being in Cameroon. Specific objectives are: (1) to model determinants of well-being, while addressing potential econometric problems – endogeneity and heterogeneity of unobservables; (2) identify individual, household, community and regional characteristics that affect economic well-being generally and along gender lines in Cameroon and; (3) formulate policy implications on the basis of the analysis.

4.1.1 Brief Review of Literature

Reviewing literature on the determinants of poverty and well-being, we observe that not until recent, approaches that were used to analyze poverty were more descriptive than explanatory. Since the early 1990s, we note that with the works of Glewwe (1991) on the determinants of poverty and well-being, regressions of household expenditure are now widely used in empirical development economics. The application and extend by how these expenditure equations applied to a wide range of cases is gaining prominence. Among these we have 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); and the determinants of inequality (Fields and Yoo, 2000); Morduch and Sicular, (2002);Wan and Zhou, (2005); Wan, (2002 and 2004).

These studies reveal two principal approaches. The first approach entails using standard regression models which establishes a behavioural relationship between the household income expenditure and the other explanatory variables (Mwabu et. al., 2000). This yields estimated coefficients that can be interpreted to evaluate the significance of the independent variables in understanding poverty. The second approach apply a qualitative regression analyses-which uses either a probit or logit regression model- to establish probabilistic statements on the significance of certain variables in determining household poverty or well-being (Alemayehu et. al., 2002; 2005; and Oyugi, 2000).

While the proponents of the first approach justify their approach by: (1) the two approaches; and (2) the Logit/ probit model involve unnecessary loss of information in transforming household expenditure into binary variables, Alemayehu et al., (2005) remarks that, although their specification is simple and easy to follow, it certainly has inherent weaknesses; (1) unlike the Logit/probit model, the linear simple regression does not yield a probabilistic statement about poverty; and (2) the major assumptions of the welfare function approach is that consumption expenditure are negatively associated with absolute poverty at all expenditure levels.

Despite this debate an abundance of literature of literature on welfare determinants, as earlier mentioned, a key issue in econometric analysis of well-being is the potential presence of endogeneity arising from the fact that some unobserved independent variables affect response outcome of the dependent variable and correlated with other unobserved covariates excluded from the model. This unobserved variables absorbed by the error term tends to cause the residual term to be correlated with observed covariates causing the estimators to be bias. Various attempts have been made to resolve this issue with authors like Mundlak (1978) suggesting we model the independent variable as cluster means. Other alternative solutions may be to: (1) compute fixed effects; (2) insert clustered values of suspected endgogenous variables; and (3) keep the random effect and adopt a consistent estimator (instrumental variable estimator). Additionally, an extension of the limited information augmented regression technique suggested by Hausman (1978) also known as the Control Function Approach can be used. Thus, the value added of this subsection, which is among the first in Cameroon is to investigate the different standards econometric procedures, tease-out the most appropriate technique that yields unbiased and consistent estimates.

4.1.2 Methodology

Let the standard determinant of household economic well-being be established by the following OLS regression:

$$InY_{i,t} = \alpha + \beta_1 x_{i,t}^1 + \beta_2 x_{i,t}^2 + ... + \beta_m x_{i,t}^m + \varepsilon_{i,t} \qquad (1)$$

where $Y_{i,t}$, represents the log-per capita expenditure, $\beta_i = 1,......., M$ are the vectors of parameters and $x^1, x^2, ..., x^m$ are the independent variables which explain expenditure, and ε is vector of residuals. Beyond the standard OLS approach, going through comparative analysis of econometric methods, most studies carrying out to regress determinants of poverty have out rightly identified the inherent econometric limitations appended to the standard OLS method. Among these we identify potential endogeneity, multicorrelation and unobserved heterogeneity. These limitations if not appropriately addressed may tend to produce less robust results as per indicators obtained. In view of the above, in this study we compare three regression procedures (OLS, IV (2SLS) and the Control Function approaches), attempting to adopt the approach that purges potential endogeneity, and unobservable heterogeneity or non-linear correlation between the regressors and unobservables, and verifying the veracity of each estimation procedure. The educational level of household heads is envisaged as being complementary to relevant unobserved inputs that cause household economic well-being. The causal relationship between household welfare and education can be depicted by controlling for potential endogenity and unobserved effects as:

$$\log Y_t = x_{1,t}\delta_{y,t} + \eta_t L_t + \varepsilon_{1,t} \qquad (2)$$

$$L_t = x_{2,t}\delta_{l,t} + \varepsilon_{2,t} \qquad (3)$$

where Y and L are household economic well-being and the education of household head-the endogenous explanatory variable in the household income generating function-surrogated by the educational level of the household head. $x_{1,t}$ is a vector of exogenous variables that capture individual, household, community and spatial characteristics, $x_{2,t}$ is a vector of exogenous variables, comprising $x_{1,t}$ correlates that belong to the income generating function and a vector of instrumental variables that affect educational levels, L, but have no direct effect on household income generating function and δ_t *and* η_t are parameters to be estimated, and $\varepsilon_{i,t}$, the respective error terms.

The null hypothesis of no complementary effects of education on household income/expenditure is $H_0 : \eta = 0$. The alternative hypothesis (assuming complementarities) $\eta > 0$ is presumed to act via increase possibility of generating extra-income because household head is educated, thus employed in better jobs. The vital argument in the complementary hypothesis here is not that education directly increases household income/expenditure, but rather that education elicits extra-employment possibilities and knowledge, which is strongly correlated with augmenting the income earning capabilities of the household head and thus income for expenditure.

Equation (2) being the structural equation of interest may be affected by reverse causality if education is expected to complement with some inputs that are omitted from the household income/expenditure function. Thus, OLS will produce bias results. Purging potential endogeneity we adopt instrumental variables that do not belong to the outcome equation but are correlated with the endogenous explanatory variable (education), conditional on the other covariates. Additionally, heterogeneity of income expenditure due to non-linear interaction of education with unobserved or omitted variables could bias the estimated structural coefficients as well. Equation (3) is the linear projection of the potential endogenous variable, L, on all the exogenous variables, that is, a reduced form linear probability model of education of the household head. Augmenting equation (2) into a control function to address the highlighted potential issues, we have:

$$\log Y_t = \alpha_t + x_{1,t}\delta_t + \eta_t L_t + \alpha_{1,t}\,\hat{\varepsilon}_{2,t} + \gamma_t(\hat{\varepsilon}_{2,t}\,.L_t) + \mu_t \tag{4}$$

where $\hat{\varepsilon}_{2,t}$ is the fitted residual of education, derived from the reduced form linear probability model of educational level, that controls for unobserved variables correlated with L; $(\hat{\varepsilon}_{2,t}\,.L_t)$ is the interaction of the fitted educational level residual with the actual value of educational level and μ_t is a composite error term comprising $\varepsilon_{1,t}$ and the unpredicted part of $\varepsilon_{2,t}$, under the assumption that $E(\mu_t) = 0$; $\delta_t, \eta_t, \alpha_{1,t}$ *and* γ_t are parameters to be estimated. As noted in Wooldridge (1997), the IV estimates are unbiased and consistent only when (a) the expected value of the interaction between level of education and its residual $(\hat{\varepsilon}_2\,.L)$ is zero or the correlation is linear; and (b) there is no sample selection problem. However, if the correlation is non-linear, then the control function approach is required and the inclusion of the interaction term $(\hat{\varepsilon}_2 .L)$ in equation (4) purifies the estimated coefficients of unobservable variables (Card, 2001). Lastly, accounting for intra-clustering correlation, a robust estimate of both the OLS and CFA models are effectuated.

4.1.3 Data

The data used in this subsection is the ECAM I (1996) and ECAM II (2001) Cameroon household consumption surveys. The ECAM I survey was conducted by the DSCN-MINEFI in 1996 (over three months). This survey is comprised of a random sample of approximately 1800 households (both urban and rural) in the ten provinces of the national territory (DSCN, 1997). This survey was aimed at the following objectives: (1) Measure the effects of the economic crisis and adjustment measures on the level and standards of living of households; (2) Establish the relationship that exist between the different dimensions of well-being of these households; and (3) Analyse the tendencies and evolutions of household well-being relative to other sources of data.

The ECAM II survey was undertaken from September to December 2001. This household survey was carried out to remedy mistakes made in the first household survey and ameliorate information concerning the poverty profiles. This survey was comprised of 11,553 households of whom 10,992 were actually visited. In additions, (1) it was conducted to propose an adequate methodology for calculating poverty lines and profiles acceptable to major development partners, and which serves as a reference for further analysis. This ECAM II acts as a follow up of the poverty reduction program; (2) To analyse monetary poverty, poverty in terms of living conditions of most households and potential poverty, while establishing the correlation between them; (3) Consolidate past analysis at a national and regional level, while isolating the two large towns (Douala and Yaoundé) and also distinguishing area of residence (urban or rural); and (4) To produce an adequate data base to ameliorate different statistics (of the population), notably in establishing household consumption in national accounts and updating data used in calculating price indices (INS, 2002a; 2002b). These surveys contain information on expenditures of households and demographic data. Variables selected for our empirical work alongside their descriptive statistics are hosted in Tables 1-3.

Table 1: SUMMARY DESCRIPTIVE STATISTICS OF VARIABLES FOR THE GENERAL SAMPLES

Variable	Year: 1996				Year: 2001			
	Mean	SD	Min	Max	Mean	SD	Min	Max

Log Total Expenditure Per Adult	12.8188	0.8150	10.181	16.084	13.0176	0.7587	10.403	17.7654
Educational Level	1.7661	0.6619	1	3	2.2293	0.9364	1	4
Age	42.5087	13.3895	14	99	42.9270	15.0635	13	99
Age Squared	1986.16	1269.65	196	9801	2069.6190	1455.345	169	9801
Household Size	5.8925	3.9008	1	32	5.1349	3.5188	1	38
Fraction of Active Household Members	0.3953	0.3007	0	1	0.4926	0.2994	0.0370	3
Primary Sector (PSU Percentage)	1.1290	1.5237	0	4.2857	0.2570	0.2954	0	0.8841
Secondary Sector (PSU Percentage)	0.6436	0.7218	0	4.3860	0.1581	0.1841	0	1.8057
Sickness_past_2_Weeks (PSU Percentage)	0.7454	0.4177	0	2.0339	0.1928	0.1086	0	0.4942
Access Medical Doctor (PSU Percentage)	0.6424	0.6194	0	2.5157	0.1745	0.3464	0	3.5484
Water (PSU Percentage)	0.6715	0.4667	0	2.0095	0.1582	0.1150	0	0.5359
Electricity (PSU Percentage)	0.6244	0.3696	0	1.6472	0.1526	0.1125	0	0.5304
Regions								
Douala	0.2207	0.4148	0	1	0.1017	0.3023	0	1
Rural Forest	0.1213	0.3266	0	1	0.1497	0.3568	0	1
Rural Haut Plateau	0.1207	0.3259	0	1	0.2112	0.4081	0	1
Savannah	0.1207	0.3259	0	1	0.1865	0.3895	0	1
Control for unobserved variables								
Predicted Educational Level residual	5.13e-10	0.5757	-1.523	1.6239	-1.00e-10	0.7399	-2.305	4.2091
Interaction between Educational Level and its residual	0.3311	1.1848	-1.523	4.8717	0.5474	1.9250	-3.3514	16.83
Instruments for Level of Education								
Land Surface Area	4.2467	2.0796	0	12.085	9.2209	26.1166	0	751.200
Own Television (PSU Percentage)	0.6124	0.4693	0	2.0258	0.1411	0.1202	0	0.5564
Own Radio (PSU Percentage)	0.7239	0.2738	0.1684	1.3468	0.1754	0.0704	0	0.4775
Public Schools (Sum PSU squared)	0.3761	1.4494	0	16	2.2377	16.0335	0	225

Source: Computed by Authors using the ECAM1 and ECAM11 surveys in SATA 10.

Table 2: **SUMMARY DESCRIPTIVE STATISTICS OF VARIABLES**

YEAR: 1996		
Variable	**Male Sub Group**	**Female Sub Group**

	Mean	SD	Min	Max	Mean	SD	Min	Max
Variables								
Log Total Expenditure Per Adult	12.7803	0.8123	10.1810	16.0847	12.9712	0.8075	10.5602	15.0631
Educational Level	1.7868	0.6731	1	3	1.676	0.6037	1	3
Age	42.7864	13.4505	14	99	41.3830	13.0986	19	80
Age Squared	2011.4630	1289.2110	196	9801	1883.6290	1183.3480	361	6400
Household Size	6.2685	3.9849	1	32	4.3594	3.0932	1	17
Fraction of Active Household Members	0.4001	0.2896	0	1	0.3746	0.3411	0	1
Primary Sector (PSU Percentage)	1.2014	1.5635	0	4.2857	0.8376	1.3136	0	4.2857
Secondary Sector (PSU Percentage)	0.6625	0.7478	0	4.3860	0.5670	0.5989	0	2.6316
Sickness_past_2_Weeks (PSU Percentage)	0.7443	0.4258	0	2.0339	0.7487	0.3827	0	2.0339
Access Medical Doctor (PSU Percentage)	0.6153	0.6192	0	2.5157	0.7511	0.6085	0	2.5157
Water (PSU Percentage)	0.6588	0.4809	0	2.0096	0.7245	0.4011	0	2.0096
Electricity (PSU Percentage)	0.6054	0.3740	0	1.6473	0.7005	0.3420	0	1.6473
Regions								
Douala	0.2239	0.4170	0	1	0.2087	0.4070	0	1
Rural Forest	0.1238	0.3295	0	1	0.1101	0.3135	0	1
Rural Haut Plateau	0.1246	0.3303	0	1	0.1072	0.3099	0	1
Savannah	0.1317	0.3383	0	1	0.0754	0.2644	0	1
Control for unobserved variables								
Predicted Educational Level residual	0.0413	0.5808	-1.522	1.6239	-0.1797	0.5167	-1.2823	1.1780
Interaction between Educational Level and its residual	0.4147	1.2317	-1.522	4.8717	-0.0325	0.8672	-1.2823	3.5341
Instruments for Level of Education								
Land Surface Area	4.3065	2.1803	0	12.0855	3.9917	1.5849	2.4171	9.6684
Own Television (PSU Percentage)	0.6051	0.4719	0	2.0258	0.6411	0.4572	0	1.8416
Own Radio (PSU Percentage)	0.7289	0.2816	0.1684	1.3468	0.7019	0.2392	0.1684	1.3468
Public Schools (Sum PSU squared)	0.3110	1.1606	0	16	0.6377	2.2463	0	16

Source: Computed by Authors using the ECAM1 and ECAM11 surveys in STATA 10.

Table 3: SUMMARY DESCRIPTIVE STATISTICS OF VARIABLES

YEAR: 2001		
Variable	**Male Sub Group**	**Female Sub Group**

	Mean	SD	Min	Max	Mean	SD	Min	Max
Variables								
Log Total Expenditure Per Adult	13.0028	0.7336	10.40	17.7654	13.0633	0.8304	10.55	16.857
Educational Level	2.3059	0.9328	1	4	1.9918	0.9076	1	4
Age	42.1269	14.7852	13	99	45.4073	15.6401	14	98
Age Squared	1993.2550	1419.2780	169	9801	2306.3450	1538.2330	196	9604
Household Size	5.4530	3.6586	1	38	4.1488	2.8264	1	28
Fraction of Active Household Members	0.4904	0.2990	0.0370	3	0.5002	0.3006	0.0714	2
Primary Sector (PSU Percentage)	0.2656	0.3003	0	0.8841	0.2305	0.2782	0	0.8841
Secondary Sector (PSU Percentage)	0.1609	0.1866	0	1.8057	0.1494	0.1758	0	1.8057
Sickness_past_2_Weeks (PSU Percentage)	0.1926	0.1088	0	0.4942	0.1933	0.1081	0	0.4942
Access Medical Doctor (PSU Percentage)	0.1712	0.3429	0	3.5484	0.1847	0.3570	0	3.5484
Water (PSU Percentage)	0.1564	0.1152	0	0.5359	0.1635	0.1142	0	0.5359
Electricity (PSU Percentage)	0.1487	0.1130	0	0.5304	0.1649	0.1100	0	0.5304
Regions								
Douala	0.1031	0.3041	0	1	0.0974	0.2965	0	1
Rural Forest	0.1492	0.3563	0	1	0.1514	0.3585	0	1
Rural Haut Plateau	0.1973	0.3980	0	1	0.2540	0.4354	0	1
Savannah	0.2058	0.4043	0	1	0.1268	0.3328	0	1
Control for unobserved variables								
Predicted Educational Level residual	0.0692	0.7426	-2.305	4.2091	-0.2389	0.6785	-2.031	3.1320
Interaction between Educational Level and its residual	0.7067	1.9936	-3.351	16.8362	-0.0023	1.5459	-2.777	12.5281
Instruments for Level of Education								
Land Surface Area	9.3522	26.5666	0	751.2004	8.8133	24.6673	0	501.62
Own Television (PSU Percentage)	0.1384	0.1204	0	0.5564	0.1495	0.1195	0	0.5564
Own Radio (PSU Percentage)	0.1761	0.0708	0	0.4775	0.1735	0.0693	0	0.4775
Public Schools (Sum PSU squared)	2.0377	15.0872	0	225	2.8579	18.6539	0	225

Source: Computed by Authors using the ECAM1 and ECAM11 surveys in STATA 10.

Results of Descriptive Statistics

Table 1 shows that average household age for 1996 and 2001 was 42 years. Household size for both periods revolved around 5 persons. Log of total expenditure per capita was marginally higher for 2001 as compared to 1996, with the female sub sample having a slightly larger value. Average fraction of active adult household members was 0.49 for 2001 and 0.39 for 1996. Tables 2 shows that the analytic sample population for 1996 is made up of 80.2% men and 19.8% women. In 2001 (Table, 3) men constituted 75.6% of the total sample as compare to 24.4 for women. While average age for men was superior to women in 1996, in 2001 the opposite is observed. Lastly, on average, and for both years the subgroup male have higher values for working in the secondary sector than the female subgroup. This opposite trend is noted for the female subgroup for the variable primary sector.

4.1.4 Empirical Results

Prior to reporting results of the household income expenditure function, it is important to recall that if education is not an individual decision, but is determined entirely by public policy and is orthogonal to individual characteristics and income generating activities of household head, the OLS estimates of the structural parameters of our income equation will yield unbiased estimates of any spill-over effects on η_t. We posit that being educated enables household heads to adopt practices that will improve income earned by households, thus their expenditure. This implies there exist a positive empirical relationship between household income expenditure and education, depicting positive externalities, as required by the complementary hypothesis. The inverse will translate negative externalities.

The results obtained for the three regression procedures ties with the complementary hypothesis (Table 4). All empirical specifications generate a positive and significant effect of education on household income expenditure. For both 1996 and 2001 the estimated parameters of education in the IV 2SLS (columns 3 & 4) increase almost three fold compared to OLS estimates (Table 4: columns 1 & 2); relative to OLS parameter estimates for education CFA estimates (columns 5 & 6) increase more than two fold. These results: (1) verify the complementary hypothesis; and (2) reveals the value added of the Control Function Approach method over the other estimation techniques.

Sometimes, the educational levels of household heads could indeed correlate with elements of the error term apart from the excluded inputs, responding to changes not made explicit in the structural equation. The direction of bias is an empirical issue, because it could be that household heads with poor endowments are the ones more likely to demand for higher levels of education in order to empower themselves and enhance well-being, thus biasing η_t towards zero and under estimating the spill-over effect. These considerations entail that it is important to properly estimate the structural parameters to correctly attribute causality for policy guidance.

In addition to education, all other OLS estimates for 1996 are significant except working in the secondary sector (column 1). For 2001, OLS estimates in addition to secondary sector also identify fraction of active household members, access to a medical doctor and access to water as non significant variables (column 2).

Table 4: Estimation of the Economic welfare function under different assumptions- Dependent variable: log of household expenditure per adult (robust t-student statistics)

Variable	OLS		IV2SLS		Control Function Approach	
	1996 Col(1)	**2001** Col(2)	**1996** Col(3)	**2001** Col(4)	**1996** Col(5)	**2001** Col(6)

Educational Level	0.3109***	0.2258 ***	0.8285***	0.7510***	0.7905***	0.7562***
	(8.56)	(17.14)	(5.38)	(9.14)	(4.99)	(10.62)
Age	0.0732***	0. 0503***	0.0649***	0.0521***	0.0612***	0.0492***
	(8.62)	(17.22)	(6.82)	(16.85)	(6.93)	(17.64)
Age Squared*10^2	-0.066***	-0.0499***	-0.051***	-0.0410***	-0.0471***	-0.0376***
	(-6.79)	(-17.81)	(-4.38)	(-11.80)	(-4.43)	(-12.50)
Household Size	-0.0307***	-0.0251***	-0.0251***	-0.0214***	-0.0247***	-0.0204***
	(-4.89)	(-8.58)	(-3.47)	(-6.22)	(-3.84)	(-7.09)
Fraction of Active Household Members	0.1926**	0. 0084	0.2815***	0.1406***	0.2610***	0.1516**
	(2.40)	(0.27)	(3.15)	(3.33)	(3.02)	(4.22)
Sex(1=male and 0=otherwise)	-0.2315***	-0. 0627***	-0.3592***	-0.2384***	-0.3629***	-0.2487***
	(-4.31)	(-3.42)	(-5.07)	(-7.07)	(-5.68)	(-8.84)
Primary Sector (PSU Percentage)	0.1179**	-0. 4289***	0.1263***	-0.1419	0.1261***	-0.1122
	(2.10)	(-6.39)	(2.45)	(-1.48)	(2.61)	(-1.53)
Secondary Sector (PSU Percentage)	0.0662	0. 0145	0.0985**	0.1006	0.0961**	0.1130**
	(1.40)	(0.28)	(2.22)	(1.36)	(2.35)	(2.16)
Sickness_past_2_Weeks (PSU Percentage)	-0.1778*	-0. 4466***	-0.1289	-0.5047***	-0.1267	-0.4970***
	(-1.96)	(-3.13)	(-1.47)	(-2.74)	(-1.42)	(-3.62)
Access to Medical Doctor (PSU Percentage)	0.1653***	-0. 0392	0.1145***	-0.0518	0.1147***	-0.0505
	(4.31)	(-1.03)	(2.68)	(-1.41)	(2.68)	(-1.33)
Water (PSU Percentage)	0.1924**	0. 0654	0.1573**	0.0281	0.1586*	0.0233
	(2.42)	(0.15)	(2.04)	(0.19)	(1.96)	(0.18)
Electricity (PSU Percentage)	0.2839**	-0. 2689**	0.1716	-0.2979*	0.1744	-0.2922**
	(2.21)	(2.16)	(1.52)	(-1.80)	(1.58)	(-2.07)
Douala	0.2179***	0. 1627***	0.1502**	0.0433	0.1666**	0.0623
	(2.99)	(3.75)	(2.04)	(0.96)	(2.52)	(1.56)
Rural Forest	-0.5376***	-0. 1045***	-0.4359***	-0.1603***	-0.4227***	-0.1538***
	(-3.68)	(-2.72)	(-2.83)	(-3.04)	(-2.61)	(-4.03)
Rural Haut Plateau	-0.4793***	-0. 2360***	-0.3444**	-0.2205***	-0.3474**	-0.2077***
	(-3.41)	(-6.67)	(-2.32)	(-5.59)	(-2.22)	(-6.00)
Savannah	-0.4869***	-0. 1189***	-0.2803*	0.1642**	-0.2741*	0.1783***
	(-3.52)	(-2.92)	(-1.86)	(2.46)	(-1.76)	(3.39)
Control Function Variables (account for the log of income expenditure per adult effects of unobservables in the error term of the projected endogenous variable)						
PEduc_Levresidual					-0.7713***	-0.7594***
					(-4.23)	(-9.55)
Edu*Educ_residual					0.1332**	0.0856***
					(2.51)	(7.43)
Constant	10.534***	11.7837***	9.7696***	10.385***	9.879***	10.3624***
	(48.77)	(128.25)	(30.17)	(43.15)	(30.91)	(49.93)
R-Squared	0.3197	0.3036	0.1770	0.0364	0.3342	0.3221
Adjusted R-Square						
Fisher(df; p-value)	24(16,148); 0.00	81.(16,608) ; 0.00			22.99(18, 148); 0.00	82.93 (18,608); 0.00
WaldChi2 (df; p-value)			429; 0.00	1216; 0.00		
Number of Observation	1338	10134	1338	10134	1338	10134

Source: Computed by Authors using STATA 10. ***, ** and * are 1, 5 and 10 percent significance.

