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

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

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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 research proposal appeals to an alternative approach in explaining poverty and inequality trends in Cameroon, notably a regression-based decomposition analysis that blends traditional decomposition techniques with regression analysis to account for measured income inequality. In addition, we tease-out factors that contribute to income inequality between men and women, as well as gender discrimination levels both nationally and regionally. The distribution of well-being entails a priori using more efficient methods that may capture the impacts of policies on asset characteristics of households. This new approach sheds more 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. The ECAM I and ECAM II household surveys are used to compute results. The web-based software to be used in performing the regression-based decomposition is developed by the WIDER institute. Other soft-wares to be used in this study are SPSS, STATA and DAD. Results obtained will be used to recommend the implementation of new policies or render more operational already existing policies with a view to enhancing well-being, fostering growth and reducing poverty.

Keywords: Regression-based decomposition approach, Poverty, Inequality, ECAM I, ECAM II and Gender welfare.

Background
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 assets 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), 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. However, the rural areas remain most affected by the poverty situation, experiencing a lesser fall in poverty levels as compare to urban areas. 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.

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, 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 approaches in terms of public finance. Failure of this program culminated to the devaluation of the CFA franc by 50% in January 1994. This was aimed at rendering the economy more performant 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

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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.
A 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 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 grass-root 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\(^2\) and health\(^3\), have not been ameliorated sufficiently or sustainably enough to fully remedy the situation, despite the retreat in the incidence of poverty. 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 grass-root welfare though 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, 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).

In Cameroon we remark 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.

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\(^2\) 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.

\(^3\) 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.
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. 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 falls 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)⁴, growth may occur leading to the expansion of the economic resources, translating 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.

1. Main Research Questions and Core Research Objectives

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). We note, for example, that 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.

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

⁴ 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.
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, 2006; etc.). This observation is in line with the works of Mckay (1997), Buccanfuso and Kaboré (2002), Kolenikov and Shorrock, (2003), etc. who also make similar remarks when accounting for poverty changes. Thus, as noted by Okummaweda (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.

Inequality and poverty reduction since the adoption of the 2003 PRSP continue to be one of the most challenging problems facing most countries like Cameroon. Though the poverty situation retreated in Cameroon between 1996 and 2001 - the incidence by 13.1%, depth by 5.1% and severity by 2% - an analysis of this trend is not enough, by itself, to fully appreciate the progress that has been made in reducing poverty. 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 of poverty 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).

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 (Chameni, 2005; Baye, 2005; Epo, 2006; etc.). Going through the ECAM I and ECAM II household surveys: (1) taking into account average annual income (estimated by mean expenditure per adult equivalent), in 1996 the inequality ratio between the poorest 20% quintile and richest 20% quintile was 1:7. This implies that, the mean expenditure per adult equivalent was seven times higher among non-poor as among the poor (79,724 FCFA versus 585,168 FCFA in 1996). In 2001, this ratio was 1:8, with the non-poor spending eight times higher than the poor; (2) the Gini Index has 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 gap in 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.

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5 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, Abdelkarim 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.

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

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 grass-root 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.

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). In this study, an analysis of gender welfare, particularly income inequality and its determinants will also be carried out. 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.

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). 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 fact that women are usually in situations where they are incapable of generating adequate income (Government of Cameroon, 2003).
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 (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. 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.

The regression-based decomposition approach incorporates a multidimensional aspect to analysing poverty and inequality because it permits us to regress well-being in relation to various variables (age, education, institution, regions, sectors, gender, etc). This is vital for two reasons: firstly, the regression-based decomposition, establishes behavioural relationships between the regressand and regressors clearly underpinning specificities of variables that actually explain income. This is tantamount to explaining correlates of poverty and done via econometric analysis. Secondly, after establishing the behavioural relationships, this approach then decomposes income into the various inequality sources that can potentially use various indices (Gini, CV, squared CV, and Theil) to account for overall income inequality.

Another dimension of the analysis will be to express the difference in inequality between two periods by the difference in the estimated contributions of factors and decompose the variations poverty inter-temporally. In addition, we tease-out factors that contribute more to inequality within male and female headed households and then between the two groups. This will be approached by appealing to the Oaxaca and 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 will include:
(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? (5) How can the regressed factors inform us on asset management strategies? and (6) Should policies be tailored mainly to activities that help augment the well-being of those at the lower tail of the distribution of income? These issues are useful for public policy in the context of budgetary constraints warranting a more rational use of resources to achieve maximum benefits in terms of poverty reduction. Such knowledge would also help to predict the impact of on-going or planned reforms on poverty and inequality trends.

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 and assess the sources of inequality by attribute; (2) tease-out the contribution of inequality in explaining change in poverty; (3) to perform an inter-temporal decomposition of changes in poverty and inequality by attributes to meaningful components (4) to investigate gender income inequality characteristics\(^7\) in Cameroon; (5) to use a discrimination index to evaluate the degree of gender discrimination in the distribution of living standards and (6) to formulate policy implications on the basis of the findings.

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. The regression-based decomposition methods determine the factors that explain distribution of well-being and then decomposing aggregate inequality into components in terms of the determinants. Additionally, grouping these factors to identify key components that account for inequality, indicate which policies help in efficiently managing grass-root endowments with the aim of reducing poverty and inequality. In this regard, it is expected that this study will contribute to the scientific knowledge in the following ways:

The Regression-Based Decomposition approach will inform us on specificities of inequality measures used 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 this approach. Also disentangling the contribution of the

\(^7\) 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.
estimated sources of income flow, 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 the inter-temporal decomposition of inequality trends into various estimated income source flows, through a more efficient method—the Regression-Based Decomposition approach into various key variables that account for inequality.

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 a particular endowment 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 what income sources belonging to a particular gender group determine the differences in within-and-between group inequality.

