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Welfare Distribution and Poverty in Uganda, 1992-1997

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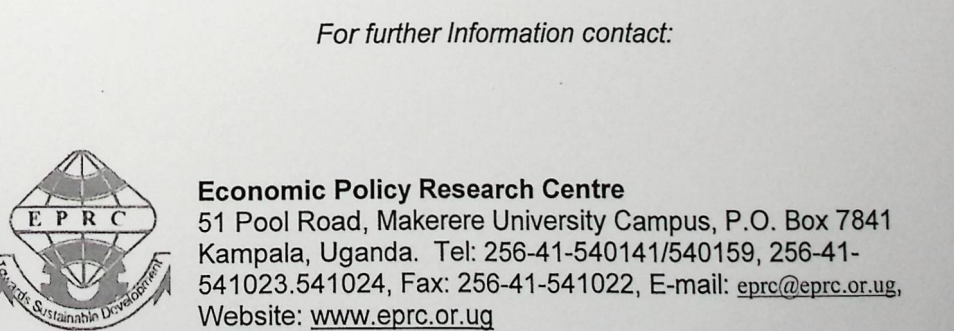
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Abstract

This study is done against a background of far-reaching economic reform policies and programs. In the paper different measures of inequality and stochastic dominance analysis are applied to a series of regionally representative Uganda household survey data to shed light on the intertemporal patterns of changes in welfare levels and distribution in Uganda across geographical and socioeconomic groupings of policy interest. Using household consumption expenditure we find that, overall, inequality declined in Uganda between 1992 and 1997. However, within Eastern region, one of the four regions of the country, and among rural households, there was an increase in inequality during this period. Stochastic dominance analysis of welfare distribution reveals that Ugandan households were better off in 1997 than in 1992 irrespective of the choice of a poverty line. At the regional level, a striking result is that, in Western region household welfare was not any better in 1997 than in 1996. An analysis of a sub-regional panel based on rural/urban categorization illustrates that deliberate policy focus on welfare distribution would significantly enhance the poverty-reducing impact of growth.

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1. Introduction

Uganda's dramatic turnaround from the political, social and economic decay of the 1970s and early 1980s earned the country some international recognition as a successful case of both post-conflict economic recovery and peacetime policy reforms. This was achieved mainly through firm commitment to stringent donor-supported reform programs. In the late 1980s, the initial period of the economic recovery, the country benefited from several lending operations that targeted rehabilitation of key social and economic infrastructure. The rehabilitation process was immediately followed by unwavering pursuit of reform policies and programs that aimed to restore macroeconomic stability and promote aggregate growth. Policy focus on human capital development and a general move from macro to micro are recent developments that are succinctly manifested in the Poverty Eradication Action Plan (PEAP), Universal Primary Education program (UPE), and Plan for Modernization of Agriculture (PMA).

The impact of the various policies and programs on the nation's welfare is indicated by the reduction in the percentage of the population living in poverty from 56% in 1992 to 44% in 1997. The distribution of the realized reduction in poverty is however skewed. In the agricultural sector, for instance, much of the reduction in poverty occurred among coffee farmers. But with the downward spiral in the coffee sector after the boom of the mid 1990s, serious skeptical scrutiny of the performance of the economy has recently taken center stage in Uganda's reform story.

The contentious debate about the reform success story takes two major dimensions. The first is that although there has been tremendous macroeconomic growth, the distribution of the associated welfare benefits is quite unequal across the various groups that are of political and socioeconomic policy interest. The second dimension is that the growth debate features serious skepticism about the official government position on the trend of poverty in Uganda. Skeptics contend that poverty has at all not declined in Uganda. Others

argue that poverty certainly declined up to 1995/96, after which it started to rise. The principle objective of this paper is therefore to capitalize on the time series of Uganda national household survey in order to make additional scientific contributions to the debate on the trend of growth and changes in welfare level and distribution in Uganda.

According to the theoretical literature, inequality in welfare distribution means different things to different people, and therefore its definition can be quite debatable. Different definitions often lead to different results. In this paper, we conceptualize inequality as the dispersion of a distribution, for example, of income, consumption, or some other welfare indicator or attribute of a population. Specifically, we use consumption expenditure as a measure of welfare because other measures such as income are not reliably comparable over time in the available survey data.