For the IV 2SLS estimates for 1996 (column, 3) all explanatory variables are significant except being sick and access to electricity which are non significant in explaining the household income generating function. IV 2SLS results for 2001 (column, 4) find all variables significant except working in both the primary and secondary sectors, which are non significantly accounting for income/expenditure behaviors of households. Lastly, CFA estimates for 1996 (column, 5) are similar to the IV 2SLS estimates. However, for 2001 (column 6) in addition to the primary sector, access to a medical doctor, water and residing in urban areas (Douala) do not significantly influence the expenditure habits of households. Spatially, while both the OLS and IV 2SLS identify leaving in urban areas as expenditure increasing for households and rural areas expenditure reducing, the CFA approach tell a similar story line for urban areas (though not significant), and as for rural areas except the savannah residency which is rather income expenditure increasing and significant.

The fitted residual of education in the CFA formulation significantly reduces income expenditure for all the samples and for the two years under review (column, 6). This entails linear endogenous relations that negatively affect income expenditure habits of household heads. In addition, controlling for non-linear interactions between education and unobservables (column 6), the value of the interaction term is significant. The statistical significance of this variable indicates evidence of unobserved heterogeneity. In this regard, Control Function modeling has the advantage over other modeling approaches because it is capable of purging most structural parameter of potential econometric problems, notably endogeneity and heterogeneity of unobservables with the endogenous variable.

In Table 5, we replicate the same results as Table 4, except for the exclusion of the variable sex. This is undertaken because we will use them as input in computing within-and-between gender inequality by regressed sources. Globally, the same trends are observed for both tables with the exception being in terms of the magnitude of the values and changes in degree of significance. Robust regressions are also undertaken with their student statistics being slightly inferior to those obtained when the variable gender is included.

Computing regressed variables along gender lines using the OLS, IV 2SLS and CFA to identify household determinants for 1996 (Table 6), we observe that education of female household heads though experiencing an increase in its value, was not significant for the OLS estimates (column 2) and the IV 2SLS estimates (column 4) but significant at a ten percent level for the CFA estimates (column 6). This could be translating the bias women face in accessing educational opportunities and consequently on female headed household income generating abilities. Concerning the male subsample (columns 1, 3 & 6) its behavior was identical to the general sample.

Table 5: Estimation of the welfare function (excluding the variable Gender) under different assumptions-Dependent variable log of household expenditure per adult, for 1996 and 2001 (robust t-student statistics)

Variable	OLS		IV 2SLS		CFA (with interaction term)	
	1996 Column(1)	**2001** Column(2)	**1996** Column(3)	**2001** Column(4)	**1996** Column(5)	**2001** Column(6)

Educational Level	0.2885***	0.2199***	0.8353***	0.7488***	0.7997***	0.7532***
	(7.65)	(16.98)	(5.52)	(9.26)	(5.18)	(10.61)
Age	0.0752***	0.0512***	0.0674***	0.0556***	0.0637***	0.0527***
	(8.6)	(17.62)	(6.99)	(17.95)	(7.12)	(18.6)
Age Squared*10^2	-0.0692***	-0.0506***	-0.0538***	-0.0434***	-0.0503***	-0.0402***
	(-6.96)	(-17.56)	(-4.74)	(-13.15)	(-4.78)	(-13.75)
Household Size	-0.0365***	-0.0271***	-0.0339***	-0.0291***	-0.0336***	-0.0283***
	(-5.66)	(-9.48)	(-4.61)	(-8.66)	(-5.2)	(-10.05)
Fraction of Active Household Members	0.1437*	-0.0023	0.2107**	0.1039***	0.1900**	0.1117***
	(1.76)	(-0.07)	(2.32)	(2.59)	(2.21)	(3.24)
Primary Sector (PSU Percentage)	0.1078*	-0.4418***	0.1108**	-0.1812*	0.1103**	-0.1544**
	(1.96)	(-6.63	(2.20)	(-1.96)	(2.32)	(-2.15)
Secondary Sector (PSU Percentage)	0.0503	0.0062	0.0758*	0.0716	0.0733*	0.0824
	(1.05)	(0.12)	(1.70)	(1.04)	(1.82)	(1.58)
Sickness_past_2_Weeks (PSU Percentage)	-0.1774*	-0.4356***	-0.1242	-0.4643**	-0.1213	-0.4562***
	(-1.93)	(-3.06)	(-1.38)	(-2.54)	(-1.34)	(-3.32)
Access to Medical Doctor (PSU Percentage)	0.1715***	-0.0382	0.1203***	-0.0482**	0.1205***	-0.0475
	(4.46)	(-1.00)	(2.76)	(-1.31)	(2.8)	(-1.25)
Water (PSU Percentage)	0.2004**	0.0652	0.1671**	0.0259	0.1680**	0.0217
	(2.53)	(0.51)	(2.17)	(0.18)	(2.09)	(0.17)
Electricity (PSU Percentage)	0.2998**	0.2776***	0.1877*	-0.2865*	0.1885*	-0.2815***
	(2.39)	(3.23)	(1.76)	(-1.76)	(1.77)	(-2.00)
Douala	0.2092***	0.1617***	0.1308**	0.0345	0.1458**	0.0510
	(2.84)	(3.72)	(2.05)	(0.76)	(2.17)	(1.26)
Rural Forest	-0.5154***	-0.1013***	-0.3921***	-0.1502***	-0.3785**	-0.1446***
	(-3.54)	(-4.21)	(-2.54)	(-2.92)	(-2.3)	(-3.81)
Rural Haut Plateau	-0.4789***	-0.2328***	-0.3326**	-0.2072***	-0.3354**	-0.1957***
	(-3.44)	(-2.66)	(-2.29)	(-5.29)	(-2.18)	(-5.66)
Savannah	-0.4812***	-0.1232***	-0.2541*	0.1585***	-0.2476*	0.1710***
	(-3.58)	(-6.59)	(-1.73)	(2.42)	(-1.62)	(3.27)
Control Function Variables (account for the log of income expenditure per adult effects of unobservables in the error term of the projected endogenous variable)						
PEduc_residual					-0.8019***	-0.7463***
					(-4.46)	(-9.46)
Edu*Educ_residual					0.1308**	0.0788***
					(2.45)	(7.01)
Constant	10.4053***	11.7426***	9.501***	10.1689***	9.6054***	10.1482***
	(46.48)	(128.58)	(26.90)	(39.20)	(27.78)	(45.08)
R-Squared	0.3085	0.3025	0.1453	0.0226	0.3243	0.3236
Fisher (df ; p-value)	23.65 (15, 148) ; 0.00	85.29 (15, 608) ; 0.00			22.7 (17, 148) ; 0.00	85.90 (17, 608); 0.00
Wald Chi2 (df, p-value)			395.3 ; 0.00	1238; 0.00		
Number of Observation	1338	10134	1338	10134	1338	10134

Source: Computed by Authors using STATA 10. ***, ** and * are 1, 5 and 10 percent significance levels

Table 6: Estimation of the welfare function under different assumptions by gender type-dependent variable log of household expenditure per adult, for 1996 (robust t-student statistics)

Variable	OLS		IV 2SLS		CFA (with interaction term)	
	Male Column(1)	**Female** Column(2)	**Male** Column(3)	**Female** Column(4)	**Male** Column(5)	**Female** Column(6)
Educational Level	0.3578***	0.0298	0.9739***	0.2780	0.9191***	0.4012*
	(9.25)	(0.34)	(5.85)	(1.43)	(5.51)	(1.67)

Age	0.0820***	0.0686**	0.0708***	0.0635**	0.0701***	0.0634**
	(8.48)	(2.52)	(6.45)	(2.29)	(7.1)	(2.29)
Age Squared*10^{2}	-0.073***	-0.0751**	-0.053***	-0.0651*	-0.053***	-0.0656*
	(-6.79)	(-2.18)	(-4.05)	(-1.82)	(-4.62)	(-1.85)
Household Size	-0.026***	-0.059***	-0.0194**	-0.054***	-0.023***	-0.0552***
	(-3.65)	(-3.94)	(-2.27)	(-3.63)	(-3.24)	(-3.83)
Fraction of Active Household Members	0.3287***	-0.1122	0.4289***	-0.0684	0.3713***	-0.0567
	(3.47)	(-0.83)	(3.93)	(-0.48)	(3.72)	(-0.40)
Primary Sector (PSU Percentage)	0.1161**	0.0924	0.1120**	0.1191	0.1128**	0.1089
	(2.01)	(0.71)	(2.04)	(0.98)	(2.19)	(0.87)
Secondary Sector (PSU Percentage)	0.0804	-0.0590	0.1152**	-0.0300	0.1013***	-0.0241
	(1.63)	(-0.69)	(2.44)	(-0.34)	(2.6)	(-0.26)
Sickness_past_2_Weeks (PSU Percentage)	-0.1368	-0.3417**	-0.0678	-0.3383**	-0.0799	-0.2930*
	(-1.43)	(-2.15)	(-0.75)	(-2.14)	(-0.86)	(-1.79)
Access to Medical Doctor (PSU Percentage)	0.1301***	0.3217***	0.0801*	0.2853***	0.0764*	0.2820***
	(3.21)	(3.92)	(1.90)	(3.13)	(1.72)	(3.24)
Water (PSU Percentage)	0.1692**	0.2115	0.1067	0.2429	0.1362*	0.1783
	(2.04)	(1.13)	(1.35)	(1.37)	(1.65)	(0.86)
Electricity (PSU Percentage)	0.2880**	0.3410	0.1284	0.3061	0.1560	0.2726
	(2.17)	(1.32)	(1.11)	(1.24)	(1.33)	(1.12)
Douala	0.1771**	0.2667**	0.0636	0.2884**	0.1050	0.2189*
	(2.06)	(2.24)	(0.89)	(2.42)	(1.39)	(1.73)
Rural Forest	-0.599***	-0.3610	-0.476***	-0.3180	-0.438***	-0.3124
	(-4.21)	(-1.29)	(-3.04)	(-1.15)	(-2.71)	(-1.13)
Rural Haut Plateau	-0.522***	-0.3564	-0.3604**	-0.2959	-0.3610**	-0.2574
	(-3.63)	(-1.13)	(-2.39)	(-0.95)	(-2.31)	(-0.78)
Savannah	-0.486***	-0.4783*	-0.2254	-0.4172	-0.2261	-0.3214
	(-3.63)	(-1.65)	(-1.49)	(-1.46)	(-1.53)	(-0.99)
Control Function Variables (account for the log of income expenditure per adult effects of unobservables in the error term of the projected endogenous variable)						
PEduc_residual					-0.828***	-0.4992
					(-4.39)	(-1.45)
Edu*Educ_residual					0.1148**	0.0562
					(2.13)	(0.31)
Constant	9.9196***	11.509***	8.9356***	11.085***	9.0557***	10.859***
	(37.81)	(20.26)	(22.82)	(17.45)	(23.85)	(16.69)
R-Squared	0.3464	0.2439	0.1358	0.2144	0.3622	0.2524
Fisher (df ; p-alue)	22.7 (15, 117);0.00	5.9 (15, 113);0.00			21.4 (17, 147);0.00	5.7 (17, 113); 0.00
Wald Chi2			413.42	92.03		
Number of Observation	1088	250	1088	250	1088	250

Source: Computed by Authors using STATA 10. ***, ** and * are 1, 5 and 10 percent significance levels

Table 7: Estimation of the welfare function under different assumptions by gender type-dependent variable log of household expenditure per adult, for 2001 (robust t-student statistics)

Variable	OLS		IV 2SLS		CFA (with interaction term)	
	Male Column(1)	**Female** Column(2)	**Male** Column(3)	**Female** Column(4)	**Male** Column(5)	**Female** Column(6)
Educational Level	0.2153***	0.2349***	0.7717***	0.6717***	0.7547***	0.7303***

	(15.36)	(9.66)	(8.20)	(5.85)	(9.68)	(6.67)
Age	0.0513***	0.0462***	0.0469***	0.0662***	0.0528***	0.0484***
	(15.49)	(7.73)	(12.95)	(9.07)	(16.2)	(8.32)
Age Squared*10^2	-0.0488***	-0.0535***	-0.0338***	-0.0617***	-0.0378***	-0.0451***
	(-14.67)	(-9.24)	(-7.72)	(-10.49)	(-11.39)	(-7.34)
Household Size	-0.0234***	-0.0508***	-0.0194***	-0.0452***	-0.0251***	-0.0520***
	(-7.79)	(-7.55)	(-5.32)	(-6.17)	(-8.53)	(-7.7)
Fraction of Active Household Members	0.0032	0.0403	0.1300***	0.1566**	0.1197***	0.1493**
	(0.09)	(0.65)	(2.68)	(2.20)	(3.19)	(2.27)
Primary Sector (PSU Percentage)	-0.4363***	-0.4191***	-0.1002	-0.2980**	-0.1410*	-0.1496
	(-6.28)	(-3.68)	(-0.92)	(-2.35)	(-1.82)	(-1.24)
Secondary Sector (PSU Percentage)	0.0164	0.0085	0.1150	0.0649	0.0992*	0.0699
	(0.28)	(0.10)	(1.59)	(0.55)	(1.77)	(0.78)
Sickness_past_2_Weeks (PSU Percentage)	-0.4139***	-0.5826**	-0.5065**	-0.5257**	-0.4186***	-0.6394***
	(-2.67)	(-2.52)	(-2.43)	(-2.04)	(-2.86)	(-2.73)
Access to Medical Doctor (PSU Percentage)	-0.0417	-0.0138	-0.0716*	0.0121	-0.0472	-0.0237
	(-1.09)	(-0.23)	(-1.74)	(0.24)	(-1.30)	(-0.38)
Water (PSU Percentage)	0.1219	-0.1833	0.0835	-0.2206	0.0786	-0.2341
	(0.98)	(-0.90)	(0.55)	(-1.03)	(0.63)	(-1.19)
Electricity (PSU Percentage)	0.2551**	0.3742*	-0.3685**	-0.0133	-0.3047**	-0.1345
	(2.10)	(1.65)	(-2.06)	(-0.05)	(-2.20)	(-0.52)
Douala	0.1637***	0.1794***	0.0106	0.1549**	0.0562	0.0761
	(3.38)	(2.92)	(0.21)	(2.39)	(1.28)	(1.18)
Rural Forest	-0.0809**	-0.1564***	-0.1686**	-0.1346**	-0.1229***	-0.1940***
	(-1.98)	(-2.56)	(-2.86)	(-1.94)	(-3.05)	(-3.18)
Rural Haut Plateau	-0.2308***	-0.2535***	-0.2423***	-0.1721***	-0.1866***	-0.2205***
	(-6.17)	(-4.86)	(-5.55)	(-2.99)	(-5.12)	(-4.26)
Savannah	-0.1041**	-0.2041***	0.1848**	0.0343	0.1938***	0.0784
	(-2.43)	(-3.22)	(2.44)	(0.38)	(3.38)	(0.99)
Control Function Variables (account for the log of income expenditure per adult effects of unobservables in the error term of the projected endogenous variable)						
PEduc_residual					-0.8180***	-0.6042***
					(-9.35)	(-4.64)
Edu*Educ_residual					0.1025***	0.0383
					(8.30)	(1.48)
Constant	11.6536***	12.2013***	10.167***	10.4920***	10.0177***	10.7371***
	(114.65)	(68.25)	(35.98)	(23.19)	(39.73)	(31.63)
R-Squared	0.3053	0.3383		0.2093	0.3290	0.3483
Fisher (df ; p-value)	64.58(15, 608) ; 0.00	62.43(15, 574) ; 0.00			67.81(17, 608) ; 0.00	58.80 (17, 574); 0.00
Wald Chi2 (df ; p-value)			878.6 ; 0.00	861.8 ; 0.00		
Number of Observation	7858	2276	7858	2276	7858	2276

Source: Computed by Authors using STATA 10. ***, ** and * are 1, 5 and 10 percent significance levels

Computing regressed variables along gender lines using the OLS, IV 2SLS and CFA to identify household determinants for 2001 Table 7, we observe that unlike Table 6 (column 6), the variable education in the female subgroup was significant at 1 per cent level of significance and increased from the OLS estimate (column 2) by almost three folds in the CFA estimates (column 6).

Considering the male and female subgroups, while for the 1996 male subgroup, all the variables were significant in explaining the income function (Table 6), in 2001 (Table7), the same variables that account for general income expenditure (Table 5, column 4) also explain income/expenditures among male-headed households (column 3). Variables that explain female income/expenditure age, age squared, household size, sickness, and areas of residence (Table 7: columns 2, 4 & 6). In 1996 (Table 6: columns 2, 4 & 6) the female subgroups have identical results to the 2001 data exception that the variable access to a doctor is significant and not sickness.

In Table 8, we report the reduced form equation of education of the general samples for 1996 and 2001, as well as the subsamples for the male and female subgroups. For both general and gender subsamples the variable age squared (experience of life-cycle effects) and fraction of active household members are significant for all groups. Age is non significant for all groups except the 2001 female subgroup (column 6). Working in the primary sector is significant for all groups except the 1996 general sample (column 1), male (column 3), and the female subgroups (columns 5 & 6). As for the secondary sector this is biased in favor of the male and general groups (column 1, 2 and 4). Infrastructural variables have identical behaviors for both years. Residing in urban areas positively influence the dependent variable except the 1996 female subgroup samples (column 5) though not significant. Rural areas negative affect educational outcomes of household heads for the 1996 general and sub samples. However, for the 2001 survey we observe different trends in the general and gender subsamples (columns 2 & 4). Looking at the instrumental variables, all instruments considered were significant for both years and their subsamples, except for the clustered variable owning a radio.

TABLE 8: Reduced for Equation for Educational status of household head for the general and gender sub-group samples (robust t-student statistics)

Variable	General Sample		Male Sub-Sample		Female Sub-Sample	
	1996 Column(1)	**2001** Column(2)	**1996** Column(3)	**2001** Column(4)	**1996** Column(5)	**2001** Column(6)
Age	0.0130	-0.0054	0.0145	0.0054	0.0270	-0.0460***
	(1.49)	(-1.54)	(1.53)	(1.28)	(1.54)	(-8.06)
Age Squared*10^2	-0.0268***	-0.0149***	-0.0278***	-0.0241***	-0.0481**	0.0191***

	(-2.69)	(-4.08)	(-2.58)	(-5.56)	(-2.37)	(3.49)
Household Size	-0.0109**	-0.0079***	-0.0120**	-0.0001***	-0.0134	-0.0128**
	(-2.07)	(-2.74)	(-1.98)	(-2.65)	(-1.21)	(-1.88)
Fraction of Active Household Members	-0. 1398**	-0.2285***	-0.1454*	-0.2114***	-0.0907	-0.2212***
	(-2.09)	(-6.83)	(-1.78)	(-5.25)	(-0.81)	(-3.74)
Sex (Male=1, 0=otherwise)	0.2424***	0.3323***				
	(6.01)	(17.08)				
Primary Sector (PSU Percentage)	-0.0171	-0.2504***	-0.0109	-0.3212***	-0.0595	0.0530
	(-0.41)	(-2.85)	(-0.24)	(-3.35)	(-0.76)	(0.47)
Secondary Sector (PSU Percentage)	-0.0920***	-0.1821*	-0.0990***	-0.1914**	-0.0885	-0.1559
	(-3.06)	(1.83)	(-3.11)	(-1.85)	(-1.25)	(-1.32)
Sickness_past_2_Weeks (PSU Percentage)	-0.1255*	0.1631	-0.1438**	0.2395	-0.0136	-0.1531
	(-1.91)	(0.89)	(-2.17)	(1.18)	(-0.10)	(-0.69)
Access to Medical Doctor (PSU Percentage)	0.0848**	0.0172	0.0704**	0.0442	0.1297*	-0.0576
	(2.52)	(0.52)	(2.11)	(1.28)	(1.72)	(-1.01)
Water (PSU Percentage)	0.0487	-0.1717	0.0848	-0.1534	-0.1531	-0.2240
	(0.91)	(-1.22)	(1.60)	(-1.01)	(-1.07)	(-1.34)
Electricity (PSU Percentage)	-0.1211	0.2538	-0.1146	0.3209*	-0.0953	0.0655
	(-1.21)	(1.44)	(-1.02)	(1.69)	(-0.61)	(0.31)
Douala	0.1113**	0.2510***	0.1569***	0.2901***	-0.1005	0.1097*
	(2.06)	(5.91)	(2.64)	(6.29)	(-0.98)	(1.81)
Rural Forest	-0.2595*	0.1112*	-0.2477*	0.1591**	-0.2634	-0.0344
	(-1.80)	(1.88)	(-1.84)	(2.41)	(-1.04)	(-0.53)
Rural Haut Plateau	-0.1786	0.0238	-0.1778	0.0682	-0.1304	-0.1135**
	(-1.39)	(0.57)	(-1.35)	(1.46)	(-0.60)	(-2.09)
Savannah	-0.3591***	-0.4732***	-0.3594***	-0.4603***	-0.2505	-0.4520***
	(-3.26)	(-9.18)	(-3.26)	(-8.23)	(-1.32)	(-6.34)
Instrumental variables						
Land Surface Area	0.0218*	0.0017***	0.0230*	0.0018***	0.0153	0.0015*
	(1.91)	(4.40)	(1.94)	(4.08)	(0.55)	(1.89)
Own Television (PSU Percentage)	0.3970***	1.9580***	0.4172***	1.8991***	0.3471***	2.0381***
	(6.58)	(9.80)	(6.74)	(8.70)	(3.14)	(8.08)
Own Radio (PSU Percentage)	-0.0055	-0.0392	0.0305	-0.0933	-0.2402	0.0841
	(-0.05)	(-0.16)	(0.26)	(-0.36)	(-0.88)	(0.27)
Public Schools (Sum PSU squared)	0.0450***	0.0029***	0.0307	0.0024**	0.0606***	0.0040***
	(4.82)	(2.98)	(1.63)	(2.20)	(5.37)	(4.47)
Constant	1.438***	2.462***	1.5884***	2.4998***	1.5198***	3.6258***
	(6.44)	(25.24)	(6.73)	(22.57)	(3.57)	(23.83)
R-Squared	0.2622	0.3890	0.2582	0.3655	0.3122	0.4562
Fisher Test(df;p-value)	28.96 (19, 148);0.000	188.8 (19, 608);0.00	23.5 (18, 147); 0.00	156(18, 608);0.000	35.2 (18, 113);0.00	119(18,574);0.000
Number of Observation	1338	10134	1088	7858	250	2276

Source: Computed by Authors using STATA 10. ***, ** and * are 1, 5 and 10 percent significance.