This study will investigate 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 considered variables and the indicator considered, scientifically tracing transmission mechanisms. Also, we will try to identify contributions of inequalities in 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 contribute in understanding the poverty and inequality link in Cameroon. Summarily, the expected contribution of this study is empirical and its relevance resides in the scarcity of works devoted to study such an issue in Cameroon. Finally, the study is consistent with comments made by Sokoloff and Engerman (2000) that, commodity endowments are central determinants of inequality and inequality in turns is affected by bad institutions, redistributive policies, low human capital investment and underdevelopment.

This research will certainly help to enrich our understanding of poverty, the dynamic of inequality trends and gender welfare 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 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

11 Fambon and Baye (2002) examine the characteristics and decompose inequality in Cameroon using the Generalized Entropy class indices.
inequality decomposition using Cameroon data, let alone the extensions we propose in this paper.

**Review of related literature**

Having outlined the scientific contributions, an overview of literature indicates that a lot of research is being done to tackle inequality issues. 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 undertook a study on discrimination between men and women showing how the characteristics pertaining to each individual can have an impact on male and female remuneration. 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 difference 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 or less conclusive thus producing findings that were below expectations to economists or policy makers. 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.

Not until recent, approaches used to analyse income redistribution have been 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 of the nature of these expenditure equations, applied to a wide range of cases are gaining prominence. Among these we distinguish 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); and Wan, (2002 and 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 Shorrockes (1982, 1984, 1999), which was later extended by Morduch and Sicular (2002) and Fields and Yoo, (2000) and then upgraded 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 these income inequality regression-based decomposition literature exist (Wan, 2004; Yuko et al., 2006; etc). 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, for instance, in the works of Fields and Yoo, (2000) and Morduch and Sicular (2002). Ignoring the residual term means throwing away vital information which captures the non-observed determinants of income or income distribution which may distort decomposition results. Thus, for any reasonable regression-based model to be effective, it is expected that the net percentage due to included factors (deterministic part) and the constant term must be no less important than the contribution by the residual term.

Reviewing literature of the poverty-inequality nexus, we observe the works of pioneers like Bourguignon (2004); Araar and Awoyemi, (2006); Araar and Duclos, (2007); Wan (2006); etc. Bourguignon (2004) tries to establish the link between poverty, growth and inequality and show their causes. 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.

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.

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 Wan (2002) for regression-based inequality decomposition. We then extend the analysis to capture inter-temporal decomposition of regressed attributes into meaningful components.
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 Cameroontans 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. Surveying the literature on inequality, it is apparent 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 in income redistribution programs aimed at reducing the gap between the poor and non-poor, it is important for government to resolve inequality problems.

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 enacted by the government in this endeavor. The apparently new approaches and measures proposed in the study will help fine-tune already existing policies by rendering them more operational or recommend new policies. Also, an inter-temporal analysis of inequality will inform government on the dynamics of inequality and how it affects grass-root poverty. The decomposition of these sources will inform public policy on the effects of income factors in influencing deprivation outcomes, and also provide information that will facilitate programs aimed at enhancing household well-being, gender and asset endowments.

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 of 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 the role played by women (in both the urban and rural milieu) in fighting poverty is important. These 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 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. Methodology of the Study

In a view to efficiently resolving redistributive problems, a clear understanding of the ability to disaggregate various components of the phenomenon using acceptable methods is important. In Cameroon, inequality analysis has been conducted by a number of authors, notably; Baye and Fambon (2002); Chameni (2005); Baye (2006); Baye (2007); etc. However, these analyses tend to simply decompose inequality into various sub groups. The regression-based decomposition presents a new dimension to inequality analysis in Cameroon.

4.1. Regression-Based Decomposition

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

\[ I(y) = \sum_i a_i(y) y_i \]  

(1)

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 \( s^d \):

\[ s^d = \sum_i a_i(y) s^d_i \]
\[ I(y) = \sum_i a_i(y) \sum_m y^m_i = \sum_m \left[ \sum_i a_i(y) y^m_i \right] = \sum_m S^m \] (2)

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:

\[ S^m = \frac{\sum_i a_i(y) y^m_i}{I(y)} \] (3)

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 allocated to any income source can be made to take any value between minus to plus infinity. Shorrocks (1982) further show how an increase in 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 inequality increases or decreases by a constant amount across all incomes sources, the overall or total inequality change is zero 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: \( S^m = \frac{\text{cov}(y^m, y)}{\text{var}(y)} \)

Morduch and Sicular (2002) extended the decomposition rule (3) to a regression-based decomposition by determinants of income. They expressed household income as:

\[ y = X \beta + \varepsilon \] (4)

Where \( X \), is a vector of explanatory variables with the first column made of the n-vector \( \alpha = (1,1,\ldots,1) \), \( \beta \) is a vector of parameters and \( \varepsilon \) 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 (5). This is considered as the estimated income source flow of the various (household) explanatory variables:

\[ y = X \hat{\beta} + \hat{\varepsilon} \] (5)

Since the econometric results yield estimates of the income flow 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 by 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):
\[ y_i = \sum_{m=1}^{M} y_i^m \] (6)

where \( y_i^m = \hat{\beta}_m x_i^m \) for \( m = 1, \ldots, M \)

\[ y_i = \hat{e}_i \] for \( m = M + 1 \)

Now, substituting equation (6) into equation (3), we obtain the share of inequality attributable to the estimated income source flow of the explanatory variable, \( y_i \) as:

\[ S^m = \frac{\hat{\beta}_m \sum_i a_i(y)x_i^m}{I(y)} \] (7)

\( \hat{\beta}_m \) 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.

This regression was first developed by Morduch and Siculcar (2002) and later ameliorated by Wan (2004). Wan (2004) extends this decomposition technique to allow for the assessment of the contribution of specific factors - the constant term and the residual to total inequality. Here the extent to which a factor accounts for inequality is independent of the inequality measure used. In this study, we adopt this approach because it 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

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\text{\textsuperscript{12}} Yuko et. al., (2006) remarks that, Morduch and Siculcar (2002) suggested a simple procedure for deriving the standard errors of \( S^m \), but this procedure turns out to be incorrect. Morduch and Siculcar (2002) claimed that since the components are linear in the regression coefficient, that is, \( S^m = \frac{\hat{\beta}_m \sum_i a_i(y)x_i^m}{I(y)} \), the standard errors are simply \( \sigma(S^m) = \frac{\sigma(\hat{\beta}_m) \sum_i a_i(y)x_i^m}{I(y)} \). This however, ignores the fact that \( \frac{\sum_i a_i(y)x_i^m}{I(y)} \) is a random variable that is not independent of \( \hat{\beta}_m \) (through the dependence of \( \hat{\beta}_m \) on \( y \)).