Inequality is often conceptualized as part of a broader analysis covering poverty and welfare, although these three concepts are distinct. Inequality is a broader concept than poverty. It is defined not only over the censored distribution of individuals or households below a given poverty line but over the whole distribution. Incomes/consumption at the top and in the middle of the distribution may be just as important to us in perceiving and measuring inequality as those at the bottom. However, inequality is a much narrower concept than welfare. Welfare captures all aspects of socioeconomic wellbeing. Although both inequality and welfare capture the whole distribution of a given indicator, inequality is independent of the mean of the distribution.

In Uganda, there is renewed interest in understanding inequality for a number of reasons. First, recent empirical studies provide conflicting results about inequality in Uganda. Whereas some studies, such as Appleton (1999), find that it is on the decline, a contradictory view is portrayed in other studies (see, for example, UPPAP (1999) and Opio (1997)). Second, with the high rates of economic growth

experienced in Uganda in consecutive years during the last decade, it is expected that the benefits of the growth have eventually trickled down to all sectors of the economy, resulting in a reduction in inequality. But there is growing concern, and evidence from household surveys shows, that regional economic imbalances remain quite distinct in Uganda. Understanding the links between inequality and the performance of the Ugandan economy has become an integral part of understanding development process and the socioeconomic impacts of different policies.

The most commonly used indicator of inequality for Uganda has been the Gini coefficient. A comparison of Uganda's Gini values with those of other countries in the region shows that inequality has been much lower in Uganda than in some eastern and southern African countries (Table 1).

Table 1: Inequality comparison for selected low-income countries

	Zimbabwe	Zambia	Kenya	Uganda	Tanzania	Ghana
Gini coefficient	0.568	0.498	0.445	0.392	0.382	0.327
GNP per capita (dollars 1998)	610	330	330	320	210	390
Income share of lowest 10%	1.80	1.60	1.80	2.60	2.80	3.60
Income share of highest 10%	46.90	39.20	34.90	31.20	30.10	26.10
Av. Annual growth of GNP(97-98)	-0.40	-1.80	1.50	5.80	3.20	4.60

Source: World Development Report, 1999

This paper seeks to make the following contributions in furthering policy relevant knowledge on poverty and welfare distribution. First, it analyses inequality in Uganda using the Gini coefficient and the Theil entropy in order to provide a robust indication of the pattern of inequality in the country. Furthermore, we disaggregate welfare distribution in Uganda by regional and socioeconomic groupings. Data limitations do not permit our analysis to extend to lower levels of disaggregation such as by district or main source of household income. Nevertheless, the decomposition we perform in this paper is useful because few past studies have applied these measures to analyze inequality in Uganda at different geographical and socioeconomic levels. Second, the analysis uses the stochastic dominance approach to compare the distribution of welfare levels

within and across groups over time in order to test the robustness of the changes in poverty that have been reported by other scholars using the same data. Third, we construct rural/urban sub-regional panels from five consecutive annual national household surveys and use the resulting data to estimate the potential long-term impact of growth and inequality on poverty.

This paper is, however, not intended to be a comprehensive survey of the issues that lead to inequality and therefore some important applications, such as the evaluation of the effects of specific policy interventions on welfare distribution are beyond the scope of this work.

The data analyzed for the paper come from household surveys, which were conducted annually from 1992 to 1997 by the Uganda Bureau of Statistics (UBOS). Each year the survey covered a nationally representative sample of households - about 10,000 households in the 1992/93 Integrated Household Survey (IHS), and about 5,000 households in each of the follow-up monitoring surveys (MS). This paper is structured into eight major sections. Before presenting the results of analysis of intertemporal change in welfare levels and distribution, we shall provide an overview of the trends in the Ugandan economy. After that we review measurement issues and indicators related to inequality and poverty. In section four we present the derivation of the Uganda poverty lines used in our analysis. In section five we use some of the inequality indicators discussed in section three to derive inequality statistics for Uganda, while section six discusses and applies stochastic dominance analysis to the Ugandan welfare data. Section seven uses econometric methods to estimate the elasticity of poverty headcount ratio to growth and inequality. The last section summarizes key results and draws conclusions.