Concluding this subsection, this study used a series of econometric methodologies and preference was given to the CFA which purges the estimated coefficients of potential endogeneity, heterogeneity with unobservables and clustering effects. In this endeavor, we applied an approach that can be used to investigate determinants of household well-being for entire samples and along gender lines in Cameroon. Overall, both individual, household and community characteristics affect household welfare.

By and large, regressed variables were consistent with economic literature and significant in determining the global and gender samples determinants of household income/expenditure for the Ordinary Least Square, Two Stage Least Square and Control Function approach. Controlling for potential endogeneity in the log of total expenditure that could produce biased estimates; we instrumented for educational level which is endogenous in the household welfare function. The complementary hypothesis enunciated in our methodology was by and large verified. Unobserved heterogeneity was detected and control function modeling was thought to be superior to other modeling strategies when fitting Cameroon data. In the next section we are going to use estimated determinants of economic well-being to undertake a regression-based decomposition analysis of inequality in Cameroon.

4.2 A Regression-Based Decomposition Analysis of Income Inequality Trends in Cameroon

4.2.0. Introduction

A renewed interest in diverse fields in economics has placed the dynamics of income inequality firmly on the forefront of the academic debate. All these efforts strive to understand the determinants of income distribution that will help both policy makers and research understand the process that generates the income patterns. During the last decades, interest in inequality and it various links and impacts in the less developed countries (LDC) has been rekindled with the observation that; sub-Saharan Africa (SSA) has been experiencing an increase in inequality despite the efforts made to implement structural adjustment programmes factoring-in the social dimension. This is because the income distribution of a country is the outcome of the whole economic process, where factor prices are determined within an interdependent system.

The question currently raised of putting in place income redistribution programmes that equalizes economic opportunities, as well as enhancing welfare entails an indebt analysis. In this light, a lot of research has been carried out in trying to quantitatively analyse income distributions, clearly bring out characteristics and drawing policy implications. Since the early 1980s, several measures have been proposed in the literature characterising inequality in income redistribution (Kakwani, 1980; Shorrocks, 1982, 1983; Sen, 1973, 1981; as well as Atkison, 1970), and recently New and Multidimensional approaches have been developed (Morduch and Sicular 2002; Wan 2002; Fields and Yoo, 2000). In addition to these inequality measures, the issue of polarisation is currently in recent discussions on income distribution (Awoyemi, 2006). Ravallion and Chen (1999) suggest that polarisation and inequality can diverge in a developing country context with the worry that in less developed countries gradually loosing the middle class populations from actively participating in the economy.

Enough evidence shows that, despite a fall in the incidence of poverty between 1996 and 2001, after an increase within the period 1984-1996, inequality has at best marginally stagnated[12] (Chameni, 2005; Baye, 2005; Epo, 2006; etc.). Reviewing inequality via the Gini index revealed that: (1) in 1996 the inequality ratio between the poorest 20% quintile and richest 20% quintile was 1:7, implying that the mean expenditure per adult equivalent was 79.724 FCFA versus 585.168 FCFA. In 2001, this ratio was 1:8, with the non-poor spending eight times higher than the poor; (2) the Gini Index marginally increased between 1996 and 2001 (0.406 in 1996 and 0.408 in 2001); (3) disparity is high between the city and countryside; (4) in the cities the gap between the poor and non-poor is more pronounced than the countryside; and (5) while the Gini index for rural areas increased from 0.345 in 1996 to 0.369 in 2001, that for urban areas decreased from 0.449 in 1996 to 0.406 in 2001. Overall between 2001 and 2007 total inequality marginally declined from 0.408 to 0.390, retreating more in cities than rural areas. Unfortunately, the main shortcoming of this result is that it fails to identify the sources that account for welfare as well as the Gini values for determinants of welfare.

In trying to explain inequality trends in a developing country setting like Cameroon, inequality is perceived as: (1) a logical outcome of the market economy which are made up by different structures, which constitute avenues for socio-economic integrations; (2) the advantages accorded to urban areas relative to rural areas in terms in of education, health, infrastructure, etc. are overwhelming and; (3) the skewed developmental focus in favour of the urban dwellers with respect to the rural population. The observations highlighted by Awoyemi and Adekanye (2003) concerning the extent and content of gender inequality in terms of unequal access and utilization of productive resources, social capital and asset endowment also apply to Cameroon. In addition to inequality concerns in Cameroon, questioning how polarized income redistribution has fared is slowly gaining grounds (Baye, 2007). This is because going through the 1996 and 2001 households consumption surveys we note that, there has been an increase in gap between the two extreme quintiles of the sample considered. Going through inequality and its concerns, we may say that inequality has been aggravated by the following factors; bad governance, corruption, poor institutions and inertia. If the presence of these factors affects and dictates inequality patterns which optimize income redistribution programs geared at reducing the gap between the poor and the rich, it is important for government to resolve inequality problems.

In other to understand these issues we set as main research question: which estimated income sources explain economic well-being and account for inequality in Cameroon. Specific questions are: (1) what is the relative importance of the estimated income sources between 1996 and 2001 in accounting for income inequality? and (2) How has inequality evolved by income sources between 1996 and 2001?. To answer these questions we set as main research objective: to examine income inequality and its determinants in Cameroon. Specifically we: (1) assess the relative importance of the estimated income sources in accounting for income inequality between 1996 and 2001; (2) examine how inequality indices by income sources have evolved between 1996 and 2001; and (3) policy formulate recommendation.

4.2.1 Brief Review of Literature

---

[12] Epo (2006); notes that this marginal decrease was not statistically significant at a 5% significant level.

Drawing on the scientific contributions of this study, an overview of literature indicates that a lot of research is being done to tackle parametric and non-parametric inequality issues into subgroups, income sources, causal factors and other units or characteristics (Heshmati, 2004). Before now, economists have attempted to develop the regression-based approach to inequality decomposition. We can identify pioneers in this area such as: Oaxaca (1973); Blinder (1973); etc. They focus on the difference in mean income between two groups, attributing it to differences in resource endowment as represented by sample averages of regression variables, and in return to the endowment as represented by parameters estimates of the regression equation. In the early 1990s, Juhn et al, (1993) applied this approach to allow for the decomposition of between-group difference in the full wage distribution rather than the mean of income as in Oaxaca (1973) and Blinder (1973). Bourguignon et al, (2001) relaxed the requirement of a linear income-generating function of Juhn et al. (1993). Wan (2002) clearly observes that these efforts were devoted to explaining between-group differences in 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 the density functions. However, as is the case with a lot of semi-parametric or non-parametric methods, the results obtained were rather inconclusive thus producing findings that were below expectations to economists or policy makers. Suen (1997) proposes solutions to treating the issue of the residual in wage decomposition, as a measure of other excluded skills, which can fine-tune our measure of wage discrimination. Fields (1995) recognized the link between conventional OLS regression and the problem of decomposing income inequality by source, as well as the possibility of explaining changes observed via determinants of income inequality (Fields, 1998). Recently, Fields and Yoo (2000) and Morduch and Sicular (2002) developed a framework for inequality decomposition based wholly and directly on conventional regression equations, and this approach was then upgraded by Wan (2004). This approach has divers' advantages owing to its vast flexibility and accommodating 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 allowing for heterogeneity in responses. Furthermore confidence intervals for disaggregated contributions to the inequality index has be constructed (Heshmati, 2004).

The income inequality regression based decomposition is a less common decomposition procedure for inequality decomposition analysis. This decomposition technique is an extension of the approach proposed by Shorrocks (1982; 1984; 1999), which was later extended by Morduch and Sicular (2002) and Fields and Yoo (2000) and then extended by Wan (2004). In the literature of income inequality regression-based decomposition, we observe the predominance of either adopting the semi-log specification or the standard linear income generating function. A range of different applications of the income inequality regression-based decomposition literature exist. Among others we note; the extension of the MS (2002) approach to the case where the composition of income by the different sources is observed (Adam, 2001); the case where different income sources are accounted for by different income regimes in Farm-household income

(Yuko et. al., 2006; Bardham and Boucher, 1998) and kimhi, (2007) via undertaking a regression-based decomposition by determinants of income. This approach is attractive because it allows the contributions of the explanatory variables to total inequality to be quantified (Wan, 2004). Despite the attractive nature of the income inequality regression-based decomposition, certain shortcomings do exist. These limitations are the stringent restrictions which are imposed on the functional form of regression model when carrying out the regression.

In addition, Wan (2002) remarks that in most past income inequality regression decomposition, the constant term in the regression model was usually ignored or incorrectly treated. Though seldom but possible to encounter a constant as a source of income inequality in empirical analysis of income distribution, the presence of a constant is rather a rule rather than an exception in regression equation. Such a special source is factually known to lower (raise) total inequality if it is positive (negative). However as noted, existing studies either avoid confronting this problem or handle it incorrectly (Wan, 2004). Questioning the issue of the residual term, which is always assumed away in conventional decompositions, is pertinent. Although this term or its estimated counterpart is a white noise by definition, which means it does not affect the mean of the dependent variable in the estimated regression equation, nor does it affect the shape of the empirical Lorenz curve, its presence or absence does result in different income density functions and thus influences income distribution of measure inequality.

This has certain advantages: Firstly, the approach holds other things equal. Secondly, decomposition is done in the sense that the contributions of the several independent variable sum to the contribution of the overall model. Thirdly, it allows for variations in the dependent variable to be gauged by an index other than the variance. Wan (2002) goes further to show that it allows for identification as well as quantification of roots or determinants of inequality. Even the number of variables (exogenous) can be arbitrary with proxies being used whenever the need arises. Concerning spatial inequality, Kanbur and Venables (2005) note the growing importance of spatial inequality and their implication for policy relevance in countries such as china, consolidating growing concerns on how geography affects well-being. Consequently, the potential and real advantage of this approach will be undermined and further advance in this area will be hampered (prior works have not used the most natural rule of decomposition by Shorrocks (1999) or equivalently the before-and-after approach recommended by Cancian and Reed (1998)), if this term is not considered.

In the context of income inequality, decomposition techniques enable researchers to distinguish the “between-group” effects due to differences in average income across subgroups from the “within-group” effect due to inequality within the population subgroups. Decomposition techniques have also been developed in order to measure the importance of components of income such as earnings or transfer payments. A less familiar, but potentially much more serious problem concerns the limitations placed on the types of contributory factors which can be considered. Subgroup decompositions can handle situations in which the population is partitioned on the basis of a single attribute, but have difficulty identifying the relevant contributions in multi-variate decompositions. Nor is there any established method of dealing with mixtures of factors, such as a simultaneous decomposition by subgroup (into say male and female) and income components (say earnings and unequal income). As more sophisticated models are used to analyze distributional issues, these limitations have become increasingly evident. The studies by Cowell and Jenkins (1995); Jenkins (1995); Bourguignon et. al., (1998) and Bouillon et al, (1998) illustrated the range of problems faced by those trying to apply current techniques to complex distributional questions. Araar (2006) overcomes a key limitation that is, the presence of the residual term, by using the Shapley Value approach to purge the residual term, when undertaking within-and-between group decomposition. This procedure greatly fine-tunes the analysis of these components in explaining total inequality using the Gini index.

In Africa, there is limited works on income inequality regression-based decomposition analysis. Among these we note the work of Alayande (2003) who applied this analysis to Nigeria. For Cameroon, authors are yet to apply this approach in evaluating income inequality decomposition. Having identified these flaws, this study uses the simple yet powerful procedure developed by Morduch and Sicular (2002) and ameliorated by Wan (2002) for regression-based inequality decomposition. We then extend the analysis to capture inter-temporal decomposition of regressed attributes into meaningful components.

4.2.2 Methodology

Prior to regression-based decomposition analysis, Shorrocks (1982) established a measure of inequality[13] written as a weighted sum of income:

$$I(y) = \sum_i a_i(y) y_i \tag{5}$$

where a_i are the weights, 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 $a_i(y)$ is the proportional share of an individual or household to total income. Since income may be observed as the sum of income from M sources or endowments, $y_i = \sum_{m=1}^{M} y_i^m$, the inequality measure can now be written as the sum-specific component s^m:

$$I(y) = \sum_i a_i(y) \sum_m y_i^m = \sum_m \left[\sum_i a_i(y) y_i^m\right] = \sum_m S^m \tag{6}$$

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

$$S^m = \sum_i a_i(y) y_i^m \Big/ I(y) \tag{7}$$

According to Shorrocks (1982), since the weight $a_i(y)$ may be chosen in an arbitrary manner, this procedure yields an infinite number of potential decomposition rules for each inequality index, so that the value we attribute to the proportional contribution

[13] Pioneers in decomposing inequality by subgroup include (Theil (1972) and later on by Bourguiognon (1979), Shorrocks (1980, 1984) and; Foster and Shneyerov (1996, 1997) amongst others.

allocated to any income source can be made to take any value and increased restrictions on the choice of weights can reduce the number of potential decomposition rules. The restrictions that will enable us derive a unique decomposition rule are: (1) if a new distribution is obtained by multiplying all incomes by a constant, measured inequality should be the same under both distribution and; (2) if total income is divided into two components whose factor distributions are permutations of each other, their contribution to total inequality are equal. The unique decomposition rule obtained by imposing these restrictions is: $S^m = \frac{\operatorname{cov}(y^m, y)}{\operatorname{var}(y)}$

Morduch and Sicular (2002) extended the decomposition rule (7) to a regression-based decomposition by determinants of household income as:

$$y = X\beta + \varepsilon \tag{8}$$

Where X , is a vector of explanatory variables with the first column made of the n-vector $\alpha = (1,1,.....,1)$, β is a vector of parameters and ε is a vector of residuals. Given the vector of consistently estimated parameters $\hat{\beta}$, income can be expressed as a sum of predicted income and predicted error as in equation (9). This is considered as the estimated income source flows of the various (household) explanatory variables:

$$y = X\hat{\beta} + \hat{\varepsilon} \tag{9}$$

Since the econometric results yield estimates of the income flows attributed to household variables, they allow us to make use of decomposition by income source (or factor income). In this approach, $\hat{y}^m = X\hat{\beta}_m$, the estimated income flow contributed to the various explanatory variables as given by the regression results, constitute the various source components of income. By construction, total income is the sum of these flows (plus the regression residual):

$$y_i = \sum_{m=1}^{M+1} \hat{y}_i^m \tag{10}$$

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

Now, substituting equation (10) into equation (7), we obtain the share of inequality attributable to the estimated income source flow of the explanatory variable, $\hat{y}_i^m$ as:

$$S^m = \frac{\hat{\beta}_m \sum_i a_i(y) x_i^m}{I(y)} \tag{11}$$[14]

[14] Yuko et al, (2006) and Kimhi (2007) criticizes Morduch and Sicular (2002) claim that claimed that since the components are linear coefficients, the standard errors are simply $\sigma(S^m) = \frac{\sigma\left(\hat{\beta}_m\right)\sum_i a_i(y) x_i^m}{I(y)}$, and the

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

Adopting Wan's (2004) extension of this procedure, our income generating function is modelled as the natural logarithm of total per capital expenditure of households which clearly assesses the income inequality accounted for by each explanatory factor, the constant term and how much of total inequality is unexplained as gauged by the residual term. The model is of the form:

$$Iny_i = \alpha + \beta_1 x_i^1 + \beta_2 x_i^2 + ... + \beta_m x_i^m + \varepsilon_i \quad (12)$$

where y_i, represents the log-per capita expenditure, $\beta_i = 1,......., M$ are the vectors of parameters and $x^1, x^2, ..., x^m$ are the independent variables which explain expenditure, and ε is vector of residuals. Adopting the simple yet powerful procedure proposed by Wan (2002) let the estimated income generating function (regression equation) be:

$$y = F(X) + \varepsilon = \alpha + y^*(X) + \varepsilon \quad (13)$$

where Y= the income generating function (per capita expenditure) or its transformation such as the logarithm of income (InY) and X= income (expenditure) determinants of 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; being linear with the presence of the constant term or highly non-linear with the absence of this term. In this case, both original income and logarithms of income or other transformations of income can be used as the dependent variable. Also, let $y^*(X) = \sum \beta_m x^m = \sum y_m$ *where* $y_i = \beta_m x^m$ representing the income flow from the m^{th} factor. Let the deterministic part of (13) be considered as $\hat{y}$, and re-representing equation (12) as $\hat{y} = \alpha + y^* \equiv \hat{y} = \alpha + \sum_i y_i$.

Using $I(\bullet)$ as an indicator of an inequality measure, we compute the inequality measures for the error term $\hat{\varepsilon}$, and following Shorrocks (1999) as:

$$CO_\varepsilon = I(y) - I\left(\hat{y}\right) \quad (14)$$

---

residual, under the assumption of homoscedastic error is $\sigma(S^\varepsilon) = \left\{ (\sigma_\varepsilon^2) \sum_i \left[\frac{a_i(y)}{I(y)} \right] \right\}$. These terms ignores that $\frac{\sum_i a_i(y) x_i^m}{I(y)}$ is a random variable dependent of $\hat{\beta}_m$ (through the dependence of $\hat{\beta}_m$ on y). Hence, the true standard errors computed in such a simple way (these results are not straightforward. At least for the Gini index of inequality, it is not straight forward to compute standard error of the index itself (See Mordarres and Gastwith, 2006), so it is logical to expect that computing standard errors of components of this index will not be straight forward either.

The difference between $I(y)$ and $I\left(\hat{y}\right)$ is subtle and important. This is simply the case of the expected values of y and $\hat{y}$, since they may be identical. The ranking by y and $\hat{y}$ differs and would be equivalent if and only if there is a good enough fit of the income-generating function[15]. Looking at it from this perspective, the decomposition makes intuitive as well as theoretical sense. Decomposing equation (13) entails that the disturbance term is irrelevant and does not affect income inequality. This is not true because in addition to earlier discussions, one should note that $I(y) \neq I\left(\hat{y}\right)$ unless all $\varepsilon = 0$. One way to treat the residual term is to discard it altogether, because the residuals are not explainable by the structural-income generating function. If this is the case, one could focus on $\hat{y}$ and obtained further decomposition results. This, however, is not recommended. Apart from earlier arguments against such practices, the residual term, to some extent is sometimes viewed as representing factors or determinants other than those included in the regression model. One may not be able to analyze the contribution of non-income determinants. But ignoring ε is certainly unwise as it does contain useful information. At least, its contribution, once identified, can inform policymakers and others as to how much included factors can explain the overall inequality.

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

$$CO_{\alpha} = I\left(\hat{y}\right) - I\left(y^{*}\right) \quad (15),$$

and $CO_{y^{*}(X)} = I\left(y^{*}\right)$ (16),

where all the contributions are simply attributed to the estimated factor used in the decomposition. In summary $I(y)$ can be decomposed into CO_{ε}, CO_{α} and $CO_{y^{*}}$ (which represents the estimated factor sources), as well as their percentage contributions which add to 100.

Adapting[16] Shorrocks (1999) approach on undertaking an inter-temporal decomposition of the regression-based approach, let's adopt the following formulae:

[15] For example, if the Gini index is used, $I(y) = G(y) = C\left(\hat{y}\right)$ must be calculated with y as the ranking variable, while $I\left(\hat{y}\right) = G\left(\hat{y}\right)$ must be calculated with $\hat{y}$ as the ranking variable.

[16] The key supposition is that change in inequality within a subgroup of the estimated income-source and the population shift between subgroup can be obtained if: (1) subgroup decomposition values can be changed independently and (2) population shift between subgroups sum to zero as well as also treated as a composite factors.

$\Delta RBD_{t,t+n} = \sum_{m=1}^{M} \frac{w_{m,t} + w_{m,t+n}}{2} \Delta s_{(\bullet)}^{m} + \sum_{m=1}^{M} \frac{s_t^m + s_{t+n}^m}{2} \Delta w_m$, where $\Delta RBD_{t,t+n}$ represents total inequality index obtained from the inter-temporal regression based decomposition between two periods, $\Delta w_m = w_{m,t+n} - w_{m,t}$ the change in number of household having this particular income source share between the two periods under review, $\Delta s_{(\bullet)}^{m} = s_{t+n}^{m} - s_t^m$ represents the change in estimated income shares between the initial and final period under review and m =1, ….,M, accounting for the number of estimated income sources. As change in the population source share is constant or equal to one, we can compute inter-temporal changes in value of the estimated shares or proportion of the two periods (time t=1 for 1996 and t=2 for 2001), holding same the variable types as:

$$\Delta S_t^m = S_2^m - S_1^m \tag{17}$$

Extending this framework to the contributions of the constant component (or percentage change shares), the estimated explanatory variable component and the residual component we have:

$\Delta CO_{\varepsilon,t} = CO_{\varepsilon,2} - CO_{\varepsilon,1}$, $\Delta CO_{\underset{y,t}{*}} = CO_{\underset{y,2}{*}} - CO_{\underset{y,1}{*}}$, and $\Delta CO_{\alpha,t} = CO_{\alpha,2} - CO_{\alpha,1}$.