Hence, the true standard errors computed in such a simple way (which in fact results in t-statistics that are identical to those of the regression coefficient) is not straightforward. At least for the Gini index of inequality, it is not straightforward 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 straightforward either.
determinants of inequality. Even the number of variables (exogenous) can be arbitrary with proxies being used whenever the need arises.

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:

$$\ln y_i = \alpha + \beta_1 x_{i1}^1 + \beta_2 x_{i1}^2 + \ldots + \beta_m x_{im}^m + \epsilon_i$$

where $y_i$ represents the log-per capita expenditure, $\beta_i = 1, \ldots, M$ are the vectors of parameters and $x_{i1}^1, x_{i1}^2, \ldots, x_{im}^m$ are the independent variables which explain expenditure, and $\epsilon$ is vector of residuals. These right-hand side variables are vast and intend to capture the household income generating capacity or factors. Such variables include; age, gender, level of education, employment, access to public goods, dummies for regional variables, ownership of household durables, landholdings etc.

Despite the practicability of this model, resolving issues related to the constant as well as the residual term needs to be tackled. This is because it is generally agreed that, a constant source of income is widely known to either lower the level of inequality when it is positive or raise the level of inequality when it is negative. In addition, ignoring the residual term does affect the shape of the empirical Lorenz curve. Its presence or absence results in different income density functions which affects income distribution or measured inequality. 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-after approach recommended by Cancian and Reed (1998)).

Having identified the aforementioned shortcomings, we adopt the simple yet powerful procedure proposed by Wan (2002) for regression-based inequality decomposition which resolves these pitfalls and limitations. In this vein, let us express our estimated income generating function (regression equation) as:

$$y = F(X) + \epsilon = \alpha + y^*(X) + \epsilon$$

Where $Y=$ the income generating function (per capita expenditure) or its transformation such as the logarithm of income ($\ln Y$) and $X=$ income (expenditure) determinants of their transformation, $\alpha$ is the constant term, $\epsilon$ is the error term and $y^*(X)$ is estimated income sources. It is crucial noting that the above model specification is very general. Here, $F(X)$ 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. Now, let $y^*(X) = \sum \beta_m x^m = \sum y_m$ where $y_i = \beta_m x_i^m$ representing the income flow from the $m^{th}$ factor.
Let the deterministic part of (9) be considered as \( \hat{y} \). This may be represented basing ourselves on (8) as \( \hat{y} = \alpha + \hat{y}^* = \alpha + \sum_i y_i \).

Using \( I(*) \) as an indicator of an inequality measure, we can compute the inequality measures for the error term \( \varepsilon \), and following Shorrocks (1999) by removing \( \varepsilon \) we obtain:

\[
CO_\varepsilon = I(y) - I(\hat{y})
\]  

(10)

The difference between \( I(y) \) and \( I(\hat{y}) \) 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. Looking at it from this perspective, the decomposition makes intuitive as well as theoretical sense.

Having identified the contribution of the residual term, the next task is to disentangle the contributions made by the constant term.

Simply, \( CO_\alpha = I(\hat{y}) - I(y^*) \)  

(11),

since \( \hat{y} = y^* + \alpha \).

Determining the contributions of the estimated income factors we have:

\[ CO_{y^*(X)} = I(y^*) \]  

(12),

where all the contributions are simply attributed to the estimated factor used in the decomposition.

In summary \( I(y) \) can be decomposed into \( CO_\varepsilon \), \( CO_\alpha \) and \( CO_{y^*} \) (which represents the estimated factor sources). Representing the percentage contributions, let

\[ y_i = y_i^* + \varepsilon_i \]  

(13),

for the whole estimated income generating function

\[ y_i^* = y_i - \hat{\alpha} \]  

(14),

translates solely the estimated factors and;

\[ \varepsilon_i = y_i - \hat{y}_i \]  

(15),

showing the value of the residual term.

Thus the percentage contributions of the error term, constant and estimated factors are:
It is straightforward to see that the decompositions given by (16) to (18) always add to 100%. Another aspect worth noting is that, we can compute the change in value of the estimated shares or proportion of the two periods (time $t=1$ for 1996 and $t=2$ for 2001) as:

$$\Delta S^m_i = S^m_2 - S^m_1$$ \hfill (19)

Extending this framework to the contributions of the constant component, the estimated explanatory variable component and the residual component we have:

$$\Delta CO_{\epsilon,t} = CO_{\epsilon,2} - CO_{\epsilon,1} \quad \Delta CO_{y,t} = CO_{y,2} - CO_{y,1}, \text{ and } \Delta CO_{\alpha,t} = CO_{\alpha,2} - CO_{\alpha,1}.$$ \hfill (18)

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. After estimating consumption function using econometric techniques, which regresses income on the various independent variables, an inequality index will be used as a measure of inequality that evaluates the contributions allocated to each explanatory variable of total inequality and this is performed using a web-based software developed by the WIDER institute.

This approach is very general because it is independent of inequality measures used. The procedure is also independent of the functional specification of $F(X)$. Furthermore, any arbitrary transformation of the target variable is allowed as long as one is prepared to measure inequality over the transformed value, as in Fields and Yoo (2000). In many cases, even if the dependent variable is transformed, inequality can still be measured over the original target variable by this procedure.
4.1.2 Possible Indicators used in our Analysis

The regression-based decomposition approach, enable us identify the following indicators that will be used in our analysis. In order to compute some results, we use the regression-based function obtained to compute the proportional inequality share of each household.