2. Overview of Trends in the Uganda Economy

At independence in 1962, Uganda inherited one of the most buoyant economies in Sub-Saharan Africa, characterized by a steady annual GDP growth rate of about five percent in real terms. During the 1960s the economy enjoyed private

consumption expansion at the rate of 5.6 percent per year. A high rate of domestic savings, averaging 15 percent, provided the bulk of financial requirements for domestic investment. All sectors had positive growth rates and the economy was not constrained by balance of payments or inflationary pressure in any significant way. Prices were relatively stable with annual inflation rates that were maintained in the single digits.

But the turmoil that was associated with the ascension to political power by the military in 1971 shattered the country and derailed it from the strong economic track that it had taken. The period 1971 to 1980 was ultimately characterized by domestic and external shocks that were largely associated with the loss of entrepreneurial capacity due to the 1972 expulsion of Ugandans of Asian origin. Consequently, the economy suffered tremendous neglect of the productive sector, macroeconomic mismanagement, lack of investment and maintenance of capital goods, destruction of administrative and management infrastructure, growth of illegal parallel markets, difficult economic and political relations with the outside world, and negative consequences of the collapse of the East African Community.

During this period of the 1970s the institutional framework for policy making collapsed. Fixed foreign exchange rates were maintained despite the prevalence of rapid inflation. Revenue collection declined and the foreign exchange constraint worsened. Real GDP growth rate was persistently negative. Between 1970 and 1985 the economy experienced a 30 percentage-point contraction in size. This period was mainly characterised by insecurity, misallocation of resources and lack of political and economic guidance and direction. Economic activities shifted from productive activities in the real sector to speculative transactions.

Following the political change that brought the National Resistance Movement to power in 1986, significant relative calm was restored and the economy experienced a glimmer of hope that also attracted substantial donor support to an Economic Recovery Program (ERP) that was launched in May 1987, an initiative

that was immediately followed by a sequence of Structural Adjustment Programs (SAP).

The ERP that was supported by the Economic Recovery Credits (ERC) and Structural Adjustment Credits (SAC) from the International Development Association and the Enhanced Structural Adjustment Facility (ESAF) from the International Monetary Fund, plus other multi-lateral and bilateral assistance were primarily aimed at realizing economic rehabilitation, growth, domestic financial stability, and low inflation rates. Indeed, a stable macroeconomic environment was achieved, particularly by 1992, resulting in a sustained growth rate of not less than five percent per annum. Inflation rate was once again contained within the single digits.

2.1 Policies and programs aimed at welfare redistribution and poverty eradication in Uganda

Despite the relatively high economic growth by Sub-Saharan African standard, poverty remains severe and widespread. In particular, the spread of the benefit of the economic growth is argued to be quite limited. Accordingly, eradication of poverty is the highest policy priority of the Uganda government. Several specific action programs have therefore been initiated to tackle the persistence of poverty in the country. Most of the action programs are contained in, or are subsidiaries of, the Poverty Eradication Action Plan (PEAP) – the ultimate embodiment of poverty policies.

The Poverty Eradication Action Plan (PEAP)

In 1996 the Government of Uganda realized that although the country's economic performance over the past decade had been remarkably good, massive poverty remained prevalent. The government then resolved to prioritize poverty eradication as the major focus of its overall sustained growth and development strategy. In effect, a Poverty Eradication Action Plan was formulated through a consultative process involving major stakeholders. The result of the consultative process was the 1997 final draft PEAP document.

Under the PEAP the government has adopted a four-pronged approach to poverty eradication, namely: (a) macroeconomic framework for poverty eradication; (b) an institutional framework for poverty reduction; (c) measures to increase the incomes of the poor; and (d) measures to improve the quality of life of the poor.