It is now evident that all these equations decompose $I(y)$ into exactly the contributions of the various explanatory variables X 's, the residual term and the constant term.

4.2.3 Data

In addition to the ECAM I and ECAM II survey data, data used to compute the contributions of the estimated income sources to income inequality are obtained from the estimated parameters of the OLS estimate (Table 4, columns 1 & 2) and CFA estimates (Table 4: columns 5 and 6). Computing the estimated income sources based on the functional specification of our household income generating function is outlined in Appendix 1. Additionally, we regroup variables being sick and access to a medical doctor into health indicator and access to water and electricity as infrastructural indicators, as well as the complementary educational inputs comprised of the predicted residual of education and the interaction term between education and its predicted residual. This procedure is made possible by the current methodology as group factors could be treated as a single entity without affecting their total contributions.

4.2.4 Empirical Analysis

Decomposing the Gini index by estimated sources based on the OLS estimates using the Araar (2006) and Rao (1969) approach (Table 9), we observe that while the income shares with the highest values were age, infrastructural indicator and educational levels of the household head, the values with the least 1996 shares were gender, household size and geographical localities (column, 9). The source age had accounted for about 40% of total shares. The combined values of geography (grouping all localities) had about 10% of the shares of the total estimated income sources revealing the important role they play in spatial inequality as concern the living standard-locality nexus. Additionally, geography is closely related to “non-removable” resources as well as market location, asset endowments infrastructure and local cultures (Wan and Zhou, 2005). In 2001 (column 2) similar tendencies were observed with a reduction in their scales.

Looking at the contributions of the various estimated income sources, the variable age had the highest contributions for both years using the Araar (column 3 and 4) and Rao (5 and 6) approach. This translates the role age of the household head plays in his abilities to generate income. This entails age conditions to an extent the level of educational attainment, job type, socialization, etc in Cameroon. The role of education, infrastructure and health facilities are also noted as contributing to inequality for 1996 (column 3). In 2001 (column 4) similar trends were observed with an increase in the contribution of the above mentioned sources and a decrease in the source - age (though this was still relatively high). The value of the residual "component" was substancial in accounting for overall inequality.

Results obtained from the Rao (1969) decomposition of the Gini index identify identical trends in the estimated income sources obtained from the OLS estimates in 1996 (column 5) and 2001 (column 6). The results for the Rao decomposition have lower values than the Araar (2006) approach. Spatially, both the urban and rural localities contribute positively in explaining inequality. The urban areas have a marginally higher value than the rural areas when computed using estimated income sources from the CFA parameters (Table 10).

Table 9: Decomposition of the Gini Index by Estimated Income Sources (Based on the Ordinary Least Squares Estimates in Column 1 and 2 of Table 4)

Income Sources	Income Shares		Absolute Contribution			
			Araar Approach		Rao Approach	
	1996 Col (1)	**2001** Col (2)	**1996** Col (3)	**2001** Col (4)	**1996** Col (5)	**2001** Col (6)

Educational Level	0.0495	0.0766	0.0179	0.0281	0.0166	0.0266
	(0.0015)	(0.0006)			(0.0011)	(0.0004)
Age	0.6071	0.4156	0.1609	0.0718	0.1692	0.0795
	(0.0097)	(0.0031)			(0.0088)	(0.0023)
Age Squared	0.0107	0.0192	0.0025	0.0057	0.0023	0.0054
	(0.0005)	(0.0002)			(0.0003)	(0.0002)
Household Size	0.0225	0.0367	0.0065	0.0105	0.0061	0.0101
	(0.0006)	(0.0002)			(0.0005)	(0.0002)
Fraction of Active Household Members	0.0296	0.0435	0.0080	0.0120	0.0075	0.0116
	(0.0007)	(0.0002)			(0.0006)	(0.0002)
Sex(1=male and 0=otherwise)	0.0229	0.0412	0.0065	0.0115	0.0060	0.0110
	(0.0006)	(0.0002)			(0.0005)	(0.0002)
Primary Sector (PSU Percentage)	0.0329	0.0391	0.0061	0.0132	0.0058	0.0125
	(0.0008)	(0.0003)			(0.0005)	(0.0002)
Secondary Sector (PSU Percentage)	0.0289	0.0434	0.0082	0.0121	0.0077	0.0116
	(0.0007)	(0.0002)			(0.0006)	(0.0002)
Health Indicator	0.0367	0.0533	0.0118	0.0157	0.0109	0.0150
	(0.0009)	(0.0004)			(0.0009)	(0.0002)
Infrastructural Indicators	0.0518	0.0616	0.0175	0.0177	0.0162	0.0169
	(0.0017)	(0.0003)			(0.0014)	(0.0003)
Regions capturing spatial Sources						
Douala	0.0292	0.0430	0.0086	0.0119	0.0080	0.0115
	(0.0007)	(0.0002)			(0.0006)	(0.0002)
Rural Forest	0.0261	0.0428	0.0082	0.0120	0.0075	0.0115
	(0.0007)	(0.0002)			(0.0005)	(0.0002)
Rural Haut Plateau	0.0256	0.0415	0.0076	0.0122	0.0071	0.0117
	(0.0008)	(0.0003)			(0.0007)	(0.0002)
Savannah	0.0265	0.0425	0.0078	0.0124	0.0073	0.0119
	(0.0007)	(0.0002)			(0.0005)	(0.0002)
Total Estimated Income Sources	1.0000	1.0000	0.2783	0.2467	0.2783	0.2467
					(0.0124)	(0.0032)
Computed Residual			0.1598	0.1895	0.1598	0.1895
Total per adult income expenditure			0.4381	0.4381	0.4381	0.4381

Source: Computed by Authors using STATA 10 and the DASP 2.0 Software developed by Araar, A and Duclos, J. Y. (University of Laval, CIPREE & the Poverty Economic and Policy Research Network). Notes: the values in brackets for the Rao approach are the standard deviations

Undertaking a similar decomposing analysis of the Gini index by estimated sources based on the CFA estimates for the Araar (2006) and Rao (1969) approaches (Table 10), we observe that the estimated income sources - age and education have the highest income shares, with the disparity being significant for 1996 (column 1).

Table 10: Decomposition of the Gini Index by Estimated Income Sources (Based on the Control Function Approach Estimates in Column 5 and 6 of Table 4)

Income Sources	Income Shares		Absolute Contribution			
			Araar Approach		Rao Approach	
	1996 Col (1)	**2001** Col (2)	**1996** Col (3)	**2001** Col (4)	**1996** Col (5)	**2001** Col (6)

Educational Level	0.1726	0.2401	0.0664	0.1210	0.0606	0.1145
	(0.0079)	(0.0036)			(0.0052)	(0.0022)
Age	0.3996	0.3197	0.0718	0.0369	0.0708	0.0452
	(0.0126)	(0.0033)			(0.0068)	(0.0019)
Age Squared	0.0152	0.0172	0.0021	0.0042	0.0019	0.0039
	(0.0006)	(0.0002)			(0.0003)	(0.0001)
Household Size	0.0265	0.0288	0.0038	0.0066	0.0042	0.0065
	(0.0006)	(0.0002)			(0.0004)	(0.0001)
Fraction of Active Household Members	0.0334	0.0352	0.0045	0.0076	0.0050	0.0075
	(0.0005)	(0.0002)			(0.0004)	(0.0002)
Sex(1=male and 0=otherwise)	0.0235	0.0272	0.0036	0.0061	0.0040	0.0060
	(0.0005)	(0.0001)			(0.0004)	(0.0001)
Primary Sector (PSU Percentage)	0.0310	0.0321	0.0040	0.0076	0.0045	0.0075
	(0.0005)	(0.0001)			(0.0004)	(0.0001)
Secondary Sector (PSU Percentage)	0.0339	0.0338	0.0048	0.0076	0.0052	0.0075
	(0.0008)	(0.0002)			(0.0006)	(0.0002)
Health Indicator	0.0421	0.0403	0.0062	0.0097	0.0068	0.0095
	(0.0007)	(0.0003)			(0.0006)	(0.0002)
Infrastructural Indicators	0.0506	0.0431	0.0073	0.0091	0.0080	0.0089
	(0.0010)	(0.0003)			(0.0008)	(0.0002)
Complementary Educational Inputs	0.0448	0.0502	0.0015	0.0082	0.0026	0.0079
	(0.0028)	(0.0006)			(0.0009)	(0.0004)
Regions capturing spatial Sources						
Douala	0.0336	0.0334	0.0043	0.0076	0.0048	0.0075
	(0.0005)	(0.0002)			(0.0004)	(0.0001)
Rural Forest	0.0310	0.0325	0.0040	0.0073	0.0045	0.0072
	(0.0004)	(0.0002)			(0.0004)	(0.0002)
Rural Haut Plateau	0.0310	0.0318	0.0039	0.0074	0.0045	0.0073
	(0.0004)	(0.0002)			(0.0004)	(0.0002)
Savannah	0.0310	0.0343	0.0039	0.0068	0.0045	0.0067
	(0.0005)	(0.0005)			(0.0004)	(0.0002)
Total Estimated Income Sources	1.0000	1.0000	0.1922	0.2537	0.1922	0.2537
					(0.0121)	(0.0036)
Computed Residual			0.2459		0.2459	

Source: Computed by Authors using STATA 10 and the DASP 2.0 Software developed by Araar, A and Duclos, J. Y. (University of Laval, CIPREE & the Poverty Economic and Policy Research Network). Notes: the values in brackets for the Rao approach are the standard deviations

An analysis for the Araar (2006) decomposition reveals that while in 1996 the estimated income source age of household head had the highest contribution (column 3), in 2001 it was rather the estimated income source education that had the highest contributions (column 4). The complementary educational inputs source for 2001 was almost twice its value in accounting for inequality in 1996.

Table 11: Gini Coefficients of Estimated Income sources (based on OLS estimates of column 1 and 2 and CFA estimates from column 5 and 6 of Table 4)

	Ordinary Least Squares			Control Function Approach		
	Gini Coefficient			Gini Coefficient		
Estimated Income Flows	**1996** Col (1)	**2001** Col (2)	**Change in Gini**	**1996** Col (4)	**2001** Col (5)	**Change in Gini**

			Col (3)			Col (6)
Educational Level	0.4202	0.3821	-0.03810	0.4259	0.5178	0.0918
	(32.69)	(75.055)	(-2.7565)	(21.06)	(81.25)	(4.3301)
Age	0.3169	0.2688	-0.04816	0.2654	0.2629	-0.00248
	(25.23)	(59.32)	(-3.6065)	(23.54)	(66.64)	(-0.2073)
Age Squared	0.4854	0.4401	-0.04541	0.2966	0.3616	0.06504
	(33.46)	(64.46)	(-2.832)	(19.00)	(53.70)	(3.825)
Household Size	0.3685	0.3123	-0.05615	0.2099	0.2564	0.04651
	(27.67)	(63.85)	(-3.958)	(21.28)	(53.01)	(4.234)
Fraction of Active Household Members	0.3391	0.2961	-0.04302	0.1955	0.2406	0.0451
	(27.42)	(64.32)	(-3.259)	(20.81)	(53.806)	(4.330)
Sex(1=male and 0=otherwise)	0.3512	0.2969	-0.05426	0.2269	0.2535	0.0265
	(28.34)	(64.33)	(-4.103)	(21.76)	(56.33)	(2.336)
Primary Sector (PSU Percentage)	0.2824	0.3459	0.06352	0.1852	0.2559	0.07075
	(24.55)	(70.07)	(5.076)	(19.53)	(55.81)	(6.720)
Secondary Sector (PSU Percentage)	0.3474	0.2966	-0.0508	0.1991	0.2460	0.04697
	(27.58)	(64.33)	(-3.784)	(12.66)	(53.38)	(2.867)
Health Indicator	0.3765	0.3119	-0.06455	0.2011	0.2636	0.0625
	(24.61)	(64.42)	(-4.0226)	(18.03)	(52.57)	(5.109)
Infrastructural Indicators	0.3929	0.3035	-0.08937	0.2013	0.2372	0.0359
	(22.32)	(62.46)	(-4.895)	(17.88)	(53.75)	(2.97)
Complementary Educational Input				0.2299	0.3126	0.0827
				(6.57)	(59.03)	(2.34)
Regions capturing spatial Sources						
Douala	0.3569	0.2971	-0.05978	0.1856	0.2476	0.06201
	(28.29)	(64.41)	(-4.4508)	(17.78)	(53.76)	(5.433)
Rural Forest	0.3806	0.2995	-0.08105	0.1852	0.2486	0.06341
	(28.74)	(66.42)	(-5.7951)	(19.53)	(54.67)	(6.036)
Rural Haut Plateau	0.3715	0.3150	-0.0565	0.1852	0.2611	0.0759
	(25.27)	(64.64)	(-3.6472)	(19.53)	(51.71)	(7.0729)
Savannah	0.3592	0.3072	0.0519	0.1852	0.2297	0.0446
	(30.17)	(62.16)	(-4.032)	(19.54)	(49.44)	(4.225)
Total Estimated Income Sources	0.2783	0.2467	-0.03161	0.1922	0.2467	0.05445
	(22.31)	(76.74)	(-2.455)	(15.86)	(76.74)	(4.344)
Total expenditure per adult	0.43812	0.43618	-0.00193	0.43812	0.43618	-0.00193
	(29.50)	(47.54)	(-0.111)	(29.50)	(47.54)	(-0.111)

Source: Computed by Authors using STATA 10 and the DASP 2.0 Software developed by Araar, A and Duclos, J. Y. (University of Laval, CIPREE & the Poverty Economic and Policy Research Network). The values in brackets are the student values of the estimated income sources.

Others sources that had significant contributions in 1996 were education of household head followed by infrastructure. In 2001, in addition to age, we also observe the complementary educational inputs as consequential in accounting for inequality. An aspect worth highlighting was the very marginal contribution of infrastructure in 2001 as compared to the 1996 contribution to inequality.

An Analysis of the Rao (1969) decomposition results (column 5 and 6) reveal similar trends as the Araar (2006) decomposition for both years exception being that in 2001 (column 6) the values of infrastructure and complementary educational effects both had positive values. Spatially, as per regions urban areas (Douala) had higher values than rural areas (columns 3, 4, 5 and 6).

In Table 11, we undertake a computation of the Gini coefficients of the estimated income sources as well as the change in Gini of the coefficients for the OLS (columns 1, 2 and 3) and CFA (columns 4, 5 and 6) estimates. Table 11 for the OLS estimated income sources identify a significant decrease in values for all the estimated income sources (column 3) except the total income expenditure per adult Gini coefficients that experienced a non-significant retreat in values. Analyzing the estimated income sources obtained from the CFA we observe a significant decrease in the sources age as well as the total expenditure per adult coefficient and a significant rise in all the other estimated income sources (column 6).

Table 12, replicates the above computations using the Entropy index (theta=1) and shows that for the OLS estimated results, all the estimated income sources experienced a decrease in their values except the sources primary sector (column 3). The CFA results of the various estimated income source notes identical trends with results obtained from Table 11 (column 6).

Table 12: Entropy Coefficients of Estimated Income Sources (based on OLS estimates of column 1 and 2 and CFA estimates from column 5 and 6 of Table 4)

	Ordinary Least Squares	Control Function Approach
	Entropy Index (thetha=1)	Entropy Index (thetha=1)

Estimated Income Flows	EI 1996 Column(1)	EI 2001 Column(2)	Change in EI Column(3)	EI 1996 Column(1)	EI 2001 Column(2)	Change in EI Column(3)
Educational Level	0.2923	0.2353	-0.0569	0.3089	0.4572	0.1483
	(15.78)	(36.29)	(-2.90)	(11.23)	(36.31)	(4.90)
Age	0.1611	0.1161	-0.0449	0.1152	0.1110	-0.0042
	(12.91)	(30.98)	(-3.45)	(11.20)	(34.87)	-0.395)
Age Squared	0.3928	0.3228	-0.0699	0.1435	0.2189	0.0754
	(15.95)	(31.62)	(-2.63)	(10.16)	(27.38)	(4.64)
Household Size	0.2192	0.1562	-0.0631	0.0705	0.1062	0.0357
	(13.69)	(31.88)	(-3.77)	(11.08)	(26.80)	(4.77)
Fraction of Active Household Members	0.1849	0.1401	-0.0449	0.0617	0.0941	0.0324
	(13.74)	(32.33)	(-3.17)	(11.15)	(27.31)	(4.96)
Sex(1=male and 0=otherwise)	0.1995	0.1408	-0.0587	0.0848	0.1044	0.0196
	(14.06)	(32.30)	(-3.96)	(10.97)	(28.53)	(2.30)
Primary Sector (PSU Percentage)	0.1285	0.1901	0.0616	0.0550	0.1054	0.0504
	(12.38)	(33.72)	(5.22)	(10.47)	(28.08)	(7.80)
Secondary Sector (PSU Percentage)	0.1932	0.1405	-0.0527	0.0651	0.0979	0.0328
	(13.63)	(32.31)	(-3.55)	(5.81)	(27.04)	(2.78)
Health Indicator	0.2279	0.1552	-0.0727	0.0643	0.1113	0.0470
	(12.11)	(32.33)	(-3.74)	(9.54)	(26.99)	(5.94)
Infrastructural Indicators	0.2483	0.1467	-0.1016	0.0647	0.0910	0.0263
	(10.67)	(31.29)	(-4.28)	(9.32)	(27.39)	(3.43)
Complementary Educational Inputs				0.0952	0.1673	0.0721
				(3.29)	(28.83)	(2.43)
Regions capturing spatial Sources						
Douala	0.2054	0.1410	-0.0644	0.0558	0.0997	0.0439
	(13.99)	(32.45)	(-4.21)	(9.40)	(27.40)	(6.30)
Rural Forest	0.2322	0.1433	-0.0889	0.0550	0.0997	0.0447
	(14.11)	(33.35)	(-5.23)	(10.47)	(27.92)	(7.04)
Rural Haut Plateau	0.2207	0.1585	-0.0622	0.0550	0.1095	0.0545
	(12.65)	(32.13)	(-3.44)	(10.47)	(26.32)	(8.13)
Savannah	0.2061	0.1501	-0.0559	0.0550	0.0862	0.0312
	(14.86)	(31.06)	(-3.81)	(10.47)	(25.59)	(5.00)
Total Estimated Income Sources	0.1216	0.0957	-0.0259	0.0613	0.0957	0.0344
	(11.02)	(38.04)	(-2.28)	(8.45)	(38.04)	(4.49)

Source: **Source:** Computed by Authors using STATA 10 and the DASP 2.0 Software developed by Araar, A and Duclos, J. Y. (University of Laval, CIPREE & the Poverty Economic and Policy Research Network). The values in brackets are the student values of the estimated income sources. Notes: EI = Entropy Coefficient.

Concluding this section we remark that we undertook a regression-based decomposition to identify the contributions of the estimated income sources that account for inequality in Cameroon. Specifically: (1) we compared the Araar (2006) and Rao (1969) results, and (2) computed the differences in the estimated income sources within the period under review for the Gini index and the Generalized Entropy index. Our main findings identify that each estimation procedure identify particular sources as explaining the considered Inequality. Generally, the sources age (OLS method) and education (CFA) are largely responsible for measured inequality.

4.3 Analyzing the Poverty-inequality linkage in Cameroon using estimated income sources obtained from the Regression-Based decomposition Analysis

4.3.0 Introduction

To understand the poverty situation calls for appropriate knowledge of the concept of inequality. This can be perceived either as inequality in terms of expenditure (income inequality) and in terms of non-income dimensions (human capital, region, gender and asset inequalities). There has been a recent upsurge of interest among policy makers and researchers in the link between poverty and inequality in their static and dynamic forms. As noted by Araar and Awoyemi (2006), understanding the contribution of total inequality or its components to total poverty can aid designing appropriate economic policies to reduce inequality and poverty. In this regard, tackling inequality in the fight against poverty is perceived as positively impacting on economic and social policies, as well as rendering more relevant programmes affecting the standards of living of the grassroots populations. Thus, acknowledging that people will desire to live in a country where there is an adequate, equitable and just distribution of income and wealth that positively affects well-being, especially in rural settings. In this vein, it becomes apparent and critical that the government of Cameroon know the inequality situation, update inequality data and develop new perspectives of understanding the nature and weight of factors contributing to poverty and income inequality in the country.

Kanbur (2007) reviews the growth/inequality-increase/poverty-decrease nexus for a number of developing countries, identifying a stylized relationship as follows: poverty has reduced where there has been growth; where there has been fast growth, inequality has increased, but not by so much as to counter the effects of growth on poverty reduction. However, just as we can imagine growth accruing without any reduction of poverty, we can also imagine ways of reducing poverty that relies exclusively on redistributing wealth from the rich and the middle classes to the poor. In principle, a country pursuing redistributive policies could reduce poverty even if its total income did not grow. Unfortunately, it would be difficult to find real world examples. This rather difficult scenarios need to be tailored so as to reflect real situations incorporating measures to enhance access to opportunities by the disadvantaged and marginalised individuals.

Inequality and poverty reduction since the adoption of the 2003 PRSP continue to be one of the most challenging problems facing Cameroon. Though the poverty situation retreated[17] in Cameroon between 1996 and 2001- the incidence by 13.1%, depth by 5.1% and severity by 2% - whereas, between 2001 and 2007, the incidence of poverty stagnated, very marginally retreating by 0.3% points, the depth of poverty by 1.9% and

[17] Statistically testing the change in incidence, depth and severity of poverty in Cameroon at a 5% significant level with the use of the DAD distributive software- developed by Jean-Yves Ducalos, Abdelkrim Araar and Carl Fortio of the MIMAP program, IDRC, University of Laval- Epo (2006) remark that while the null hypothesis was rejected for the incidence and depth of poverty, the story line was not the same as concerns the severity of poverty. This raises the question of shading more light on the inequality situation among the poor captured by this index.

the severity of poverty by 1.9%-an analysis of this trend is not enough, by itself, to fully appreciate the progress that has been made in reducing poverty since 1996. These efforts need to be supplemented by an analysis of the contributions of correlates of income, in order to have a complete picture of the dynamics and linkage of poverty and inequality in Cameroon. It may be assumed that a relatively equitable income distribution, or a high concentration of households around the mean income and poverty threshold, is what explains the apparent improvement in the incidence of poverty in Cameroon (Government of Cameroon, 2003).