For the m sources indicator shares for household $i$, we have:

$$ S_{im} = \beta_m^\wedge \left[ \frac{a_i(y)x_{im}}{I(y^{\star})} \right] $$

(20)$^{13}$

For the composite or aggregate inequality share of household $i$, we have:

$$ S_i = \frac{1}{I(y)} \left[ \sum_{m=1}^M \beta_m^\wedge a_i(y)x_{im} \right] $$

(21).

This is simply the total shares of household $i$ in explaining aggregate inequality.

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.

Thus, income share of source flows per household is:

$$ Q_{im} = \frac{\beta_m^\wedge x_{im}}{y_i^\wedge}, $$

(22)

where the denominator may also be $y_i$ or $y_i^\wedge$.

The aggregate household income share of income source flows is:

$$ Q_i = \frac{\sum_{m=1}^M \beta_m^\wedge x_{im}}{y_i} $$

(23)

and $y_i$ = total observed household income, $y_i^\wedge$ the sum of all the estimated household income sources plus the constant term $\left( \alpha + \sum_{m=1}^M \beta_m^\wedge x_{im} \right)$ and $y_i^{\star}$ is sum of all the estimated income source flows excluding the constant and residual term $\left( \sum_{m=1}^M \beta_m^\wedge x_{im} \right)$.

$^{13}$ We can also calculate the inequality shares by substituting the value of the denominator with either $y_i$ (the inequality value of total income) or $y_i^\wedge$ (the inequality value of the estimated household income).
4.1.3 Analyzing the Link between Poverty and Inequality in Cameroon

To analyze the link between poverty and inequality in Cameroon, we adopt a methodology proposed by Araar and Awoyemi (2006), and based on the Shapley value approach. In this section we will show: (1) how between-and-within-group inequality contribute to the total poverty, notably, what is the contribution of regional disparities to total poverty as well as the contribution of the within-group inequality of a given group (female/male) to total poverty in Cameroon; (2) what is the contribution of inequality in income-sources to total poverty, checking whether the same factor that contribute significantly to total inequality can also explain poverty in Cameroon.

Let the poverty indices be decomposed as follows:

\[ P(y,z) = E_\mu + E_\pi \]  \hspace{1cm} (24)

where, \( y \) represents the vector of income, \( z \) is the poverty line, \( E_\mu \) is the contribution of average income (\( \mu \)) with perfect equality and \( E_\pi \) is the contribution of total inequality (\( \pi \)) with observed average income.

**A(A)** The form of decomposition proposed by Araar and Awoyemi (2006) that resolves the above questions (first question) takes the form:

\[ P(y,z) = E_\mu + E_B + \sum_{d=1}^{D} E_{W}^d \]  \hspace{1cm} (25)

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. This is simply the difference in the poverty index when the component is present minus when the component is absent. 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

14 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.

15 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.

16 Re-expressing the contribution of average income we have: \( E_{\mu/\pi=0} = \begin{cases} 0, & \text{when } \mu \geq z \\ P(\mu, z), & \text{when } \mu < z \end{cases} \). This expression indicates that the 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.
vector of income where each household has the average income of its group $\mu_d$. This relationship is represented in the following equation:

$$MC_w = P(y) - P\left(\frac{\mu}{\mu_d}\right)$$  \hspace{1cm} (26)

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 $P\left(\frac{\mu}{\mu_d}\right)$ 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 $\mu$. Thus, the marginal contribution of the between group inequality is:

$$MC_b = P\left(\frac{\mu}{\mu_d}\right) - P\left(y, \frac{\mu}{\mu_d}\right)$$  \hspace{1cm} (27)

where, $MC_b$ is the marginal contribution of the between-group inequality, $P(y)$ the poverty index with the observed household incomes and $P\left(y, \frac{\mu}{\mu_d}\right)$ 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 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:

$$E_\pi = E_w + E_b$$  \hspace{1cm} (28)

where:

$$E_b = \frac{1}{2}\left[ P(y) - P\left(y, \frac{\mu}{\mu_d}\right) + P\left(\mu_d\right) - P\left(\mu\right) \right]$$  \hspace{1cm} (29)

$$E_w = \frac{1}{2}\left[ P(y) - P\left(\mu_d\right) + P\left(y, \frac{\mu}{\mu_d}\right) - P\left(\mu\right) \right]$$  \hspace{1cm} (30)

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
\[ E^d_w = \frac{1}{2} \Phi_d \left[ P_d \left( y \right) - P_d \left( y \left( \frac{\mu}{\mu_d} \right) \right) + P_d \left( \mu_d \right) - P_d \left( \mu \right) \right] \]  

where, \( \Phi_d \) is the population share of group \( d \).

(B) Estimating the contribution of inequality in income-sources to total poverty in Cameroon (answering question 2) Let us proceed as follows:

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 \( \mu_m \) for each household if the component, \( m \), is eliminated, we have:

\[ MC_m = E_\pi - P \left( y^o = \sum_k s_{k,m} + \mu_m \right) \]  

where \( MC_m \) is the marginal contribution of the income source, \( m \), \( E_\pi \) the contribution of total inequality in explaining total poverty with the observed income and \( P \left( y^o \right) \) 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:

\[ E_\pi < \sum_m MC_m \]  

To resolve this issue, the Shapley approach with the same rule for removing inequalities in income sources may be used. To generate these results, we will use the DAD Software developed by the PEP Research Network.

4.2 Applying the Regression-Based decomposition to Analyze Gender Welfare

We extend the existing regression-based method to account for gender welfare. This part of the analysis will lead to more informative results, as well as complementing the other findings in this research study. In this section, we will perform (1) undertake a spatial and inter-temporal subgroup decomposition of the Gini via the Shapley value approach to study the between-group and within-group components of male and female inequality in Cameroon, and (2) perform a traditional Oaxaca traditional decomposition to study gender inequality in Cameroon.
4.2.1 Subgroup Decomposition of Gender Inequality Sources: Shapley Value Approach

In trying to understand gender inequality in Cameroon, we are going to study spatial and inter-temporal (between-group and within-group) components of male and female inequality sources in Cameroon.