Measures to increase the incomes of the poor focus on:

- Provision of an adequate and reliable road system that would benefit the poor by opening villages to the rest of the country, reducing transport costs, and increasing the prices farmers receive for their produce;
- Enactment of a land Law which gives rights over land to all citizens including men, women, orphans and children, plus promotion of sustainable utilization of land;
- Modernization of agriculture with an objective of transforming it from a subsistence to commercial system through improved research, extension and farmers' linkages, development of marketing infrastructure, accessing credit in rural areas, and promoting agro-industrial enterprises;
- Development of a rural market infrastructure;
- Promotion of strategies and interventions that increase employment and improve labor productivity; and
- Promotion of micro financing institutions to increase credit access to small and medium scale enterprises.

Measures to improve the quality of life of the poor include:

- Provision of adequate and affordable primary health care facilities in an effort to transform the existing health system from largely a curative to preventative system;
- Provision of safe drinking water on a sustainable basis for the people and animals in an effort to reduce or eliminate the incidence of water borne diseases;

- Provision of basic education and functional literacy programs that equip recipients with the necessary skills to survive and improve the quality of ones life; and
- Promotion of conservation and sustainable use of natural resources, soil, forests, biomass, water bodies, wetlands and wildlife.

The PEAP is consistent with the government's economic liberalization strategy in that government action is confined to providing public goods, which the private sector does not have adequate incentives to provide, for example, feeder roads to increase access to markets, security, land rights for the poor, and universal primary education. The priorities identified in the PEAP have been reflected in national budgets to ensure that public investment is pro-poor. The objective is to create an environment through good governance and regulatory reforms as well as to target sectoral interventions that can generate productive employment for the poor. At the sectoral level, there are four priority areas: primary education, primary health care, agricultural extension, and rural feeder roads. Regional disparities are to be reduced through the enforcement of national minimum standards of basic service delivery.

The 1997 PEAP was revised in 2000 and will serve as Uganda's Poverty Reduction Strategy Paper (PRSP). The general goals of the revised PEAP build on the goals outlined in the 1997 PEAP and are closely related to the key themes identified in the country's Vision 2025, which envisages:

- A technologically advanced, competitive, self-sustaining and growing economy;
- A health, well-educated society with a high quality of life;
- Regional integration and international co-operation, with Uganda as a regional hub;
- Harmonious coexistence within a dynamic society where the citizenry is responsible, accountable, hardworking and peaceful;
- Effective, participatory and democratic governance; and

- Equal opportunities, empowerment and poverty eradication.

The four goals of the PEAP can be summarized as follows.

1) *Economic growth and structural transformation*

The realization is that poverty cannot decline unless the economy as a whole grows, and economic growth requires structural transformation. This involves the following intermediate objectives:

- Improved technology in all sectors and in enterprises;
- Better information about economic opportunities in all sectors;
- Macroeconomic stability, which is a necessary condition for economic growth;
- Macroeconomic incentives for competitive economic activity
- Social, physical and human infrastructure for economic growth

2) *Good governance and security*

Security is both an instrument for poverty eradication and a result of it.

Components of this objective include:

- Promotion of human rights;
- Regional and domestic conflict resolution;
- Crime reduction through efficient administration of law and order;
- Strengthening the democratization process;
- Ensuring efficient public expenditure;
- Ensuring effective and honest service delivery;
- Democracy and empowerment, including the empowerment of both men and women, and the promotion and protection of the rights of the disadvantaged and vulnerable ; and
- Disaster management.

3) *Increased ability of the poor to raise their incomes*

The maximization of economic growth in Uganda requires the participation of the poor. Intermediate objectives here include:

- Ensuring access to appropriate technology for the poor;

- Ensuring adequate infrastructure for transport and energy;
- Ensuring access to productive assets (land, capital and savings);
- Promoting access to formal jobs as well as self-employment inside and outside agriculture;
- Ensuring that the environment can continue to support agricultural production;
- Enhancing gender balance in the control of productive resources; and
- Ensuring the poor are able to cope with temporary fluctuations in their income

4) *Enhanced quality of life of the poor*

The quality of life is directly affected by the following components

- Promoting education and literacy;
- Promoting better health and the ability to choose family size;
- Ensuring access to safe and convenient water supply;
- Increasing access to information;
- Promoting adequate nutrition;
- Ensuring the voice of the poor is heard in decisions which affect their lives; and
- Promoting the most positive aspects of Ugandan culture.