To identify the link between poverty and inequality in Cameroon, we attempt to answer the main question: what are the contributions of the estimated income source in accounting for poverty and inequality in Cameroon. Specifically: (1) what are the marginal contributions of the regressed sources to poverty and inequality in Cameroon; and (2) what are the within-and-between group contributions to gender as per the estimated income sources. To answer these questions we can set as main objective to compute the marginal impacts of the various estimated income sources to poverty and inequality in Cameroon. Specifically, we: (1) evaluate the marginal contributions of the regressed sources to poverty and inequality in Cameroon; (2) compute the within-and-between gender contributions to income inequality by estimated income sources and (3) formulate policy recommendations on the basis of the findings.

4.3.1 Brief Literature review

Reviewing literature of the poverty-inequality nexus, we observe the works of pioneers like Kuznets (1956); Bourguignon (2004); Araar and Awoyemi, (2006); Araar and Duclos, (2007); Wan (2006); Kanbur (2008); etc. Kanbur (2008) questions the current perception of poverty and inequality issues teasing out differences noticed in the domain of poverty and inequality and their impact on development. Bourguignon (2004) tries to establish the link between poverty, growth and inequality and show their causes via the poverty-growth-inequality triangle, attempting to identify policies that countries should pursue in a successful poverty reduction strategy. Araar and Awoyemi, (2006) explore the link between poverty and inequality, and develop a new theoretical framework that captures this link. They show that between-and-within-group inequalities as well as inequality by income sources contribute in explaining total poverty. This procedure is applied to analyze the contributions of regional inequalities in accounting for poverty in Nigeria.

The UN/WIDER (2000) report observed that the higher the level of inequality, the less impact economic growth has in reducing poverty at any rate of economic growth. Thus, the role of inequality though indirect, in accounting for the change in depth and severity of poverty is established. Kuznets (1956) remarked that the link between growth in GDP per capita and inequality takes an inverted U shape during economic development. Recent studies have extended the frontiers of Kuznets hypothesis to inquire how globalization impacts on poverty and inequality reduction, as well as what appropriate transmission mechanism cohabitate (World Bank, 2002 and Watkins, 2002). Despite this acclaimed results, empirical studies reveal that there exist little support for Kuznets hypothesis, acknowledging that this relationship is more complex than homogenous

(Deininger and Squire, 1998; Frazer, 2006) as remarked in many country studies (Eusufzai, 1997; Amos 1998; Ram, 1991; List and Gallet, 1999). Datt and Ravallion (1992); Kakwani (1997); kolenikov and Shorrocks (2003) and Shorrocks (1999) all decompose observed variation of poverty into the growth and redistribution components.

The World Bank (2006) World Development Report in understanding the link between growth, inequality and poverty highlights the issue of “inequality trap” captured by a self reinforcing inequality in the economic, political, social and cultural domains which: (1) negatively affects not only income distribution but also the aggregate dynamics of growth and development; and (2) hamper effort geared at long term efficient poverty reduction in most countries. As concerns Araar and Duclos (2007), they use a micro framework to assess the link between poverty and inequality through an analysis of the poverty impact of changes in income-components inequality and in between-and-within group inequality. They note that the sign and size of the derived elasticity can be sensitive to the choice of measurement assumption and are very much distribution-sensitive, depending on the type of inequality-changing process taking place. They remark that the relationship between poverty and inequality is more complex and heterogeneous.

4.3.2 Methodology

4.3.2.1 Analyzing the Link between Poverty and Inequality in Cameroon

To analyze the link between poverty and inequality in Cameroon, we adopt a methodology[18] proposed by Araar and Awoyemi (2006), and based on the Shapley value approach[19] as well as borrowing from Araar and Duclos (2007). Let the poverty indices be decomposed as follows:

$$P\left(y,z\right)=E_{\mu}+E_{\pi} \qquad (18)$$

where, y represents the vector of income, z is the poverty line, E_{μ}[20] is the contribution of average income (μ) with perfect equality and E_{π} is the contribution of total inequality (π) with observed average income.

Let equations (18) take the form:

---

[18] A review of inequality analysis reveals that the main components of inequality that are modeled are the between-group, within-group and income-source inequality.

[19] Shorrock (1999) used the Shapley value to decompose distributive indices. A crucial property appended to this approach is the additivity of the contribution of components and the exactness of the decomposition, by which the residual due to the interaction between components is attributed to each of the components by means of a linear approximation.

[20] Re-expressing the contribution of average income we have: $E_{\mu/\pi=0}=\begin{cases}0, when\,\mu \geq z\\ P\left(\mu,z\right), when\,\mu<z\end{cases}$. This expression indicates that almost perfect equality is not sufficient to eliminate poverty when average income is very low. When average income is close to the poverty line any increase in inequality implies a significant increase in poverty. Otherwise, when the former is high (during economic performance) one may note that they were accompanied frequently by an increase in inequality (Araar and Awoyemi, 2006). Feldstein (1998) observe that this situation can also be Pareto optimal in a dynamic way, where the wellbeing of each household is improved or at the limit does not worsen.

$$P(y,z) = E_{\mu} + E_B + \sum_{d=1}^{D} E_W^d \qquad (19)$$

where, E_B is the contribution of the between-group inequality and E_W^d is the contribution of inequality within the group d. The term "marginal contribution" of a component refers to the variation in the poverty index generated by removing such a component. To estimate, at the margin, the contribution of the within-group inequality to total poverty, we compare the poverty index with the observed household income and that which would occur if the within-group inequality is eliminated.

To remove this component, we use a vector of income where each household has the average income of its group μ_d. This relationship is represented in the following equation:

$$MC_W = P(y) - P(\mu_d) \qquad (20)$$

where, MC_W is the marginal contribution of the within-group inequality to total poverty, $P(y)$ the poverty index with the observed household incomes and $P(\mu_d)$ the poverty index when the within-group inequality is removed.

To eliminate the inter-group inequality and estimate the contribution at the margin of the intra-group inequality to total poverty, we use a vector of income where each household is given its income scaled by the ratio $\frac{\mu}{\mu_d}$. With this new income vector, the average income of each group equals to μ. Thus, the marginal contribution of the between group inequality is:

$$MC_B = P(y) - P\left(y, \left(\frac{\mu}{\mu_d}\right)\right) \qquad (21)$$

where, MC_B is the marginal contribution of the between-group inequality, $P(y)$ the poverty index with the observed household incomes and $P\left(y, \left(\frac{\mu}{\mu_d}\right)\right)$ the poverty index when the income of each household is given its income scaled by $\frac{\mu}{\mu_d}$. Though this procedure gives us an idea on the contributions of each factor, this approach overestimates[21] their contributions such that: $E_{\pi} < MC_W + MC_B$.

Using the Shapley value to avoid this drawback and keeping the same rules for eliminating each of the between and within-group factor (Araar and Awoyemi, 2006) we have:

$$E_{\pi} = E_W + E_B \qquad (22)$$

where :

[21] Worth recalling is the potential presence of a residual, when the Gini index is decomposed into within-and-between group inequality. However, this may be tackled based on Araaar (2006) argument that this term may be allocated into the between-group inequality component.

$$E_B = \frac{1}{2}\left[P(y) - P\left(y\left(\frac{\mu}{\mu_d}\right)\right) + P(\mu_d) - P(\mu) \right] \tag{23}$$

$$E_W = \frac{1}{2}\left[P(y) - P(\mu_d) + P\left(y\left(\frac{\mu}{\mu_d}\right)\right) - P(\mu) \right] \tag{24}$$

For the additive class of poverty indices, the within-group contribution can easily decompose across groups as follows: $E_w = \sum_{d=1}^{D} E_W^d$, such that

$$E_W^d = \frac{1}{2}\Phi_d \left[P_d(y) - P_d\left(y\left(\frac{\mu}{\mu_d}\right)\right) + P_d(\mu_d) - P_d(\mu) \right] \tag{25}$$

where, Φ_d is the population share of group d.

Extending this approach to compute the contribution of inequality in income-sources to total poverty in Cameroon, Let: First, we assume that the sum of M income sources equals to total income and the amount of income source, m, is denoted s_m. The contribution of the inequality of income source m at the margin is the difference between the observed total poverty and that when the inequality of this component is removed. Formally, replacing s_m by μ_m for each household if the component, m, is eliminated, we have:

$$MC_m = E_\pi - P\left(y^\circ = \sum_k s_{k \neq m} + \mu_m \right) \tag{26}$$

where MC_m is the marginal contribution of the income source, m, E_π the contribution of total inequality in explaining total poverty with the observed income and $P\left(y^\circ\right)$ the difference in the poverty index observed and that when the inequality of this component is removed.

Due to overestimation of these contributions we have:

$$E_\pi < \sum_m MC_m \tag{27}$$

To resolve this issue, the Shapley approach with the same rule for removing inequalities in income sources may be used. Lastly, in addition we adopt certain formulation of the Araar and Duclos (2007) methodology which is analogous to the above mentioned methodology to compute elasticities of poverty and inequality to generate these results, using the DASP 2.0 Software.

4.3.2.2 Subgroup Income Inequality Decomposition by estimated income: Shapley Value Approach

Litchfield (1999) remarked that there are various ways of decomposing the Gini by group but the component term of total inequality are not always intuitively or mathematically appealing. However, since the introductory works of Bhattacharaya and Mahalanobis (1967) in decomposing the Gini coefficient of inequality into between-group and within-group contributions which raised the problem of a residual term if the subgroups ranges overlapped, a lot has been done to purge this term. In this regards, Araar (2006) uses the Shapley value approach to make vanish the residual.

Let $G(y)$ be the Gini coefficient and let the population subgroup be indexed by $k = 1,2,....,m$. Decomposing this coefficient takes the form (Lambert and Aronson, 1993; Araar, 2006):

$$G(y) = \sum_{k \in K} a_k G_k + \bar{G} + \varepsilon \tag{28}$$

where G_k is the Gini coefficient within the subgroup k, $\bar{G}$ the between-group Gini coefficient, defined as that which is obtained if every income in every subgroup is to be replaced by the relevant subgroup mean, $a_k = f_k\left(\frac{\mu_k}{\mu}\right)$ is the product of the population share f_k and the income share $\frac{\mu_k}{\mu}$ of the subgroup, and ε is the residual which does not vanish if subgroups ranges overlap.

Using the Shapley value decomposition rule to obtain an exact decomposition of the Gini coefficient into the between-and-within-group components that add up to total inequality (Araar, 2006), we follow two steps. The first step is to decompose total inequality into between-group and within-group contributions. The second step is to express global within-group contributions as a weighted sum of the within-group contributions by the different subgroups. Let us denote the within-group inequality by W_g and the between-group inequality by B_g, so that the total Gini inequality index $G(y) = v(W_g, B_g)$ is expressed in terms of the characteristic function v.

In the first step we presume that the two Shapley contributions that account for the overall Gini coefficient G(y) are within-group inequality component (G_w^{sh}) and between-group inequality component (G_B^{sh}) given by: $G(y) = G_W^{sh} + G_B^{sh}$. The basic rules to compute the marginal contributions of each of these factors are: (1) eliminate the between-group inequality and compute the within-group inequality by using a vector where each household's well-being is multiplied by the ratio μ/μ_k. This operation renders the average value of each group to equal μ; (2) eliminate the within-group inequality and compute the between-group inequality, $G(\mu_1,...,\mu_k)$, by using a vector of well-being where each household has the average of its group, denoted by μ_k; and (3) eliminate between- and within-group inequality simultaneously and each household remains with the average value. In this case, $G(\mu) = 0$.

The elimination order of factors following these rules is arbitrary and the arbitrariness is removed by obtaining the Shapley Value within-group and between-group contributions expressed by:

$$G_W^{sh} = \frac{1}{2}\left[v\left(W_g, B_g\right) - v\left(B_g\right) + v\left(W_g\right) - 0\right]$$
$$= \frac{1}{2}\left[G(y) - G(\mu_k) + G\left(y\left(\frac{\mu}{\mu_k}\right)\right) - G(\mu)\right] \tag{29}$$

and

$$G_B^{sh} = \frac{1}{2}\left[v\left(W_g, B_g\right) - v\left(W_g\right) + v\left(B_g\right) - 0\right]$$
$$= \frac{1}{2}\left[G(y) - G\left(y\left(\frac{\mu}{\mu_k}\right)\right) + G(\mu_k) - G(\mu)\right] \tag{30}$$

From the within-group contribution to total inequality expressed in equation (29), the second step consists in decomposing global within-group inequality as a sum of within-group inequality across groups. Since we set G(μ) = 0, this implies that the within-group contribution is based on three inequality indices. The same rule is used for determining the impact of eliminating the marginal contribution of group k, notably the attribution of group k's average share to all its members in order to eliminate the group's contribution to global within-group inequality. This gives the Shapley Value of group k's contribution to total within-group inequality.

To illustrate this procedure, we suppose that there are only two groups F (female) and M (male) and restate equation (34) as:

$$G_W^{sh} = \frac{1}{2}\left[G(y) - G(\mu_F, \mu_M) + G\left(y_{F,i}\left(\frac{\mu}{\mu_F}\right), y_{M,i}\left(\frac{\mu}{\mu_M}\right)\right)\right] \tag{31}$$

The Shapley Value Contribution of group F to global within-group inequality is given as:

$$G_W^{sh} = \frac{1}{4}\left[G(y) - G(\mu_F, \mu_M) + G(y_F, \mu_M) - G(\mu_F, \mu_M)\right]$$
$$+\left[G(\mu_F, \mu_M) - G(\mu_F, \mu_M) + G(\mu_F, \mu_M) - G(\mu_F, \mu_M)\right] \tag{32}$$
$$+\left[G\left(y_{F,i}\left(\frac{\mu}{\mu_F}\right), y_{M,i}\left(\frac{\mu}{\mu_M}\right)\right) - G\left(\mu, y_{M,i}\left(\frac{\mu}{\mu_B}\right)\right) + G\left(y_{F,i}\left(\frac{\mu}{\mu_F}\right), \mu\right) - G(\mu, \mu)\right]$$

This procedure can be applied symmetrically for the second group. Fortunately, this decomposition is already generalized and programmed in the DAD 4.5 and recently the DASP 2.0 softwares. This procedure is also applicable to inter-temporal changes in Gini indices of the considered distribution.

Using rather the estimated income sources obtained from Table 5 (columns 5 and 6), we replace the observed income by S_p, the predicted total expenditure per adults (Wooldridge, 2006). Adapting (37) we obtain

$$G_{W,S}^{sh} = \frac{1}{4}\left[G(S_T) - G\left(\bar{\mu}_F, \bar{\mu}_M\right) + G\left(S_F, \bar{\mu}_M\right) - G\left(\bar{\mu}_F, \bar{\mu}_M\right)\right]$$
$$+\left[G\left(\bar{\mu}_F, \bar{\mu}_M\right) - G\left(\bar{\mu}_F, \bar{\mu}_M\right) + G\left(\bar{\mu}_F, \bar{\mu}_M\right) - G\left(\bar{\mu}_F, \bar{\mu}_M\right)\right] \quad (33)$$
$$+\left[G\left(S_{F,i}\left(\frac{\bar{\mu}_T}{\bar{\mu}_F}\right), S_{M,i}\left(\frac{\bar{\mu}_T}{\bar{\mu}_M}\right)\right) - G\left(\bar{\mu}_T, S_{M,i}\left(\frac{\bar{\mu}_T}{\bar{\mu}_M}\right)\right) + G\left(S_{F,i}\left(\frac{\bar{\mu}_T}{\bar{\mu}_F}\right), \bar{\mu}_T\right) - G\left(\bar{\mu}_T, \bar{\mu}_T\right)\right]$$

Where S_T = the predicted income expenditure (Wooldridge, 2006), this could also be each estimated income-sources obtained for each household $\bar{\mu}_T$ = average of the considered estimated income source for the whole population, $\bar{\mu}_F$ = average of each estimated income source in the subgroup female, $\bar{\mu}_M$ =average of each estimated income source in the subgroup male, $S_{F,i}$ and $S_{M,i}$ = predicted income expenditure or income sources distributed for the female and male group, with $n = 1, \cdots\cdots N$ representing the various income sources and $G\left(\bar{\mu}_T, \bar{\mu}_T\right)$=0.

4.3.3 Data

Data used to compute the contributions of the estimated income sources are obtained from the estimated parameters of the CFA estimate (Table 5: columns 5 & 6). Computing the estimated income sources based on the functional specification of our household income generating function is outlined in Appendix 1. Additionally, we collapsed or regrouped identical variables into single components. These are: health indicator which is comprised of collapsing access to a medical doctor and the frequency of being sick; complementary educational inputs captured by the predicted residual of the reduced form equation and the interaction of the instrumented variable with unobserved variables; infrastructural indicator is obtained by combining access to water and electricity and lastly geography which regroups the considered regions. This procedure is made possible by the current methodology as group factors could be treated as a single entity without affecting their total contributions.

4.3.4 Empirical Results

In Table 13 we decompose the contribution of each source (excluding the constant term and the residual) for our estimated income sources. Decomposing these contributions for 1996 for $\alpha = 0$ and $\alpha = 1$ we observe that the within-group components of the marginal impacts of both inequality and poverty are more than the between-group components. Comparing analytical elasticities obtained by "simulating" on the sample the effects on poverty of changing the S-Gini inequality appended to our computed welfare indicator by a percentage point, Table 13 shows that obtained headcount elasticities (column 4) are all positive with the income source educational level of household head having the highest elasticity. This is followed by the estimated income sources geography, health and age, in that order. The least elasticity for the head count is observed in the primary sector. The Between-group elasticity is higher than the within group elasticity for FGT_0 (column 4) and the opposite is observed for the FGT_1 values (column 5). Elasticities obtained for the poverty gap index reveal that the variable complementary educational inputs have the highest elasticity and the sources infrastructure, health, geography, secondary sector and experience all have high elasticities (column 6). This highlights the key role education and its associated derivatives have in enhancing the living standards of households. Analyzing marginal impacts on poverty and inequality as well as their associated elasticities of changing within-and-between group inequality, results reveal that for $\alpha = 0$ and $\alpha = 1$: (1) all estimated income-sources have positive marginal impacts on inequality for both the headcount and the poverty gap index (column 2). Similar results are indicated for their marginal impact on poverty (columns 3 and 5). Lastly, within-group inequalities have a higher elasticity than between-group elasticity in accounting for a change in poverty levels brought about by a percentage change in the S-Gini inequality.

Table 13) Marginal Impacts and Elasticities of Estimated Income Sources for 1996 (using estimated parameters from the CFA estimates (Table 5: columns 5 and 6))

			FGT_0: 0.325879 and $z = 2/3\,\mu$; **Gini:** 0.281910		**FGT_1:** 0.096893and $z = 2/3\,\mu$ **Gini:** 0.281910	
Estimated Income Source	**Income Share** Column (1)	**Marginal Impact on Inequality** Column (2)	**Marginal Impact on Poverty** Column (3)	**Elasticity** Column (4)	**Marginal Impact on Poverty** Column (5)	**Elasticity** Column (6)
Educational Level	0.149086	0.000663	0.000248	0.324016	0.000328	1.438071
Age	0.488632	0.001233	0.000253	0.177754	0.000646	1.523788
Age Squared	0.014531	0.000031	0.000007	0.200181	0.000018	1.681529
Household Size	0.025022	0.000064	0.000015	0.199331	0.000035	1.589113
Fraction of Active Adult Household Members	0.033777	0.000079	0.000017	0.183473	0.000043	1.584825
Primary Sector	0.037486	0.000060	0.000010	0.148213	0.000031	1.496443
Secondary Sector	0.033300	0.000083	0.000019	0.198691	0.000046	1.613027
Health Indicator	0.042191	0.000114	0.000026	0.201376	0.000063	1.601111
Infrastructure	0.059744	0.000180	0.000040	0.191896	0.000099	1.605335
Geography	0.069588	0.000217	0.000059	0.236971	0.000122	1.634071
Complimentary Educational Inputs	0.046642	0.000096	0.000012	0.105744	0.000059	1.768805
Within Group		0.002819	0.000624	0.191596	0.001488	1.535752
Between Group		0.000188	0.000070	0.324664	0.000055	0.859338
Total	1.000000					

Source: Computed by Authors using STATA 10 and the DASP 2.0 Software developed by Araar, A and Duclos, J. Y. (University of Laval, CIPREE & the Poverty Economic and Policy Research Network).
Notes: Elasticity of poverty with respect to inequality, are all simulated for a percentage change in the considered welfare indicator. **FGT_0:** incidence of poverty and **FGT_1:** depth of poverty.

Table 14 host results for the 2001 household survey. In relation to the marginal impact of the estimated income sources on inequality, we observe similar results as in 1996 (Table 13). The within-group marginal impact on inequality is greater than the between-group value. Regarding $\alpha = 0$ and $\alpha = 1$: the marginal impact of the estimated income sources on poverty and inequality have similar tendencies as the 1996 results, with the exception their values are larger (columns 2, 3 and 5). The within-group marginal impact for both poverty indices is twice as high as the between-group marginal impact. Looking at the elasticities, while the values obtained for the headcount index show complementary educational inputs as having the highest elasticity value (column 4), the poverty gap values tend to be identical (column 6). The within-and-between group elasticities in 1996 and 2001 have the same values.

Table 14) Marginal Impact and Elasticities of Estimated Income Sources to poverty for 2001 using estimated parameters from the CFA estimates (Table 5, columns 5 and 6)

			FGT_0:0.427898 and $z = \frac{2}{3}\mu$ **Gini:** 0.253374		**FGT_1:** 0.078834 and $z = \frac{2}{3}\mu$ **Gini:** 0.253374	
Estimated Income Source	**Income Share** Column (1)	**Marginal Impact on Inequality** Column (2)	**Marginal Impact on Poverty** Column (3)	**Elasticity** Column (4)	**Marginal Impact on Poverty** Column (5)	**Elasticity** Column (6)
Educational Level	0.237883	0.001145	0.001465	0.757293	0.000905	2.540361
Age	0.364167	0.000552	0.000709	0.761005	0.000464	2.704721
Age Squared	0.016615	0.000039	0.000049	0.746283	0.000034	2.759178
Household Size	0.027205	0.000064	0.000066	0.608959	0.000053	2.684330
Fraction of Active Adult Household Members	0.034367	0.000077	0.000084	0.646410	0.000064	2.707200
Primary Sector	0.031531	0.000077	0.000091	0.696051	0.000066	2.721758
Secondary Sector	0.033304	0.000076	0.000084	0.658955	0.000064	2.717966
Health Indicator	0.040437	0.000097	0.000111	0.677454	0.000081	2.693080
Infrastructure	0.046487	0.000100	0.000109	0.643876	0.000084	2.705628
Geography	0.113885	0.000219	0.000239	0.645769	0.000182	2.671105
Complimentary Educational Inputs	0.054118	0.000088	0.000122	0.824145	0.000081	2.954227
Within Group		0.002534	0.002896	0.676708	0.002079	2.637075
Between Group		0.000162	0.000330	1.208600	0.000092	1.825139
Total	1.00000					

Source: Computed by Authors using STATA 10 and the DASP 2.0 Software developed by Araar, A and Duclos, J. Y. (University of Laval, CIPREE & the Poverty Economic and Policy Research Network). Notes: Elasticity of poverty with respect to inequality, are all simulated for a percentage change in the considered welfare indicator. **FGT_0:** incidence of poverty and **FGT_1:** depth of poverty.