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, 1998; Araar, 2006):

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

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 $\varepsilon$ 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 ($G^{sh}_w$) and between-group inequality component ($G^{sh}_B$) given by: $G(y) = G^{sh}_w + G^{sh}_B$. 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 \( \mu/\mu_k \). This operation renders the average value of each group to equal \( \mu \); (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 \( \mu_k \); 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:

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

and

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

From the within-group contribution to total inequality expressed in equation (35), the second step consists of decomposing global within-group inequality as a sum of within-group inequality across groups. Since we set \( G(\mu) = 0 \), 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 (35) as:

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

The Shapley Value Contribution of group \( F \) to global within-group inequality is given as:
This procedure can be applied symmetrically for the second group. Fortunately, this decomposition is already generalized and programmed in the software DAD 4.4. This procedure is also applicable to inter-temporal changes in Gini indices of the considered distribution.

4.2.2 Explaining differences in the within-and-between group inequality

We can further develop our analyses to investigate how factors explain the difference in within-group inequality. This is expressed by the equation:

\[
H_{\text{male}}(y) - H_{\text{female}}(y) = \sum_{m=1}^{M+1} \left( CO_{m,\text{male}} - CO_{m,\text{female}} \right)
\]

where, \( H_{\text{\bullet}}(y) \) refers to the case where each individual has the income of his group, \( CO_{\text{\bullet,\bullet}} \), the contribution to total inequality explained by source \( m \), where each individual has the income source of his group.

Analyzing how these factors will explain the difference in between-group inequality we have:

\[
\hat{H}(y) = \sum_{m=1}^{M+1} \hat{CO}_m
\]

where, \( \hat{H}(y) \) refers to the case where each individual has the average income of his group and \( \hat{CO}_m \) the contribution to total inequality explained by source \( m \) where each individual has the average income source of his group. We can also perform an inter-temporal analysis of these differences, while holding same the variable types between the two periods.

4.3 The Oaxaca Traditional Decomposition Methodology Applied to Gender Inequality in Cameroon

In trying to tackle gender inequality as well as factors that contribute more to income-inequality within male-headed and female-headed household in this study, we use the Oaxaca (1973) and Blinder (1973) approach to study the difference in household expenditure between male and female. This technique hinges on the basic premise that in the absence of societal discrimination (considered as a source of inequality), the household expenditure structure faced by men also applies to women. Here, the method
for measuring these two sources of the difference in gender expenditure-discrimination and personal-specific characteristics is to estimate separate semi-log income expenditure functions for male and female, and to decompose the difference in the mean of the log of household income expenditure. This difference in household income expenditure disparity will translate the inequality situation between men and women. In this section we will: (1) analyze gender inequality within male-headed and female-headed households; (2) compute the partial gender inequality of a particular characteristic and; (3) determine a discrimination index that captures discrimination between male-and-female headed households.

Establishing this framework, if the male and female geometric mean of household expenditure is denoted by \( Y^M \) and \( Y^F \), we can decompose the log-differential of geometric mean \( \Delta \) as follows:

\[
\Delta \equiv \log \left( \frac{Y^M}{Y^F} \right) = \left( \log \left( Y^M \right) - \log \left( Y^0F \right) \right) + \left( \log \left( Y^0F \right) - \log Y^F \right)
\]

In which we denote by \( Y^0F \) a hypothetical distortion-free or discrimination-free mean household expenditure for woman. Furthermore, we can summarize the variation in the male-female income expenditure cross section sample by using the following common place statistical models:

\[
\ln y_{i,M} = X_i \beta^M + \varepsilon_i
\]

and

\[
\ln y_{j,F} = X_j \beta^F + \varepsilon_i
\]

In which \( y_{i,M} \) is the log expenditure of man \( i \) and \( y_{j,F} \) is the log income expenditure of woman \( j \); \( \beta^M \) and \( \beta^F \) are the coefficients that determine the effects of characteristics on household spending and \( X_i \) and \( X_j \) 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 equation (42) and (43), the stochastic \( \varepsilon \)-term drops out.

Designating arithmetic mean by an over lined variable \( \bar{y}^\alpha \), where \( \alpha = M \) or \( F \) for men and women, and applying a semi-log regression we have:

\[
\ln \bar{y}^M = X^M \hat{\beta}^M
\]

and

\[
\ln \bar{y}^F = X^F \hat{\beta}^F
\]

17 Discrimination here is considered as the difference not explained by differences in household income expenditure-determining personal characteristics.
which simply says that mean expenditures are predicted by using mean characteristics and, $\beta^F$ and $\beta^M$ the vectors of the estimated coefficients of the female and male groups.

Since $\bar{y}$ is the mean of the log, it is the log of the geometric means $\bar{Y}$ we can then plug equation (44) and (45) into (41), and averaging this relationship we obtain:

$$\Delta = \frac{1}{2} \left( \beta^M + \beta^F \right) \left( \bar{X}^M - \bar{X}^F \right) + \frac{1}{2} \left( \frac{X^M + X^F}{2} \right) \left( \beta^M - \beta^F \right)$$

Equation (46) 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). In this paper, we distinguish the contribution of different characteristics on the one hand and of the unexplained differential effect on the other hand. The structural form of equation (46) resolves the critical issue\(^{18}\) of having to define a priori a reference structure for our analysis. This structure (equation 46) emerges by avoiding the arbitrariness in selecting the gender structure reference and by analyzing the wage 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 the 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 as follows:

$$PE_i = \left[ b_i^M + b_i^F \left( x_i^M - x_i^F \right) \right] + \frac{1}{2} \left( \frac{x_i^M + x_i^F}{2} \right) \left( b_i^M - b_i^F \right)$$

where $b_i^M$ and $b_i^F$ are the estimated coefficients of the $i-$th characteristics, $x_i$ denotes the mean value of the $i-$th characteristic or endowment and $PE_i$ is the partial gender inequality attributable to the characteristics of the individual.