Going through results obtained for the within and between gender decomposition per estimated income sources (See Appendix for Tables showing results) we note the following: (1) the within-group components for the Gini and marginal impact on poverty are higher than the between-group components for each year for both the marginal impacts on poverty and inequality; and (2) varying trends are observed for the elasticities.

Concluding this subsection, we analyze the contribution of each estimated income source in explaining inequality and poverty as well as their respective marginal impacts and elasticities. The predicted household per capita expenditure is used as the measure of living standards of the considered populations. Household observations are weighted by the household size and the sample weights (coefficient of extrapolation). The same procedure is applied when computing the contributions of the within-and-between gender group inequalities for all estimated income sources, as well as their elasticities. The computed poverty line is obtained as two-third of the mean of the considered welfare distribution.

4.4. Inter-Household Gender inequality: An Oaxaca-Blinder Approach

4.4.0 Introduction

In Cameroon, we observe a dichotomy when analysing ‘reproductive’ (household) and productive works. While the overall burden of the former is shouldered by women (which is labor-intensive and time-consuming), the latter considered as “real work” because it involves the production of goods and services are in favor of men. Moser and Levy (1996) observe that when most individuals are asked what kind of work they do, their response is often related to productive work from which they are either paid for or which generates income (Kabeer, 2003).

Socio-cultural fabric of most traditions in developing countries and Cameroon have out rightly been in favor of men[22], notably as concerns land inheritance, relegating the women to secondary roles that prevent them from acquiring and developing assets to participate fully in realizing growth potentials that can aid households break away from poverty and inequality traps (World Bank, 2005; Endeley and Sikod, 2006; Fonjong, 2001). These differences or disadvantages that are gender-oriented and skewed in favor of men affect supply responses and resource allocation both at micro (household) and macro levels of well-being (Sikod, 2006). Gender analysts remark that women and children are more vulnerable[23]. This dampens gender-neutral and gender-bias opportunities to undertake remunerative activities that will help them acquire their own assets, thus, limiting overall household and local community welfare. According to the UNDP Cameroon Office (MDG progress report, 2002; 2003) it seems unlikely, given the progress made for Cameroon to attain most of the MDG3 objectives before the dateline. Bias in government policy-making in favor of men can be explained by weak position of women as a lobby group to push government resolve gender issues.

Applying the Oaxaca-Blinder (1973) traditional decomposition methodology to gender inequality and factors that contribute to household income/expenditure inequality between male-headed and female-headed household in Cameroon, we elicit the contribution of factors that explain gender-neutrality (gender-expenditure discrimination) and gender-bias (personal-specific characteristics) in Cameroon. This technique hinges on the basic premise that in the absence of societal discrimination (considered as a source of inequality), the household income expenditure structure faced by men also applies to women. Measuring sources of the difference in gender expenditure-discrimination[24] and personal-specific characteristics we estimate separate semi-log income expenditure functions for male and female, and decompose the differences in the mean of the log of household income expenditure.

To tackle the household gender inequality question in Cameroon, our main research question is what is the pattern of well-being and inter-household gender inequality in

---

[22] In Cameroon, for instance, fewer women compared to men own land because of certain socio-economic and cultural constraints, particularly, subordination of women within marriages and inadequate economic power to pay land market prices.

[23] Vulnerability is considered as a type of asset. It entails defenselessness, insecurity and exposure to risk. Thus it is obvious that the more people are asset endowed, the less vulnerable they will be to protect themselves from poverty (Moser and Felton, 2006).

[24] Discrimination here is considered as the difference not explained by differences in household income expenditure-determining personal characteristics.

Cameroon? Specifically: (1) which gender-neutral and gender-bias factors explain household income in Cameroon; and (2) what are the between gender contributions to total inequality in Cameroon. Our main research objective is, therefore, to tease-out the nature of inter-household gender well-being and inequality in Cameroon. Specifically, this subsection seeks: (1) study the partial gender inequality of particular characteristics; and (2) determine a discrimination index that captures discrimination between male-and-female headed households; and (3) suggest policy implications on the basis of the findings.

4.4.2 Brief Review of Literature

The Oaxaca-Blinder decomposition to identify wage discrimination between men and women has been effectuated by several authors. Amongst these we note, Chzhen (2006), who applies this concept in determining the role of labor market discrimination in assigning men and women to different occupations in Denmark, Germany and the United Kingdom (UK) and documents the degree of occupational segregation[25]. Implementing a Heckman selection model to the estimations highlight the relevance of human capital and regional labor market segmentation in wage determination in Romania, Paternostro and Sahn (1998) observes that, gender discrimination is found in both urban and rural labor markets, with the observed bias in urban areas comparable to what has been found in other Western countries. González et al. (2005) , using data from the Personnel Records for the period 1985-2000, analyzes the gender wage gap in Portugal to study the key factors that lie behind the persistent gender pay gap despite the deep changes that characterize the recent evolution of the Portuguese labour market and the high female participation rate that exists in the country. Pena-Boquete (2009) analyzes factors that account for the degree of female wage discrimination using the Discrimination Curve and Discrimination Indices proposed by Del Río et al. (2003) in the Spanish region of Galicia relative to the rest of Spain between 1995 and 2002. DasGupta (1987) observes that cultural rights and obligations favor sons relative to daughters in rural India. Ahuja and Filmer (1996) identify disparities in male-female educational attainments and enrollment levels in developing countries. Despite this popularity to the best of our knowledge there has been very little adaptation of this to study overall gender inequality.

4.4.3 Methodology

Let the male and female geometric mean of household expenditure be denoted by $\bar{Y}_t^M$ and $\bar{Y}_t^F$, we decompose the log-differential of the geometric mean Δ :

[25] Occupational gender segregation refers to “the tendency for men and women to work in different occupations” (Anker 1998: 403). Distinguishing between segregation and concentration we not that while the former indicates the separation of women from men across all occupations, the latter denotes the overrepresentation of one sex in an occupation (Blackburn and Jarman 2005: 2). Further conceptualization of occupational segregation helps distinguish between its two main dimensions: vertical and horizontal (Fortin and Huberman, 2002).

$$\Delta \equiv \log\left(\frac{\overline{Y}_t^M}{\overline{Y}_t^F}\right) = \left(\log\left(\overline{Y}_t^M\right) - \log \overline{Y}_t^{0F}\right) + \left(\log\left(\overline{Y}_t^{0F}\right) - \log \overline{Y}_t^F\right) \tag{34}$$

where $\overline{Y}_t^{0F}$ is a hypothetical distortion-free or discrimination-free mean household expenditure for woman, the subscript t represents the year or period considered (This could be the initial or final period). Furthermore, summarizing the variation in the male-female income expenditure cross section sample, we can use the following common place statistical models:

$$In\, y_{i,t,M} = X_t^i \beta_t^M + \varepsilon_{i,t} \tag{35}$$

and

$$In\, y_{j,t,F} = X_t^j \beta_t^F + \varepsilon_{j,t} \tag{36}$$

where $y_{i,t,M}$ is the log income expenditure of man i at the considered period and $y_{j,t,F}$ is the log income expenditure of woman j at the considered period; β_t^M and β_t^F are the coefficients that determine the effects of characteristics on household spending and X_t^i and X_t^j are the vectors of the mean personal endowments related characteristics of man i and woman j. Since the regression function passes through the sample mean of X and y, taking the arithmetic average of equations (35) and (36), the stochastic ε-term drops out. Designating arithmetic mean by an over lined variable $\overline{y}_t^\alpha$, where $\alpha = M \; or \; F$ for men and women, and applying a semi-log regression we have:

$$In\, \overline{y}_t^M = \overline{X}_t^M \hat{\beta}_t^M \tag{37}$$

and

$$In\, \overline{y}_t^F = \overline{X}_t^F \hat{\beta}_t^F \tag{38),}$$

simply stating that mean expenditures are predicted by using mean characteristics, and $\hat{\beta}_t^F$ and $\hat{\beta}_t^M$ the vectors of the estimated coefficients of the female and male groups. Since $\overline{y}_t$ is the mean of the log at the considered period, and is the log of the geometric means $\overline{Y}_t$, we then plug equations (37) and (38) into (34), and averaging over the entire spectrum of endowments, we obtain:

$$\Delta = \sum_{z=1}^{Z} \left(\frac{\hat{\beta}_{z,t}^M + \hat{\beta}_{z,t}^F}{2}\right)\left(\overline{X}_{z,t}^M - \overline{X}_{z,t}^F\right) + \sum_{z=1}^{Z} \left(\frac{\overline{X}_{z,t}^M + \overline{X}_{z,t}^F}{2}\right)\left(\hat{\beta}_{z,t}^M - \hat{\beta}_{z,t}^F\right) \tag{39}$$

where z= 1,…..Z indicates the endowments attributed to each household. Equation (39) is a decomposition of the effects of difference in average characteristics (the first term) and the effects of difference in treatment of characteristics (second term). Distinguishing the contribution of different characteristics on the one hand and of the unexplained differential effect on the other hand, the structural form of equation (39) resolves the critical issue[26] of having to define *a priori* a reference structure as per the base and/or final years used in the analysis. This structure (equation 39) emerges by avoiding the arbitrariness in selecting the gender structure reference by using the Shapley value approach. The first term simply shows the part of the log expenditure differential between men and women that can be explained by different personal characteristics. The second term is the difference not explained by the difference in expenditure-determining personal characteristics and thus could be considered as a rough measure of expenditure discrimination for female household heads. Similar to Takahashi (2007) we can estimate the partial effect of a particular individual endowment or characteristic on gender inequality by computing for each z (z=1,….., Z).

Inter-temporally computing gender neutral and gender biased characteristics between 1996 and 2001, hinging on Shorrocks (1999) decomposition framework; we extend equation (39) to:

$$Inter-Temporal_{2001-1996} = \sum_{z=1}^{Z}\left[\left(\frac{\left(\hat{\beta}^{M}_{z,t+1}-\hat{\beta}^{M}_{z,t}\right)+\left(\hat{\beta}^{F}_{z,t+1}-\hat{\beta}^{F}_{z,t}\right)}{2}\right)\left(\left(\bar{X}^{M}_{z,t+1}+\bar{X}^{M}_{z,t}\right)-\left(\bar{X}^{F}_{z,t+1}+\bar{X}^{F}_{z,t}\right)\right)\right] \quad (40)$$
$$+\sum_{z=1}^{Z}\left[\left(\frac{\left(\bar{X}^{M}_{z,t+1}-\bar{X}^{M}_{z,t}\right)+\left(\bar{X}^{F}_{z,t+1}-\bar{X}^{F}_{z,t}\right)}{2}\right)\left(\left(\hat{\beta}^{M}_{z,t+1}+\hat{\beta}^{M}_{z,t}\right)-\left(\hat{\beta}^{F}_{z,t+1}+\hat{\beta}^{F}_{z,t}\right)\right)\right]$$

Having formulated gender income/expenditure inequality, we are going to evaluate the rate of discrimination between the men and women based on the variables considered; by constructing a discrimination index (Lissenburgh, 2000; Chzhen, 2006; Gonzalez et al., 2005). This analysis will inform us on gender income inequality using a discrimination or segregation index. Let us denote the Discrimination coefficient or index by:

$$DISC_{f,t} = \left\{\exp\left[\left(\hat{\beta}^{M}_{t}-\hat{\beta}^{F}_{t}\right)\left(\frac{\bar{X}^{F}_{t}+\bar{X}^{M}_{t}}{2}\right)\right]-1\right\}\times 100 \quad (41)^{27}$$

Here $DISC_{f,t}$ equals to the percentage change in the income/expenditure women could undertake given that they have the same attributes as men or if they had the same

[26] A review of literature raises two issues: (1) how do we account for the unexplained part in explaining the considered variable and; (2) how do we choose the reference structure. In Oaxaca and Ransom, (1994) the reference structure is chosen as a matrix weighted average of the male and female β -vectors. However, Oaxaca and Ransom (1997) caution on the use of categorical variables because its presence implies that the unexplained part of each of these variables cannot be uniquely determined. Vartiainen (2002) and Papapetrou (2005) present computed results using both male and female coefficient as references. The value-added of this procedure is that it permits a clear interpretation: using male (female) structure as reference and computing the effects of different characteristics yields an answer to the question "how much would be left of the gross differential if women (men) were treated as men (women) with similar characteristics?"

[27] This index may be subjected to modifications to incorporate other methods as in Chzhen (2006) or Gonzalez et al. (2005).

income/expenditure as men. This, therefore, represents the increase in well-being of women if discriminations were eliminated[28].

4.4.4 Data

Data used in this section is obtained from ECAM I and ECAM II plus parameter estimates using the Control function approach hosted in Table 5 (Columns 5 and 6).

4.4.5 Empirical Results

Based on results obtained from the CFA econometric specifications (Table 5), we compute gender neutral and gender biased characteristics that account for inter-household gender disparities for the two years, as well as their inter-temporal values, and the discrimination coefficients. Undertaking a gender-neutral and gender-bias analysis for 1996 (Table 15: column 1 and 4), we observe that in 1996 gender-neutral characteristics that exacerbated inter-household gender disparities are educational level, age, the fraction of Active adults, working in the primary and secondary sectors, being sick and residing in Douala. Gender-bias inter-household inequality augmenting endowments are education, age, the square of age, household size, the fraction of Active adults, working in the primary and secondary sectors, being sick, consulting a medical doctor, access to portable water and electricity and residing in the savanna regions. Spatially, in terms of gender-neutral characteristics, urban localities contributed in increasing gender disparities, rural areas help decrease inter-household gender differences. In terms of gender-bias characteristics, localities that curbed between household gender inequalities were Douala, Rural Forest and Rural Haut Plateau regions (column 4).

In 2001 (Table 15), age, household size, fraction of active adult members, working in the primary sector and the predicted residual of education level of household heads were gender-neutral characteristic with the tendency to decrease inter-household gender inequality (column 2). Personal specific characteristics that fill inter-household gender gaps were the fraction of active adult members, consulting a doctor (which reflects health), access to electricity and residing in Douala (column 5). While both urban and rural areas worsen differences that exist between male and female household heads according to the gender-neutral criterion (column 2), basing oneseves on personal specific characteristic, urban areas help bridge income expenditure gaps between men and women, unlike rural localities that would dampen women's ability to fill the gap that exist between them and their male counterparts (column, 5).

Inter-temporally determining gender-neutral and gender-bias characteristics (columns 3 and 4), individual and household gender-neutral endowments that fuel income expenditure gaps between men and women are education, age, household size, working in the secondary sectors, consulting a medical doctor, being ill, access to water and electricity, as well as rural forest and savannah residency. Gender-bias determinants that are inclined to worsen inter-household gender inequality inter-temporally are education, age, the square of age, fraction of active adult members, access to electricity and being able to consult a medical doctor (column 6). Rural Forest and Rural Haut Plateau

[28] The discrimination coefficient can be carried out using the male human capital attributes as standardize factors.

residency inter-temporally exhibit personal-specific characteristics that dampen inter-household gender disparities (column 6).

Table 15: GENDER-NEUTRAL AND GENDER-BIASED CHARACTERISTICS USING PARAMETER ESTIMATES FROM THE CFA FOR 1996 and 2001 obtained in Table 5

	Gender-neutral characteristics			Gender-biased characteristics		
Variables	**CFA 96** Col(1)	**CFA 01** Col(2)	**CFA Inter Temporal** Col(3)	**CFA 96** Col(4)	**CFA 01** Col(5)	**CFA Inter Temporal** Col(6)
Educational Level	0.0731	0.2332	0.0350	0.8967	0.0523	0.2264
Age	0.0936	-0.1659	0.0303	0.2815	0.1946	0.0187
Age Squared	-0.0756	0.1297	-0.0328	0.2490	0.1567	0.0406
Household Size	-0.0748	-0.0503	0.0021	0.1697	0.1295	-0.0302
Fraction of Active Household Members	0.0040	-0.0013	-0.0004	0.1658	-0.0146	0.0430
Primary Sector (PSU Percentage)	0.0403	-0.0051	-0.1022	0.0040	0.0021	-0.0096
Secondary Sector (PSU Percentage)	0.0037	0.0010	0.0049	0.0771	0.0045	-0.0711
Sickness_past_2_Weeks (PSU Percentage)	0.0008	0.0004	0.0017	0.1591	0.0426	-0.2402
Access Medical Doctor (PSU Percentage)	-0.0243	0.0005	0.0320	-0.1404	-0.0042	0.1157
Water (PSU Percentage)	-0.0103	0.0005	0.0171	-0.0291	0.0500	-0.1439
Electricity (PSU Percentage)	-0.0204	0.0036	0.0483	-0.0761	-0.0267	0.1423
Regions						
Douala	0.0025	0.0004	-0.0020	-0.0246	-0.0020	0.0155
Rural Forest	-0.0051	0.0004	0.0025	-0.0147	0.0107	-0.0018
Rural Haut Plateau	-0.0053	0.0115	-0.0042	-0.0120	0.0076	-0.0077
Savannah	-0.0154	0.0107	0.0555	0.0099	0.0192	0.0132
Control for unobserved variables						
PEduc_residual	-0.1466	-0.2191	-0.0251	0.0228	0.0181	0.0085
Edu*Educ_residual	0.0382	0.0499	-0.0174	0.0112	0.0226	0.0198

Source: Computed by authors.

Decomposing inter-household gender inequality and computing the rate of discrimination between men and women that reveal the percentage change in income/expenditure women could effectuate if they had the same attributes of income/expenditure as men (Table 16). In 1996 (column 1), decomposing the Oaxaca-Blinder function reveals that the educational status of the household head overwhelmingly accounts (60%) for inter-household gender disparities. This is followed by age, the square of age (experience) and the fraction of active household members. The least contributions were access to medical consultation of a doctor and the accounted unobserved linear heterogeneity component. Regionally, Douala had the least contribution and the Savanna region the best negative contribution. Urban/rural wise, rural areas attenuate household gender inequality more than urban areas. The immerging policy implication suggests that government should skew their policy towards these localities.

In 2001 (column 2), education, age squared, household size and the unobserved non-linear interaction variable globally explained income expenditure differences that exist between male and female headed households. Spatially, while Douala contributed solely in bridging this gap, all rural areas marginally contributed in increasing this gap with the

Savannah region being the most rural contributive milieu in increasing household gender inequality.

The inter-temporal decompositions (column 3) indicate that education over-accounts for the income gap disparity between 2001 and 1996. Other variables that explain this are age, fraction of active household members, electricity and access to a medical doctor. The least contributions are being sick and access to portable water. Regionally, while rural Savannah and Rural forest worsened inter-household gender inequality within the period under review, Rural Haut Plateau rather improved this disparity over time. Living in urban areas tends to bridge disparities over time.

Discrimination coefficients for 1996 (column 4) show that equating male and female educational attainment via policies that bridge inequality in education and schooling schemes will increase income earned by women by about 60%, considerably reducing disparities in inter-household income expenditures between men and women. In this vein, age, experience, household size, increasing the number of active working adults in female headed households, working in the primary and secondary sectors will decrease income expenditure gaps between men and women. Accessing water and electricity would marginally increase inter-household gender disparities, revealing that these are not significant discrimination factors in household gender disparity in Cameroon.

In 2001, education, age, age squared, household size, primary and secondary sectors, access to water all helped fill the gender income expenditure gap. Fraction of active adult household members, ability to consult a medical doctor and electricity marginally augments inequality between male and female headed households. Spatially, while urban areas marginally worsened gender disparity, the rural areas would marginally decreased gender income expenditure gap disparity (column 5 of Table 16).

Between 1996 and 2001, education stands out as the main income expenditure equalizing endowment between male and female headed households. In addition, age, experience, fraction of active adult household members, access to medical doctors and electricity all reduce inter-household gender inequality. Within the period under review, household size tends to exacerbate disparities in income expenditures between men and women. Also, the primary and secondary sectors, as well as access to water increase inter-household gender inequality. Spatially, residing in Douala, the Rural Forest and the Savannah regions over time have the tendency to decrease income expenditure between male and female headed households (column 6 of Table 16). Both unobserved control function variables for both years, as well as over time have all help bridge gender disparities, revealing the possibility that unaccounted for variables would help retreat income expenditure gaps (column 4-6 of Table 16).

Table 16: DECOMPOSITION of GENDER WELL-BEING & DISCRIMINATION COEFFICIENTS USING PARAMETER ESTIMATES FROM THE CFA FOR 1996 and 2001

Decomposition of the Oaxaca-Blinder coefficient				Discrimination coefficient (%)		
Variables	**Total 96** Col.(1)	**Total 01** Col.(2)	**Total Inter Temporal** Col.(3)	**Disc96** Col.(4)	**Disc 01** Col.(5)	**Disc Inter Temporal** Col.(6)
Educational Level	0.9698	0.2855	0.2613	145.1	5.36	25.4
	(59.5%)	(43.0%)	(141.6%)	(59.5%)	(07.6%)	(110.8%)
Age	0.3752	0.0287	0.0490	32.5	21.4	1.88
	(23.0%)	(4.3%)	(26.5%)	(13.3%)	(30.3%)	(08.2%)
Age Squared	0.1735	0.2864	0.0078	28.27	16.9	4.14
	(10.6%)	(43.2%)	(4.2%)	(11.6%)	(23.9%)	(18.1%)
Household Size	0.0948	0.0792	-0.0282	18.4	13.8	-2.97
	(5.8%)	(11.9%)	(-15.3%)	(07.5%)	(19.5%)	(-13.0%)
Fraction of Active Household Members	0.1698	-0.0160	0.0427	18.0	-1.44	4.31
	(10.4%)	(-2.4%)	(23.1%)	(07.4%)	(-02.0%)	(18.8%)
Primary Sector (PSU Percentage)	0.0443	-0.0030	-0.1118	0.40	0.21	-0.95
	(2.7%)	(-0.4%)	(-60.6%)	(00.2%)	(00.3%)	(-04.1%)
Secondary Sector (PSU Percentage)	0.0807	0.0055	-0.0661	8.0	0.45	-6.86
	(5.0%)	(0.8%)	(-35.8%)	(03.3%)	(00.6%)	(-29.9%)
Sickness_past_2_Weeks (PSU Percentage)	0.1599	0.0429	-0.2384	17.2	4.35	-21.3
	(9.8%)	(6.5%)	(-129.2%)	(07.1%)	(06.2%)	(-92.9%)
Access Medical Doctor (PSU Percentage)	-0.1647	-0.0037	0.1478	-13.09	-0.42	12.26
	(-10.1%)	(-0.6%)	(80.0%)	(-05.4%)	(-00.6%)	(53.5%)
Water (PSU Percentage)	-0.0395	0.0506	-0.1268	-2.86	5.10	-13.4
	(-2.4%	(7.6%)	(-68.7%)	(-01.2%)	(07.2%)	(-58.4%)
Electricity (PSU Percentage)	-0.0965	-0.0231	0.1906	-7.32	-2.63	15.29
	(-5.9%)	(-3.5%)	(103.2%)	(-03.0%)	(-03.7%)	(66.7%)
Regions						
Douala	-0.0222	-0.0016	0.0135	-2.49	-0.21	1.56
	(-1.4%)	(-0.2%)	(7.3%)	(-01.0%)	(-00.3%)	(06.8%)
Rural Forest	-0.0198	0.0110	0.0007	-1.46	1.07	0.17
	(-1.2%)	(1.7%)	(0.4%)	(-00.6%)	(01.5%)	(00.7%)
Rural Haut Plateau	-0.0174	0.0192	-0.0118	-1.19	0.76	-0.76
	(-1.1%)	(2.9%)	(-0.064%)	(-00.5%)	(01.1%)	(-03.3%)
Savannah	-0.0056	0.0299	0.0687	0.99	1.93	1.32
	(-0.3%)	(4.5%)	(37.2%)	(00.4%)	(02.7%)	(05.8%)
Control for unobserved variables						
PEduc_residual	-0.1239	-0.2010	-0.0166	2.32	1.82	0.85
	(-7.6%)	(-30.3%)	(-9.0%)	(01.0%)	(02.6%)	(03.7%)
Edu*Educ_residual	0.0494	0.0725	0.0023	1.12	2.28	1.99
	(3%)	(10.9%)	(1.3%)	(00.5%)	(03.2%)	(08.7%)
Log Total Expenditure Per Adult gap/ Discimination Index	1.631	0.6632	0.1846	243.89	70.73	22.93
	(100%)	(100%)	(100%)	100%	100%	100%

Source: Computed by Authors. Notes: the values in brackets below the Oaxaca-Blinder decomposition and the discrimination coefficients translate the percentage contributions to total gender income expenditure gap.

Concluding this subsection, we investigated inter-temporal and spatial inter-household gender inequality in Cameroon, identifying (1) gender-neutral and gender-bias factors that influence household income/expenditure in Cameroon and (2) determine inter-temporal and spatial discrimination coefficients. Overall, both personal-specific and gender-discrimination expenditure characteristics of household heads linked to their gender orientation shapes the patterns of inequality observed between these two groups, as well as the spill-over effects of the gender type on household income.

5. General Conclusion

This research is aimed at understanding the nature and determinants of inequality in Cameroon via the regression-based decomposition analysis. Given the different inherent econometric problems, we undertook a series of econometric analysis to identify an appropriate method that purges endogeneity, unobserved heterogeneity and intra-clustering correlation, which all constitutes issues that may produce biased estimates. Our investigations based on the OLS, IV 2SLS as well as the CFA, and we identified the CFA as the most appropriate econometric method fitting our data. Regressed variables were consistent with economic literature and significant in determining the global and gender samples determinants of household income expenditure for the Ordinary Least Square, Two Stage Least Square and Control Function approach. Controlling for potential endogeneity that could produce biased estimates; we instrumented for educational level which is endogenous in the household welfare function. The complementary hypothesis enunciated in our methodology was by and large verified. Education is crucial in explaining household well-being. In addition, variables such as the age, age squared (experience), household size, fraction of active adult household members, and the sectors of activity, access to drinking water and electricity, as well as residential milieu influence household economic well-being.

Having obtained significant and unbiased estimates of the household income generating function, we undertake a regression-based decomposition using estimated income sources computed from the regression procedures. We exactly decomposed inequality using the Araar (2006) and Rao (1969) approaches, and also computed the change in Gini and the Generalized Entropy coefficients of the estimated income sources within the period under review. Generally, the variables educational level of household head and age of household head highly accounted for inequality. Other variables included location, health and infrastructural indicators. Spatially, both the urban and rural localities contribute positively in explaining inequality. The urban areas have a marginally higher value than the rural areas when computed using estimated income sources from the CFA parameters applied to both the Araar (2006) and Rao(1969) approaches. Change in Gini and Entropy coefficients of the estimated income sources were significant except for the total income expenditure.

In linking poverty to inequality we used parameter estimates obtained from the econometric estimations to compute the marginal contributions of the considered sources to poverty and inequality, the within-and-between group contributions, as well as the elasticities of these estimated income sources. Generally, all considered sources: (1) positively affected the poverty and inequality marginal contributions; (2) had positive elasticities, and; (3) the within group components had higher values than the between group components. However, we observed differences in within-group and between group contributions based on the poverty index when analyzing their elasticities. Undertaking a within-and-between group decomposition of the estimated income sources along gender lines, we noted that generally the within group components largely accounted for the marginal impacts on poverty and inequality, but for elasticities varying trends were depicted.

Lastly, using estimates from the CFA specification, we investigated inter-household gender inequality and discrimination between male-and-female headed household using the Oaxaca-Blinder approach. Our main findings indicate that both personal-specific and gender-discrimination expenditure characteristics of household heads linked to their gender orientations shape the patterns of observed inequalities, as well as the spill-over effects of the gender type on household income.

These results have implications for our understanding of factors that explain and account for inequality trends in the distribution of living standards and the extent to which inequality affects poverty in Cameroon. These analyses are important in informing policy debates in the process of enhancing well-being, fostering growth and reducing poverty.

References

Adams, R. H.Jr. (2001). " Non-Farm Income, Inequality and Land in Rural Egypt." *Economic Development and Cultural Changes*, 50: 339-363.

Ahuja, V. and D., Filmer. (1996). "Educational Attainment in Developing Countries: New Estimates and Projections disaggregated by Gender". *Journal of Education Planning and Administration,* vol. 3(4): 229-254.

Alayande, B. (2003). 'Development of Inequality Reconsidered: some Evidence from Nigeria.' Paper presented at the UNU/WIDER conference on Inequality, Poverty and Human Wellbeing in Helsinki, Finland between 29th and 31st of May, 2003.

Ali, A.A. G. (2005). 'Growth Poverty and Institutions: Is there a missing Link?' Seminar Paper in Poverty, Growth and Institutions, AERC Senior Policy Seminar VII, South Africa, 22-24 March 2005.

Alemayehu, G., A., Shimeless and, J., Weeks. (2002). 'Prospects for the pro-poor Growth strategies in Ethiopia'. Mimeo. Ministry of economic Development and Finance of Ethiopia. Addis Ababa.

Alemayehu, G., Neik de Jong, M.S. Kimenyi and, G., Mwabu. (2005). 'Determinants of Poverty in Kenya: A Household Level Analysis'. Working Paper 2005-44, Department of Economics, University of Connecticut.

Amos, O. (1998). "Unbiased Regional Growth and Regional Income Inequality in the Latter stages of Development". *Regional Science and Urban Economics*, 18(4): 549-567.

Anker, Richard. (1998). Gender and Jobs: Sex Segregation of Occupations in the World. Geneva: ILO.

Araar, A. (2006). "On the decomposition of the Gini Coeffiecient: an Exact Approach, with Illustration Using Cameroonian Data", Cahiers de recherché, 0602, CIRPEE.

Araar, A. and J-Y., Duclos. (2007). "Poverty and Inequality Components: A Micro framework". Cahier de Recherche, 0735, CIRPEE.

Araar, A. and T., T., Awoyemi. (2006). "Poverty and Inequality Nexus: illustrations with Nigerian Data." Cahier de Recherche, 0638, CIRPEE

Atkinson, A. B. (1997). 'Bringing Income Distribution in from the Cold'. *Economic Journal, 107: 297–321*.

Atkinson, A. B., and F. Bourguignon. (2000). 'Introduction: Income Distribution and Economics', in A. B. Atkinson and F. Bourguignon (eds.), Handbook of Income Distribution Volume 1. Amsterdam: North-Holland, 1–58.

Awoyemi and Adekanye. (2003). 'Gender Analysis of Economics Efficiency in Cassava-Based Farm holdings in South-Western Nigeria.' *Journal of Economic and Rural Development*. Department of Agricultural Economics, University of Ibadan,pp. 45-59.

Balmori, H.H. (2003). *Gender and Budget: Overview report.* Institute of Development Studies. February 2003.

Barham, B., and S., Boucher. (1998). " Mitigation, Remittances and inequality: Estimating the Net effects of Migration on Income Distribution." *Journal of Economics*. 55: 307-331.

Baye, M. F. (2006). "Growth, Redistribution and Poverty changes in Cameroon: A Shapley Decomposition Analysis". *Journal of African Economies, 15, No.4, pp. 543-570.*

Baye, M. F. and Fambon, S. (2001). "The Impact of Macro and Sectorial Policies on the extent of Poverty in Cameroon". In Globalization and Poverty: The role of Rural institutions in Cameroon". Background paper submitted to FASID, Tokyo, Japan.

Baye, M.F. (2007). "Exact configuration of poverty, inequality and polarization trends in the distribution of well-being in Cameroon." Final report, AERC Nairobi, Kenya.

Baye, M.F., and S., Fambon.(2002). "Decomposition of Inequality in the Distribution of Living standard in Cameroon." *African Journal of Economic Policy*, 9, No. 2, pp.51-75.

Bhattacharaya, N. and B. Mahalanobis (1967) "Regional Disparities in Household Consumption in India," *Journal of the American Statistical Association*, 62.

Blackburn, R. and Jarman, J. (2005). "Gendered Occupations: Exploring the Relationship Between Gender Segregation and Inequality." GeNet Working Paper 5. ESRC Gender Equality Network, University of Cambridge. http://www.genet.ac.uk.

Blinder, A.S. (1973). 'Wage Discrimination: Reduced Form and Structural Estimates.' *Journal of Human Resources, 8:436-55.*

Boccanfuso, D. and Kabore, S.T. (2003). "Croissance, Inégalité et Pauvreté dans les années 1990 au Burkina Faso et au Sénégal ". Paper presented within the MIMAP Project Financed by CRDI.

Bouillon, C., A., Legovini and N. Lustig. (1998). "Rising Inequality in Mexico: Returns to Househol Characteristics and the Chiappas Effect". Paper presented at the LACEA conference, Buenos Aires, October 1998.

Bourguignon, F. (1979). "Decomposing Income Inequality Measures." *Econometrica*, 47, 901-920.

Bourguignon, F. (2002). 'The Growth Elasticity of Poverty Reduction: Explaining Heterogeneity across Countries and Time-Periods'. DELTA Working Paper 2002-03. Paris.

Bourguignon, F. (2004). 'The Poverty-Growth-Inequality Triangle'. Paper presented at the Indian Council for Research on International Economic Relations, New Delhi, 4 February.

Bourguignon, F., M. Fournier and M. Gurgand. (1998). "Distribution, Development and Education: Taiwan, 1979-1994". Paper presented at the LACEA conference, Buenos Aires, October 1998.

Bourguignon, F., M. Fournier and M. Gurgand. (2001). 'Fast Development with a stable Income Distribution: Taiwan, 1979-1994'. *Review of Income and Wealth, 47(2):139-63.*

Cagatary, N., M. Keklik, R.. Lal and J., Lang. (2000). *Budget as if people mattered: democratizing Macroeconomic Policies.* United Nations development Program/ SEPED Conference Paper series.

Cancian, M. and D. Reed. (1998). "Assessing the Effects of Wives Earning on Family Income Inequality." *Review of Economics and Statistics, 80: 73-79.*

Card, David. (2001). 'Estimating the return to Schooling: Progress on some Persistent Econometrics Problem'. *Econometrica, 69(5): 1127-1160.*

Chameni, C. N. (2005). "A Three component Subgroup Decomposition of the Hirschman-Herfinduhl Index and Households Income Inequality in Cameroon|" *Applied Economic Letter, 12, 941-947.*

Chameni, C. N. (2006). 'A Note on the Decomposition of the Coefficient of Variation Squared: Comparing Entropy and Dagum's methods'. *Economics Bulletin*, 4(8), pg. 1-8.

Chzhen, Y. (2006). "Occupational Gender Segregation and Discrimination in Western Europe." Center for Research in Social Policy (CRSP), Loughborough University. UK

Cling, J., P. De Vreyer, M. Rasafindrakoto and F. Roubaud. (2003). 'Growth and Poverty Reduction: inequalities Matters'. Unpublished Paper presented at the UNU/WIDER conference on Inequality, Poverty and Human Wellbeing. Helsinki, May 20003.

Coefficient Revisited" *Economic Journal*, 103, 1221–27.

Coker ,J.B. (1999). "Household Sample Survey in the Study of Poverty: the FOS Experience." Centre for Economic and Allied Research, University of Ibadan, Ibadan, Nigeria.

Cowell, F.A. and S.,P., Jenkins. (1995). "How Much Inequality can we Explain-A Methodology and an Application to the United States". *Economic Journal*, 105: 421-430.

DasGupta, M. (1987). "Selective Discrimination Against Female Children in Rural Punjab". *Population and Development Review,* vol. 13(1): 77-100.

Deaton, A.(1997). *The Analysis of Household Surveys.* John Hopkins University Press: Baltimore.

Deininger, K. and L., Squire. (1998). "New Ways of Looking at Old Issues: Inequality and Growth". *Journal of Development Economics*, 38: 259-87.

DiNardo, J., N.M. Fortin and T. Lemiux. (1996). 'Labour Market Institution and the Distribution of Wages, 1973-1992: A semi-parametric Approach.' *Econometrica 64(5):1001-44.*

Duclos, J.Y., Araar, A., and Fortin, C. (2003). "DAD3.4-A: Software for Distributive Analysis/ Analyse Distributive" MIMAP program, International Development research Center, Government of Canada and CREFA, University of Laval.

Epo, B.N. and M.F., Baye. (2007). "The Heavily Indebted Poor Country Initiative (HIPC) Process and Determinants of Regional Poverty Changes in Cameroon". Paper presented at the Social Science Inter-Faculty Seminar Series 2006/2007 (Implementation, Challenges and Prospects of the HIPC Initiative in Cameroon) sponsored by the Council for the Development of Social Science Research in Africa (CODESRIA) and the University of BUEA, Cameroon.

Epo, B.N. and M.F., Baye. (2008). "Poverty Reduction in Cameroon, 1996-2001: The Role of Growth and Income Redistribution." Paper submitted in 2008 and is available online at http://mpra.ub.uni-muenchen.de/10124/MPRA Paper No. 10124, Munich RePec Archive.

Epo, B.N. (2006). 'Implications of Economic Growth and Redistribution to Poverty Alleviation in Cameroon: A Shapley Value Decomposition Analysis'. A dissertation presented in partial fulfillment of a DEA in Mathematical Economics and Econometrics. University of Yaoundé II, SOA, Cameroon.

Eusufzai, Z. (1997). "The Kuznets hypothesis : An Indirect Test." *Economic Letters*, 54: 81-85.

Fields, G.S. (1995). " Accounting for Differences in Income Inequality." Mimeo, Cornell University.

Fields, G.S. (1998). " Accounting for Differences in Income Inequality and Its Changes." Department of Economics, Mimeo, Cornell University.

Fields, G.S. and G. Yoo. (2000). 'Falling Labour Income Inequality in Korea's Economic Growth: Patterns and Underlying Causes.' *Review of Income and Wealth, 46(2): 139-59.*

Fortin, N.e and Huberman, M. (2002). "Occupational Gender Segregation and Women's Wages in Canada: An Historical Perspective." Canadian Public Policy, 28 (1): S11-S39

Foster, J. Greer, J and Thorbecke, E. (1984). 'A class of Decomposable Poverty Measures', *Econometrica*, 52(3): 761-776.

Foster, J.E. and A., A., Shneyerov. (1996). "Path Independent Inequality Measures." Discussion Paper No. 97-W04. Department of Economics, Vanderbilt University.

Foster, J.E. and A., A., Shneyerov. (1997). "A General Class of Additively Decomposable Inequality indices." Discussion Paper No. 97-W10, Department of Economics, Vanderbilt University.

Frazer, G. (2006). "Inequality and Development Across and Within Countries". *World Development,* 34.

Glewwe, P. (1991). 'Investigating the Determinants of Households welfare in Cote d'Ivoire.' *Journal of Development Economics, 35(2), pp. 307-37.*

González M.P, Santos M.C., and S.L., Delfin. (2005) "Gender wage gap in Portuguese: recent Evolution and Decomposition". Research Center on Industrial, Labour and Managerial Economics. DP 2005 – 05, October 2005.

Government of Cameroon, (1996). Data Base of ECAM I, Ministry of Economy and Finance.

Government of Cameroon, (2003). *The Poverty Reduction Strategy Paper,* Ministry of Economic Affairs, Programming and Regional Development.

Heltberg, R. (2003). 'Spatial Inequality in Vietnam: A Regression-based Decomposition.' The World Bank, 1818H Street, NW Washington DC, 20433, USA.

Heshmati A. (2004). " A review of Decomposition Income Inequality" IZA Discussion Paper No. 1221. July 2004.

Ibrahim, E. and M. Gray. (2005). 'Growth Income Inequality and Growth In Africa'. Seminar Paper in Poverty, Growth and Institutions, AERC Senior Policy Seminar VII, South Africa, 22-24 March 2005.

IMF (2003). "IMF Country Report". No. 03/249. August 2003.

Institue Nationale des Statistiques. (2002b). *Evolution de la Pauvreté au Cameroun entre 1996 et 2001*. Decembre 2002.

Institue Nationale des Statistiques. (2008). *Tendance, Profil et Déterminant de la Pauvreté au Cameroun en 2007.* Disponible sur *www.statistic-Cameroun.org.*

Institue Nationale des Statistiques.(2002a). « ECAM II : Document de Méthodologie », Yaoundé.

Jenkins, S.,P. (1995). "Accounting for Inequality Trends: Decomposition Analysis for the UK, 1971-86". *Econometrica,* 62: 29-64.

Juhn, C., K. Murphy and B. Pierce. (1993). 'Wage Inequality and the Rise in Returns to Skill.' Journal of Political Economy.

Kanbur, R and A.,J., Venables. (2005). "Spatial Inequality and Development: Editorial Introduction to a special issue of Journal of Economic Geography." October 2004. Revised version published in *Economic geography*, January 2005.

Kanbur, R. (2008). "Poverty and Distribution: Twenty Years Ago and Now". www.people.cornell.edu/pages/sk145 July, 2008. Cornell University.

Kanbur, Ravi. (2007). "Globalization, Growth and Distribution: Framing the Questions." Commission on Growth and Development, Working Paper 5. http://cgdev.nonprofitsoapbox.com/storage/cgdev/documents/gc-wp-005_web.pdf

Khan, S. and Noumba, I. (2001). 'Rural Health Care and Educational Services in Cameroon', in Baye, M.F., Fambon, S. and Sikod, F. (eds), *Globalisation and poverty: the Role of Rural Institutions in Cameroon,* Tokyo, Japan: FASID.

Kimalu, P. K. et. al., (2001). 'A Situational Analysis of Poverty in Kenya'. KIPPRA, Working Paper.

Kimhi, A. (2007). "Regression-Based Inequality Decomposition: A Critical review and Application to Farm-Household Income Data." Agricultural Economics Department, The Hebrew University, Isreal.

Kuznets, S. (1955). "Economic Growth and Income Inequality." *American Economic Review*, 45, 1-25.

Lamber, P. J. and J. R. Aronson. (1993): "Inequality Decomposition Analysis and the Gini Coefficient Revisited," *Economic Journal*, 103, 1221–1227.

Lissenburgh, S. (2000). "Gender Discrimination in the Labour Market: Evidence from BHPS and EIB Surveys." PSI Research Discussion Paper, 3. Policy Research Institute, 2000.

List, J.A. and C.A., Gallet. (1999). "The Kuznets Curve: What Happens after the Inverted-U?". Review of Development Economics, 3(2): 200-6.

Litchfield, J. A., (1999). Inequality: Method and Tools. The World Bank, Washington D.C., available on *http://www.worldbank.org/poverty/inequal/index.htm*

Mbanga, G. and Sikod,F. (2002). 'The Impact of Debt and Debt Service Payments on Investment of Cameroon', Final Report submitted to AERC, Nairobi, Kenya.

Mckay,A. (1997).' Poverty Reduction through Economic Growth: Some Issues', *Journal of International* Development, 9(4): 665-673.

Ministère de Plan et de l'aménagement du territoire: Direction de la statistique et de la Comptabilité Nationale. (1993). « Comptes Nationaux Du Cameroun ». juin, 1993.

Modarres, R. and Joseph, L. Gastwirth. (2006). 'A Cautionary Note on Estimating the Standard Error of the Gini Index of Inequality.' *Oxford Bulletin of Economics and Statistics 68: 385-390.*

Morduch, J. and T, Sicular. (2002). 'Rethinking Inequality Decomposition with Evidence from Rural China'. *Economic Journal, 112(January), 93-106*.

Moser, C. and K. Levy. (1996). "A Theory and Method of Gender Planning: Meeting Women's Practical and Strategic Needs." London development planning Unit, University College.

Mwabu, G., M. Wafula., R.Gesami, J. Kirimi, G., Ndenge'e, T., kiriti, F., Minene, M., Chemngich and, J., Mariara. (2000). 'Poverty in Kenya: Profile and Determinants'. Nairobi: University of Nairobi and Ministry of Finance and Planning.

National Institute of Statistics. (2007) *Enquête Camerounaise Auprès des Ménages (ECAM III).* National Institute of Statistics, 2007.

National Institute of Statistics. (August, 2005). *Les Comptes Nationaux Du Cameroun 1993-2004*. Cameroun.

National Institute of Statistics. (October, 2004). *Annuaire Statistique du Cameroun*. Edition 2004. Tome III.

Oaxaca, R. (1973). 'Male-Female Wage Differences in Urban Labour Markets.' *International Economic Review 14(3): 693-709*.

Oaxaca, R. and Ransom, M. (1994). On Discrimination and the Decomposition of Wage Differentials. *Journal of Econometrics*, 61:5–21.

Oaxaca, R. and Ransom, M. (1999). "Identification in detailed wage decompositions." *Review of Economics and Statistics*, 81(1):154–157.