After 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;

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\(^{18}\) 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 $\beta$-vectors. However, Oaxaca and Ransom (1997) cautions us on the use of categorical variables because its presence implies that the unexplained part of each of these variables cannot be uniquely determined. Therefore, as in Vartiainen, (2002) and Papapetrou, (2005), we choose simply to present the computations 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?”
by constructing 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:

$$DISC_f = \left\{ \exp \left( \left( \hat{\beta}_m - \hat{\beta}_f \right) \tilde{X}_f \right) - 1 \right\} \times 100$$

(48)$^{19}$

Here $DISC_f$ 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 income/expenditure as men. This, therefore, represents the increase in well-being of women if the discriminations were eliminated.$^{20}$ Concluding this subsection, we highlight the fact that we are going to mirror the above procedure to study the difference between male and female household heads in Cameroon, using the ECAM I and II household surveys.

### 4.4 Applying the Shapley Value to Study the variations in Poverty and Inequality by Attributes

To better understand the Shapley decomposition rule, let $\Omega$, represent an aggregate statistical indicator, such as a welfare indicator that translates the overall level of poverty or inequality. Let $X_k, k = 1, 2, ..., m$, denote a set of contributory factors which together account for the value of $\Omega$, which we define as: $\Omega = f \left( x^1, x^2, ..., x^m \right)$, with $f(\bullet)$ being a suitable aggregate function representing the underlying model. The goal of any decomposition exercise is to assign contributions $J_k$ to each of the factor $X_k$ such that the value of $\Omega$ should ideally represent the sum of the contributory factors. Globally, the proposed solution considers the marginal effect of eliminating each of the contributory factors. This procedure yields an exact additive decomposition of $\Omega$ into $m$ contributions.

Following Shorrocks (1999), we imagine a scenario in which some or all of the factors are eliminated and use $F(S)$ to signify the value $\Omega$ takes when the factors $X_k, k \not\in S$ have been dropped. As each of the factors is either present or absent, it is convenient to characterize the model structure $\langle K, F \rangle$ in terms of a set of factors, $K$, and the function $F : \{ S / S \in K \} \rightarrow \mathbb{R}$. This implies $F(\emptyset) = 0$ when all the factors are removed from $\Omega$. A decomposition of $\langle K, F \rangle$ is a set of values $J_k, k \in K$, indicating the contribution of each of the factors. In seeking a decomposition rule Shapley (1953) proposes the following axioms: symmetry, linearity, and efficiency. The only function that satisfies these axioms is the Shapley value. The Shapley value for player $k$, denoted

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$^{19}$ This index may be subjected to modifications to incorporate other methods as in Chzhen (2006) or Gonzalez et. al., (2005).

$^{20}$ The discrimination coefficient can be carried out using the male human capital attributes as standardize factors.
by $J^s_{k} (k,v)$, is thus defined as the weighted mean of its marginal contribution over the set of coalitions, given by:

$$J^s_{k} (k,v) = \sum_{s=0; S \subseteq K \setminus \{k\}}^{m-1} \sum_{|S|=s} \frac{s!(n-s-1)!}{n!} \left[ v(S \cup \{k\}) - v(S) \right]$$

(49)

This value is symmetric, exact and additive when used in redistributive analysis (see, Shorrocks, 1999). To apply this value we consider components or factors rather than players in explaining changes under consideration.

In adopting this framework in our analysis, let, for instance, $Q_{m,t}^i = \frac{\hat{\beta}_{m,t} x_{i,t}^m}{y_{i,t}^*}$ be the proportion or share of the estimated source, m, at period t ($t = 1$ for 1996 and $t = 2$ for 2001) allocated to each household $i$ that possesses the explanatory variable $X_i$ which determines source m’s proportional contribution or let $Q_{i,t} = \frac{\sum_{m=1}^{M} \hat{\beta}_{m,t} x_{i,t}^m}{y_{i,t}^*}$ the composite allocation to household $i$.

Following Shorrocks (1999), the mean component obtained from households that contribute in determining the share of estimated source between the initial and final period is given by: $G = \left( \frac{\mu_2}{\mu_1} \right) - 1$ and the redistribution component is obtained by a shift in the Lorenz curve by: $R = L_2 - L_1^{21}$, where $\mu$ = average well-being and $L$ = the Lorenz curve. The exercise can now be expressed as identifying the contributions of growth, $J_G$, and redistribution, $J_R$, in analyzing changes in a measure which is additively decomposable. Adopting the $P_\alpha$ class of our measures (as with the simple FGT poverty measure in Foster et al., 1984) and considering fixed threshold ($Z$) levels of contributions to income inequality by source or composite of sources, changes in poverty levels by sources can now be expressed as:

$$\Delta P^m_{\alpha} = P^m_{\alpha,2} - P^m_{\alpha,1}$$

$$= P_{\alpha} (\mu_2 (1 + G), L_1 + R) - P_{\alpha} (\mu_1, L_1) = \nu_{\alpha} (G, R)$$

(50)

The growth and redistribution components can be distilled from Equation 22 as follows:

For growth:

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21 As noted by Shorrocks, this is slightly an overstatement for both components need to be distinguished from variables showing growth and redistribution. Since growth and redistribution are eliminated by setting $G$ and $R$ equal to zero, no serious confusion arises.
\[ J_{aG}^{m,sh} (2, v) = \frac{1}{2} \left[ v(G, R) - v(R) + v(G) - v(\emptyset) \right] \\
= \frac{1}{2} \left[ P_a (\mu_2, L_2) - P_a (\mu_1, L_1) - \left[ P_a (\mu_2, L_2) - P_a (\mu_1, L_1) \right] + P_a (\mu_2, L_1) - P_a (\mu_1, L_1) \right] \\
= \frac{1}{2} \left[ P_a (\mu_2, L_2) - P_a (\mu_1, L_2) + P_a (\mu_2, L_1) - P_a (\mu_1, L_1) \right] \quad (51) \]

For Redistribution:
\[ J_{aR}^{m,sh} (2, v) = \frac{1}{2} \left[ v(R, G) - v(G) + v(R) - v(\emptyset) \right] \\
= \frac{1}{2} \left[ P_a (\mu_2, L_2) - P_a (\mu_1, L_1) - \left[ P_a (\mu_2, L_2) - P_a (\mu_1, L_1) \right] + P_a (\mu_1, L_2) - P_a (\mu_1, L_1) \right] \\
= \frac{1}{2} \left[ P_a (\mu_2, L_2) - P_a (\mu_2, L_1) + P_a (\mu_1, L_2) - P_a (\mu_1, L_1) \right] \quad (52) \]

Overall change in the considered measure is given by:
\[ \Delta P_{a}^{m} = J_{aG}^{m,sh} (2, v) + J_{aR}^{m,sh} (2, v) \quad (53) \]

Omitting the superscript, \( m \), (equation 53) gives rise to the decomposition of changes in the composite allocation of the household level.

5. Data Requirements and some Econometric issues

The data considered in this study will be the ECAM I (1996), ECAM II (2001) and ECAM III household surveys. However, as for the ECAM III its usage will be conditioned on the publication of these results by the National institute of Statistics. Till date, the availability of these results is still pending.

The ECAM I survey was conducted by the DSCN-MINEFI in 1996 (over three months). This survey was 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 conditions of the living standards of the households; (2) Establish the relationship that exist between the different dimensions of the living standards of these households and; (3) Analyse the tendencies and evolutions of household living standard relative to other sources of data.

The ECAM II survey was undertaken in 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 profile base. 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 the living standard of households and a poverty line accepted by major development partners, which would serve as a reference for further analysis. This acts as a follow up of the poverty reduction
program; (2) To analyse monetary poverty, poverty in terms of living standards of most households and potential poverty, while establishing the correlation between them; (3) The production of 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 calculations used in calculating price indexes (INS, 2002a; 2002b).

The ECAM III survey was carried out from May to June in 2007. The main objective of this survey was to produce indicators that capture and explain the living standards of the population. These indicators will help update the current poverty profile, evaluate strategies aimed at poverty reduction (PRSP) as well as the efforts geared at attaining the objectives enshrined in the Millennium Development Goals. Specific objectives were: (1) to study the correlation between monetary poverty, welfare poverty, potential poverty and subjective poverty, both nationally and regionally; (2) study the dynamics of poverty between 2001 and 2007, with the aim of evaluating the impact of the macro-economic policies put in place by the government these last years on the living standards; (3) to analyze and identify determinants that affect education; (4) evaluate internal tourism within Cameroon and; (5) collect data on child labor in Cameroon (See 3eme Enquête Camerounaise Auprès des Ménages (ECAM III), National Institute of Statistics, 2007).

Variables selected for the analysis include; education which is capture by the level of education of the household head; household size represented by the number of persons in a given house which will be controlled for possible scale economies in households (Lanjouw and Ravallion, 1998); gender which is the sex orientation of the household head (D=1 if female, 0 if otherwise); age and the square of age (experience) represented by the age of the household head. The sector dummy which is (D=1 if rural and 0, if urban). Occupation of household heads which is (D=1, if in the informal sector and 0, if in the formal sector). Region represented by forest, savannah, Haut plateau, other towns, Douala and Yaoundé, which represents the current focus on geographical inequality geared at finding the spatial inequality map of an area. Indicator of public goods which are considered as indicator of infrastructural development with D=1, representing access of electricity/water/telephone and D=0, otherwise.

**Potential Econometric Problems**

Parental Education or average household head education expressed in years of schooling in the formal education sector or literacy status may be endogenous to household expenditure per capita because it is a decision variable. In this context, potential instruments of household education are needed to consistently estimate effects of education on household expenditure per capita. The instruments for average educational attainment or literacy status are those that affect demand for education without directly influencing expenditure. As noted in Wooldridge (1997), Instrumental variables would be unbiased and consistent only when one or the other of the following conditions holds:

(a) The expected value of the interaction between average household education and its fitted residual is zero. Or
(b) The expectation of the interaction between the average household education and its fitted residual is linear. However, if the correlation is non-linear, then the interaction term as one of the regressors purges the estimated coefficient and the effects of the unobserved variables (see Card, 2001). In this case the MLE procedure will be used to estimate the Engle curve. Another problem as concerns the regression may be the obtainment of biased estimates when applying the OLS methods due to correlation between the variables. This can be resolved, for instance, via the 2SLS or other methods to verify any effect of causality between the variables.

6. Dissemination Strategy

As the project progresses, the team members are intending to disseminate the findings, knowledge, and techniques from the research to colleagues through faculty seminars. Upon completion of the study, findings from his research will be to some extent integrated into the development strategy of Cameroon through a number of activities covering a wide range of activities such as seminars, papers and audio-visual press interventions. First of all, the proposed study will be presented in at least a seminar and a roundtable conference. The first seminar will be held in the host institute of the researchers –University of Yaoundé II, Soa, Cameroon. More precisely in the Centre of Studies and Research on Economics and Management (Centre d’Etudes et Recherche en Economie et Gestion-CEREG) attached to the Faculty of Economics and Management of the University of Yaoundé II.

The final report will be presented and discussed in round table arrangements that target stakeholders including development partners. Policy briefs will be made available to policy-makers and development partners in Cameroon and also to the public. The final report of our study will produce a PEP working paper, which will be made available to our institution and the Ministry of Planning and Regional Development, which is charged with the formulation and implementation of the PRSP, as well as the Government’s Statistic Office, which also performs poverty and inequality analysis.

While the first seminar targets local researchers, the results from the round table are hoped to disseminate the result of the research to policy makers, who are primarily interested and directly in charge of formulating poverty-alleviated policies. Moreover, Dr. Francis Menjo Baye has worked and still maintains a long working relationship with government organs charged with the formulation and monitoring of the PRSP. In addition, we intend to expand outreach of the study to access international organizations such as World Bank and UNDP in Cameroon. Secondly, a primary objective of the research team is to present the main findings of the interim report at international conferences for exchanging ideas and receiving comments. Third, main findings of the study will be geared toward publications in various forms. We intend to publish article(s) emanating from the research in academic journals, scientific reviews, working papers, reader friendly policy briefs, etc.
7. List of Key References


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


8. Prior Training and Experience of Team Members

1) Epo Boniface Ngah, is a PhD student in the Faculty of Economics and Management, University of Yaoundé II. He is currently working on impacts of globalisation on poverty and inequality trends in Cameroon. He presented a paper on the HIPC process and determinants of regional poverty in Cameroon, in an interfaculty seminar from the 8th-9th November 2007, jointly organised by the University of Buea (Cameroon) and the Council for the Development of Social Science Research in Africa (CODESRIA).