Okunmadewa, F. (1999). 'Overview of the Measurement of Poverty and Inequality.' Centre for Econometric and Allied Research, University of Ibadan, Nigeria.

Oyugi, L.N. (2000). 'The Determinants of Poverty in Kenya'. (Unpublished MA Thesis, Department of Economics, University of Nairobi).

Papapetou, E. (2005). "Gender Wage Differential in Greece". University of Athens, Athens, Greece.

Paternostro, S and Sahn, D. (1998). "Wage Determination and Gender Discrimination in a Transition Economy: The Case of Romania." Cornell University, USA.

Pena-Boquete, Y. (2009). "A Comparative Analysis of the Evolution of Gender Wage Discrimination: Spain vs. Galicia." Papers in Regional Science, Blackwell Publishing, Vol. 88 (1), pages 161-180, 03.

PRSP, (2000). *Interim Poverty Reduction Strategy Document*, Republic of Cameroon, August 2000.

PRSP, (2003) *Poverty Reduction Strategy Document*, Republic of Cameroon, August 2003.

Ram, R. (1991). "Kuznets Inverted U hypothesis: Evidence from Highly Developed Country". *Southern Economic Journal*, 57(4): 1112-1113.

Ravallion, M. and Van de Walle. (2001). 'Breaking up Collective Farm: Welfare Outcomes of Vietnam's Massive Land Privatization.' World Bank.

Sen, A.K. (1973). " On Economic Inequality". Oxford University Press, Oxford.

Sen, A.K. (1976). "Poverty: An Ordinal approach to measurement". *Econometrica*, 44, pp. 219-231.

Sen, A. (1998). 'Mortality as an indicator of economic success and failure'. *Economic Journal,* 108, pp.1-25.

Shapley, L. (1953). 'A Value for n-Person Games'. In: H. W. Kuhn and A. W. Tucker, eds., *Contributions to the Theory of Games*, Vol. 2, Princeton University Press.

Shorrocks, A., F. (1980). "The Class of Additively Decomposable inequality Measures." *Econometrica*, 48, 613-625.

Shorrocks, A.F. (1982). "Inequality Decomposition by Factor Components." *Econometrica,65,* pp.*177-207*.

Shorrocks, A.F. (1984). "Inequality Decomposition by Population Subgroups." *Econometrica, 52, 1396-1385*.

Shorrocks, A.F. (1999). "Decomposition procedure for Distribution Analysis: A unified Framework Based on Shapely value". University of Essex and Institute for Fiscal studies, Colchester, England

Shorrocks, A.F. and Kolenikov, S. (2001) "Poverty Trends in Russia during Transition". Mimeo.

Sikod, F. (2007). "Gender division of Labor and Women's Decision-Making Power in Rural Households in Cameroon." *Africa Development, 32, No. 3.*

Sokoloff, K.L. and S.L. Engerman. (2000). "Institutions, Factor Endowments, and Paths of Development in the New World." *Journal of Economic Perspective, 14, No. 3, 217-32.*

Suen, W. (1997): "Decomposing wage residuals: Unmeasured skill or statistical artifact?", *Journal of Labor Economics*, 15(3): 555-566.

Takahshi, K. (2007). "Sources of Regional Income Disparity in Rural Vietnam: Oaxaca-Blinder decomposition". Discussion Paper No. 95. Institute of Developing Economies, JETRO, Japan

Theil, H. (1972). *Statistical Decomposition Analysis.* (North Holland, Amsterdam).

Theil, H. (1972). *Statistical Decomposition Analysis.* (North Holland, Amsterdam).

UNDP Cameroon Office. (2002). The Republic of Cameroon. Country Report. Millennium Development Goals Progress. Yaoundé.

UNDP Cameroon Office. (2003). The Republic of Cameroon. Country Report. Millennium Development Goals Progress report at Provincial Level. Yaoundé.

UNU (2000). UNU/WIDER-UNDP World Income Database, VI.o ed. (United Nation University/ WIDER).

Van de Walle, D. and Gunewardena, D. (2005). "Sources of Ethics Inequality in Vietnam." *Journal of Development Economics, 65, pp.177-2007.*

Vartiainen, J. (2002). "Gender wage differentials in the Finnish Labour Market" Ministry of Social Affairs and Health Finland.

Wan, G.H. (2002). 'Regression-Based Inequality Decomposition: Pitfalls and a Solution Procedure.' UNU-WIDER Discussion Paper No. 2002/101. Helsinki.

Wan, G.H. (2004). 'Accounting For Income Inequality in Rural China: A Regression-Based Approach.' *Journal of Comparative Economics. 32(2), 348-63.*

Wan, G.H. (2006). "Poverty Accounting by Factor component: With an Empirical Illustration Using Chinese Data." Research paper No. 2006/63, UNU-WIDER Institute, Helsinki, Finland.

Wan, G.H. (2007). 'Understanding Regional Poverty and Inequality Trends in China: Methodological Issues and Empirical Findings.' Review of Income and Wealth, Series 53, No.1, March 2007.

Wan, G.H. and Z.Y. Zhou. (2005). 'Income Inequality in Rural China: Regression-Based Decomposition Using Household Data.' *Review of Development Economics, 9, 107-20.*

Watkins, K. (2002). "Making Globalization Work for the Poor". *Finance and Development*, 39.

Wooldridge, J. M. (1997). 'On Two Stage least Squares estimation of average treatment effect in a Random coefficient Model'. *Economics letters, 56, 129-133.*

Wooldridge, J.M. (2006). *Introductory Economics. A Modern Approach.* 3rd Edition. Thomson South-Western Publications.

World Bank. (2001). "Country Assistance Evaluation: Cameroon". (January 24, 2001). Operation Evaluation Department.

World Bank. (2002). *Globalization, Growth and Poverty.* World Bank policy Research Report.

World Bank. (2005). World Bank Development Report 2006: Equity and Development. Washington: World Bank.

Yuko,A., J.M. Kim. and A., Kimhi. (2006). 'Determinants of Income Inequality among Korean Farm Households'. Economic Research Centre, Discussion paper, No. 161, School of Economics, NAGOYA University.

APPENDIX 1: Computing Indicators used in for the regression-based decomposition analysis as well as the within-and-between group analysis.

Computing the estimated income sources the proportional inequality share of each household is obtained via equation (11). It is important to remark that income inequality shares per household may be inadequate in trying to undertake decomposition analysis. This is because income inequality shares per household may not respect the "satiation" axiom of utility which states that much of something is better than less. To resolve this issue we propose income shares flows per household as $Q_i^m = \frac{\hat{\beta}_m x_i^m}{y_i^*}$ and the aggregate household income share of income source flows is: $Q_i = \frac{\sum_{m=1}^{M} \hat{\beta}_m x_i^m}{y_i^*}$

where y_i^* is sum of all the estimated income source flows excluding the constant and residual term.

However, given the functional specification (log-linear) we develop a computational process for the contributions of each estimated source on the estimated per capital expenditure rather than the log of the per capita expenditure.

Let $\hat{y} = \exp(\alpha)\exp\left(\beta_1 x^1 + \beta_2 x^2 + \cdots\cdots + \beta_m x^m\right)$. For a particular estimated income source, say, i we obtain: $\beta_i X_i = \frac{\hat{y}}{\exp(\alpha)\exp\left(\beta_1 x^1 + \cdots + \beta_{i-1} x^{i-1} + \beta_{i+1} x^{i+1} + \cdots + \beta_m x^m\right)}$

where $\hat{y}$ is the predicted household income per capita expenditure (Wooldridge, 2006), and source i is excluded from the denominator. However, source α is a constant and debate exists as to its interpretation. Thus excluding the constant and computing solely the estimated income sources:

$$y^* = \hat{y} - \alpha \equiv \frac{\hat{y}}{\exp(\alpha)} = \exp\left(\sum_{i=1}^{M} \beta_i X_i\right) \text{ where } i = 1 \cdots\cdots M$$

Scaling the estimated income sources to obtain the predicted income expenditure, we proceed as follows:

Let's assume $y^* = \sum_{i=1}^{M} \beta_i X_i$, and the scaling indicator: $\delta = \frac{y^*}{\hat{y}} \Rightarrow \hat{y} = \frac{y^*}{\delta}$. Thus scaling each estimated income source we obtain:

$\frac{y^*}{\delta} = \frac{1}{\delta}\left[\beta_1 x^1 + \beta_2 x^2 + \cdots\cdots + \beta_m x^m\right]$ which produces adjusted values of the estimated income sources used in our analysis.

APPENDIX 2

Table 1a: Marginal Impact and Elasticities by Gender per Estimated Income Sources for 1996

Estimated Income Source	**FGT_0** Column(1)	**FGT_1** Column(2)	**Gini** Column (3)	**MII** Column (4)	**MIP (FGT_0)** Column (5)	**Elas. (FGT_0)** Column (6)	**MIP (FGT_1)** Column (7)	**Elas. (FGT_1)** Column (8)
Expenditure per Adult								
Male	0.295950	0.088854	0.2209	0.002516	0.000503	0.173089	0.001326	1.533686
Female	0.029930	0.008039	0.0036	0.000292	0.000125	0.372116	0.000154	1.540874
Within Group			0.2246	0.002808	0.000629	0.193758	0.001481	1.534433
Between Group			0.0573	0.000007	-0.00000	-0.28037	0.000005	3.464839
Total	0.325879	0.096893	0.2819	0.002819	0.000624	0.191596	0.001488	1.535752
Educational Level								
Male	0.394608	0.222515	0.4040	0.004613	-0.00005	-0.01153	0.002128	0.965707
Female	0.045012	0.024064	0.0068	0.000535	0.000016	0.035223	0.000277	1.083542
Within Group			0.4108	0.005148	-0.00003	-0.00666	0.002405	0.977959
Between Group			0.1055	-0.000001	0.000005	-4.56657	0.000003	5.666934
Total	0.439620	0.246578	0.5163	0.005163	-0.00003	-0.00585	0.002410	0.977386
Age								
Male	0.225251	0.076109	0.2433	0.002743	0.001025	0.450975	0.001455	1.906577
Female	0.031894	0.010212	0.0041	0.000360	0.000141	0.474444	0.000193	1.927104
Within Group			0.2474	0.003103	0.001166	0.453695	0.001648	1.908956
Between Group			0.0630	0.000002	0.000001	0.693827	0.000000	0.517979
Total	0.257144	0.086321	0.3104	0.003104	0.001170	0.455163	0.001648	1.909335
Age Squared								
Male	0.333884	0.165822	0.3054	0.003462	-0.00003	-0.00892	0.001625	1.051831
Female	0.029250	0.012314	0.0058	0.000455	0.000128	0.308936	0.000214	1.052240
Within Group			0.3112	0.003917	0.000100	0.027987	0.001839	1.051879
Between Group			0.0880	0.000008	0.000015	2.221368	0.000025	3.360614
Total	0.363135	0.178136	0.3992	0.003992	0.000086	0.023792	0.001878	1.053983
Household Size								
Male	0.331568	0.126771	0.2442	0.002773	0.000054	0.017055	0.001318	1.119439
Female	0.031083	0.008149	0.0044	0.000333	0.000159	0.417933	0.000172	1.216478

Within Group			0.2486	0.003106	0.000213	0.060064	0.001490	1.129850
Between Group			0.0693	0.000012	0.000008	0.560369	0.000020	4.293661
Total	0.362651	0.134920	0.3179	0.003179	0.000192	0.052960	0.001518	1.125173
Fraction of Active Adult Household Members								
Male	0.302764	0.100365	0.2223	0.002532	0.000341	0.115505	0.001259	1.323576
Female	0.030077	0.006710	0.0037	0.000279	0.000155	0.475975	0.000152	1.456425
Within Group			0.2260	0.002811	0.000496	0.151240	0.001411	1.336746
Between Group			0.0591	0.000005	0.000010	1.855477	0.000010	1.953915
Total	0.332841	0.107075	0.2851	0.002851	0.000492	0.147808	0.001427	1.332342
Primary Sector								
Male	0.184891	0.055549	0.1795	0.002044	0.001036	0.575852	0.000974	1.841413
Female	0.015151	0.003246	0.0027	0.000211	0.000154	0.829310	0.000087	1.587142
Within Group			0.1822	0.002255	0.001190	0.599609	0.001060	1.817578
Between Group			0.0450	0.000006	0.000019	3.550746	0.000006	4.903930
Total	0.200042	0.058795	0.2272	0.002272	0.001219	0.609388	0.001071	1.820870

Table 1b: Marginal Impact and Elasticitiess by Gender per Estimated Income Sources for 1996

Estimated Income Source	**FGT_0** Column (1)	**FGT_1** Column (2)	**Gini** Column (3)	**MII** Column (4)	**MIP (FGT_0)** Column (5)	**Elas. (FGT_0)** Column (6)	**MIP (FGT_1)** Column (7)	**Elas. (FGT_1)** Column (8)
Secondary Sector								
Male	0.310564	0.105812	0.2323	0.002653	0.000338	0.111221	0.001342	1.333619
Female	0.029542	0.006788	0.0037	0.000274	0.000162	0.516377	0.000154	1.485759
Within Group			0.2360	0.002927	0.000500	0.149118	0.001496	1.347850
Between Group			0.0609	0.000006	0.000001	0.200938	0.000012	6.214160
Total	0.340107	0.112599	0.2969	0.002969	0.000485	0.142719	0.001515	1.345121
Health Indicator								
Male	0.316815	0.116722	0.2452	0.002795	0.000254	0.082435	0.001400	1.266306
Female	0.030546	0.008148	0.0041	0.000313	0.000132	0.382134	0.000173	1.394823
Within Group			0.2493	0.003108	0.000385	0.112643	0.001573	1.279259
Between Group			0.0663	0.000010	0.000015	1.332508	0.000013	62.48811 3
Total	0.347360	0.124870	0.3156	0.003156	0.000386	0.111072	0.001594	1.276289
Infrastructure								
Male	0.324867	0.136182	0.2720	0.003109	0.000162	0.051183	0.001565	1.215065
Female	0.032957	0.009133	0.0046	0.000341	0.000135	0.388588	0.000196	1.387148
Within Group			0.2766	0.003449	0.000297	0.084518	0.001761	1.232066
Between Group			0.0742	0.000003	-0.000002	-0.72524	0.000011	-9.47109
Total	0.357825	0.145315	0.3508	0.003508	0.000278	0.077794	0.001780	1.225218
Geography								
Male	0.355850	0.157194	0.2809	0.003200	-0.000024	-0.00707	0.001534	1.019603
Female	0.034741	0.013408	0.0049	0.000381	0.000049	0.120717	0.000208	1.162099
Within Group			0.2858	0.003580	0.000025	0.006509	0.001742	1.034751
Between Group			0.0771	0.000004	0.000020	5.339996	0.000016	6.394633
Total	0.390591	0.170602	0.3629	0.003629	0.000037	0.009412	0.001763	1.033659
Complimentary Educational Inputs								
Male	0.311221	0.109171	0.2463	0.002792	0.000396	0.137428	0.001411	1.412372

Female	0.021306	0.006123	0.0045	0.000338	0.000219	0.627104	0.000154	1.271547
Within Group			0.2507	0.003130	0.000615	0.190309	0.001565	1.397164
Between Group			0.0714	0.000018	0.000029	1.522388	0.000038	7.039293
Total	0.332527	0.115295	0.3221	0.003221	0.000614	0.184658	0.001620	1.405208

Table 2a) Marginal Impact and Elasticitiess by Gender per Estimated Income Sources for 2001

Estimated Income Source	**FGT_0** Column (1)	**FGT_1** Column (2)	**Gini** Column (3)	**MII** Column (4)	**MIP (FGT_0)** Column (5)	**Elas. (FGT_0)** Column (6)	**MIP (FGT_1)** Column (7)	**Elas. (FGT_1)** Column (8)
Predicted Expenditure per Adult								
Male	0.35845	0.068792	0.1765	0.002173	0.002270	0.618557	0.001758	2.599816
Female	0.06944	0.010041	0.0069	0.000359	0.000636	1.048290	0.000321	2.865903
Within Group			0.1833	0.002532	0.002906	0.679563	0.002078	2.637590
Between Group			0.0700	-0.00000	-0.00001	2.940763	0.000000	-0.82708
Total	0.42789	0.078833	0.2533	0.002534	0.002896	0.676708	0.002079	2.637075
Educational Level								
Male	0.49092	0.283344	0.3795	0.004569	0.000414	0.080570	0.003831	1.284430
Female	0.11252	0.066904	0.0132	0.000772	-0.00001	-0.011224	0.000646	1.281972
Within Group			0.3928	0.005341	0.000404	0.067300	0.004477	1.284075
Between Group			0.1439	0.000032	0.000025	0.683930	0.000019	0.916453
Total	0.60344	0.350247	0.5366	0.005366	0.000412	0.068306	0.004495	1.283380
Age								
Male	0.25847	0.081080	0.1882	0.002283	0.001855	0.756754	0.001809	2.369053
Female	0.04066	0.012116	0.0086	0.000480	0.000451	0.874085	0.000343	2.132916
Within Group			0.1968	0.002764	0.002306	0.777152	0.002152	2.328003
Between Group			0.0718	0.000007	0.000025	3.087747	0.000011	4.346995
Total	0.29913	0.093197	0.2786	0.002786	0.002330	0.778794	0.002170	2.328254
Age Squared								
Male	0.35873	0.187387	0.2649	0.003189	0.000687	0.190989	0.002590	1.371439
Female	0.07975	0.042938	0.0118	0.000699	0.000106	0.134986	0.000568	1.372567
Within Group			0.2767	0.003888	0.000793	0.180922	0.003159	1.371642
Between Group			0.1121	0.000001	-0.000002	-1.323863	0.000000	0.474270
Total	0.43848	0.230325	0.3889	0.003889	0.000791	0.180314	0.003160	1.371816
Household Size								
Male	0.33426	0.118462	0.1946	0.002355	0.001071	0.330695	0.001808	1.581802
Female	0.05961	0.020501	0.0087	0.000500	0.000325	0.471911	0.000367	1.511516
Within Group			0.2034	0.002856	0.001396	0.355436	0.002175	1.569489
Between Group			0.0830	0.000001	0.000005	5.252399	0.000005	14.40598
Total	0.39388	0.138963	0.2864	0.002864	0.001396	0.354545	0.002182	1.570224
Fraction of Active Adult Household Members								
Male	0.27597	0.092255	0.1804	0.002177	0.001545	0.566470	0.001631	1.787490
Female	0.05628	0.018870	0.0081	0.000474	0.000333	0.561179	0.000352	1.773865
Within Group			0.1885	0.002650	0.001878	0.565524	0.001983	1.785056
Between Group			0.0766	-0.00000	0.000003	-3.139190	0.000000	-1.311890
Total	0.33226	0.111126	0.2651	0.002652	0.001880	0.565927	0.001983	1.784642
Primary Sector								
Male	0.31169	0.104885	0.1935	0.002335	0.001558	0.509042	0.001791	1.731206
Female	0.06127	0.021187	0.0087	0.000509	0.000355	0.532581	0.000384	1.705776
Within Group			0.2022	0.002844	0.001913	0.513251	0.002175	1.726659

Between Group			0.0824	-0.00000	0.000004	-4.325576	0.000001	- 3.841189
Total	0.37295	0.126072	0.2846	0.002846	0.001917	0.513927	0.002177	1.726671

Table 2b) Marginal Impact and Elasticitiess by Gender per Estimated Income Sources for 2001

Estimated Income Source	**FGT_0** Column (1)	**FGT_1** Column (2)	**Gini** Column (3)	**MII** Column (4)	**MIP (FGT_0)** Column (5)	**Elas. (FGT_0)** Column (6)	**MIP (FGT_1)** Column (7)	**Elas. (FGT_1)** Column (8)
Secondary Sector								
Male	0.27601	0.093165	0.1830	0.002208	0.001581	0.579456	0.001663	1.805740
Female	0.05646	0.019093	0.0082	0.000482	0.000348	0.585075	0.000360	1.792145
Within Group			0.1912	0.002689	0.001929	0.580462	0.002024	1.803306
Between Group			0.0778	-0.00000	0.000003	-2.60397	0.000000	-1.22539
Total	0.33247	0.112258	0.2690	0.002690	0.001931	0.580868	0.002024	1.802868
Health Indicator								
Male	0.29714	0.101747	0.1930	0.002328	0.001554	0.530399	0.001785	1.774128
Female	0.06050	0.021067	0.0087	0.000512	0.000340	0.527323	0.000389	1.756415
Within Group			0.2018	0.002840	0.001894	0.529844	0.002174	1.770934
Between Group			0.0823	-0.00001	0.000003	-3.23687	0.000001	-1.79744
Total	0.35764	0.122814	0.2841	0.002841	0.001896	0.530193	0.002175	1.770644
Infrastructure								
Male	0.24916	0.079845	0.1720	0.002078	0.001746	0.706242	0.001515	1.913983
Female	0.05057	0.016130	0.0076	0.000441	0.000360	0.687259	0.000321	1.909855
Within Group			0.1796	0.002519	0.002106	0.702921	0.001836	1.913261
Between Group			0.0724	-0.00000	0.000003	-2.49874	0.000000	-0.89435
Total	0.29973	0.095975	0.2520	0.002520	0.002108	0.703307	0.001836	1.912974
Geography								
Male	0.31705	0.105715	0.2359	0.002854	0.002058	0.651600	0.002308	2.169232
Female	0.06374	0.022520	0.0102	0.000586	0.000364	0.561629	0.000474	2.168964
Within Group			0.2461	0.003440	0.002423	0.636269	0.002782	2.169186
Between Group			0.0979	0.000000	-0.000	-1.69018	-0.00000	-0.92330
Total	0.38079	0.128235	0.3440	0.003440	0.002420	0.635480	0.002782	2.169128
Complimentary Educational Inputs								
Male	0.35586	0.126873	0.2143	0.002597	0.001227	0.382453	0.002088	1.844007
Female	0.04848	0.015902	0.0112	0.000601	0.000475	0.640702	0.000418	1.594100
Within Group			0.2255	0.003198	0.001702	0.430969	0.002506	1.797058
Between Group			0.1020	0.000040	0.000081	1.637348	0.000044	2.534553
Total	0.40434	0.142775	0.3275	0.003274	0.001756	0.434273	0.002571	1.800768

Source: Computed by Authors using STATA 10 and the DASP 2.0 Software developed by Araar, A and Duclos, J. Y. Notes: MII: Marginal Impact on Inequality; MIP: Marginal Impact on poverty; and Elas: Elasticity of poverty with respect to inequality, are all simulated for a percentage change in the considered welfare indicator. Population shares for the male and female groups are 0.816195 and 0.183805. **FGT_0:** incidence of poverty and **FGT_1:** depth of poverty.