2) Francis Menjo Baye (PhD) is a senior lecturer in the Faculty of Economics and Management, University of Yaoundé II. He has received training on issues of poverty measurement and analysis since the seminar workshop in 1997 in Kampala, Uganda, and subsequently, through seminars of the collaborative research project on poverty under the support of AERC, Nairobi, Kenya. He has also benefited from twinning arrangements with CIRPÉE, Université Laval (October 2003). More recently he presented a paper in a conference on poverty organised by CSAE, University of Oxford (21-22 March 2004), and another in Cape Town, South Africa on poverty reduction, Macro-micro linkage, organised by DPRU, TIPS and Cornell University (13-15 October 2004). He also presented a paper on Structure of Sectoral Decomposition of Aggregate poverty Changes in Cameroon, Accra, Ghana, on 21-22 July 2005. In December 2007, he just finalized an
AERC project on: Exact configuration of poverty, inequality and polarization trends in the distribution of well-being in Cameroon, submitting a final report. He recently presented these findings in the CSAE, Oxford from the 14th to 18th March 2008. Lastly, he is also supervising the PhD thesis of Epo Boniface Ngah and other research students.

3) Mrs Manga Teme A Nadine is employed in the Ministry of Health and a student in the University of Yaoundé II, finalizing her MS.c (DEA). She is carrying out a study on Comparing the Monetary and Non-Monetary approaches in explaining poverty in Cameroon.

9. Expected Capacity Building

Epo Boniface Ngah is presently doing a Ph.D in development economics. The conduct of this study which is part of my PhD will give me not only a sound base, but also experience and capacity building for future research in the domain of poverty and inequality analysis. In addition, access to material provided by the network will enable me enhance my knowledge and know-how.

Mrs Manga Teme A Nadine is currently finalizing her Msc (DEA). This research project will help her in acquiring knowledge and building her capacity on poverty and inequality issues. This project will also enable her to pursue a PhD program in the domain of poverty analysis by enabling her learn new analytic techniques in regressing and decomposing poverty or inequality issues.

In details, the capacity building will be structured as follows:

(1) **Team leader**: Epo Boniface Ngah
- Improve research skills on policy-relevant research.
- Broaden research capacity to include a wide range of issues of development economics: poverty, inequality and assets endowment, in both theoretical and empirical fields.
- Deepen the knowledge of econometrics techniques in regression analysis (including software’s such as STATA) provided by the PEP network.
- Strengthen the non-parametric technique, i.e. new methods of decomposition (DAD, SPSS).
- Improve the skills of conducting and implementing a dissemination strategy of the research.
- Improve the relationship with other State organizations and other research institutes during the project.
- Aim to establish the international cooperation between the host institutes and foreign organisations.

(2) **Team member**: Baye Menjo Francis (PhD)
- Broaden research capacity to include a wide range of issues of development economics: poverty, inequality, asset endowments and gender issues.
- Deepen the knowledge of econometrics techniques in regression analysis.
- Strengthen the non-parametric technique, i.e. new methods of decomposition
- Extend the theoretical knowledge of poverty, inequality, asset enhancement and gender
issues in development.

- Improve the relationship with other State organizations and other research institutes during the project.
- Help other team members improve the research skills and knowledge of econometrics.
- Give training Stata software to other members in the host institution.

**3) Team member: Nadine Manga Angele T**

- Learn Stata software and econometrics, e.g. regression analysis.
- Train techniques of secondary data gathering and of data management
- Gain both theoretical and empirical knowledge of poverty, inequality, asset endowment and gender issues in development.
- Learn the non-parametric technique, i.e. new methods of decomposition (DAD, SPSS).
- Develop skills of doing policy-relevant research, skills on writing report and papers and skills on research presentation.
- Improve skills on conducting policy formulation, writing report and papers
- Improve the relationship with other State organizations and other research institutes during the research.

**The task will be partitioned as follows:**

Epo Boniface Ngah will effectuate empirical test (analysis) on the regression-based decomposition approach, the analysis linking inequality to poverty, the within-and-between group decomposition, the gender analysis and the inter-temporal analysis. He will be assisted by Mrs. Manga Nadine in undertaking gender welfare inequality analysis. Mrs. Manga Nadine will principally be in charge of gathering data, as well as managing the data (data treatment).

Mr. Baye M.F. (PhD) will be the overall supervisor of the team. Given his vast experience in the fields of research and policy paper writing, he will oversee the other team members in all the domains and will supervise the simulation processes and ensure quality control.

**10. Risk and other Relevant Issues**

To the best of our knowledge except for serious illness or death of the members, we are sure to accomplish the research in record time. We are sure to be in possession of all the data announced above.

**11. List of Past, Current or Pending Projects in Related Areas**

- **Recent Past Projects**

  **Francis Menjo Baye (PhD)**


Epo Boniface Ngah

Paper entitled: The HIPC process and determinants of Regional poverty Changes in Cameroon. Paper presented in the interfaculty seminar Organised by the CODESRIA and the University of Buea. 8-9 November 2007.

Nadine Manga T.A.
Dissertation entitled ‘Comparing the Monetary and Non-Monetary approaches in explaining poverty in Cameroon.’

-Current Projects

Francis Menjo Baye (PhD)
Demand for reproductive Health care Services in Cameroon. AERC collaborative project on Reproductive Health, Economic Growth and poverty Reduction in Africa.

-Pending projects.

Epo Boniface Ngah
Currently extracting a paper from MS.c. dissertation for submission to a Journal for publication.