As already noted earlier, all the goals are mutually reinforcing in that many of the actions contribute simultaneously to several goals. The revision of the PEAP benefited extensively from the reinforcing voices of the poor that were collected through a qualitative consultative process commonly known in Uganda as the Uganda Participatory Poverty Assessment Program.

The Uganda Participatory Poverty Assessment Program (UPPAP)

When the drafting of the PEAP was nearing completion the Ministry of Finance, Planning and Economic Development (MFPED) - the ministry responsible for the PEAP - realized that the process had been excessively Kampala and elite based. Accordingly, in mid 1997 MFPED staff participating in a World Bank Country Assistance Strategy mission to Eastern and Western Uganda found that the

communities consulted did not necessarily share the PEAP priorities. In particular, the poorest of the poor in Uganda did not participate in the making of the PEAP. Recognition of the importance of understanding local variations in poverty prompted an exercise in participatory poverty assessment. As a result, the UPPAP was designed to strengthen the understanding and nature of poverty with the primary view to complement statistical monitoring of trends in poverty.

UPPAP is a three year research and advocacy project which seeks to bring the voice and perspective of the poor into national and district planning for poverty reduction in Uganda by enhancing knowledge about the nature and causes of poverty and the corresponding strategies for action, building district capacity to plan for poverty reduction, and developing a national system for qualitative and quantitative poverty monitoring.

The core activity of UPPAP is participatory poverty assessment, an exercise that has been carried out in nine districts (Moroto, Moyo, Kapchorwa, Kumi, Kalangala, Kampala, Kisoro, Kabarole, and Bushenyi). The first round of participatory poverty assessment in the nine districts began in September 1998. One of the main objectives of the UPPAP is to institutionalize a participatory approach to the assessment and monitoring of poverty at the district level. In its second phase, UPPAP will support capacity building for local participatory planning. Each of the nine districts involved in the first training process for the UPPAP sent three participants, usually a planner, a councilor and a Non-Governmental Organization representative. These three people are being supported by three members of the core UPPAP team in conducting four weeks of field research using participatory methods. The findings of the process have been discussed with district and national authorities and disseminated to government planners. UPPAP findings will support an ongoing process at the MFPED of improving the information on poverty used by planners through the publication of discussion papers on poverty trends in Uganda.

2.2 Facilitating the realization of the PEAP objectives

Several other programs have been initiated to facilitate the implementation of the PEAP. These include the Poverty Action Fund, fiscal decentralization, Plan for Modernization of Agriculture, and Universal Primary Education program.

Poverty Action Fund (PAF)

A major policy initiative directly aimed at poverty alleviation is the creation of the Poverty Action Fund. The PAF is where money from debt relief is channeled, with the sole purpose of funding programs that have direct bearing on poverty. In other words the primary aim of the PAF is the mobilization of additional resources for programs in the Poverty Eradication Action Plan, through the savings from Highly Indebted Poor Countries debt relief and additional donor contributions, specifically for poverty reduction interventions. The Ministry of Finance, Planning and Economic Development in consultation with other line Ministries determines which programs qualify to benefit from the PAF. Such a participatory process in budgeting for pro-poor programs is an important milestone in ensuring poverty orientation of public expenditure programs.

Government acknowledges that additional responsibilities come with the success of mobilizing these additional resources. A key commitment of Government is to see that this large increase in expenditure in PAF program areas actually translates into improved services on the ground. Therefore, Government committed itself to improving monitoring and accountability of programs under the PAF and ensuring transparency in the PAF's operations. To this end 5% of PAF funds are earmarked specifically for enhancing monitoring and accountability.

The PAF has succeeded in raising the profile of social sector expenditures. The Quarterly PAF meetings have proved very effective in doing so. They provide a public forum for discussing PAF issues and reviewing progress in PAF programs. The attendance has been widened, and now includes representatives of line ministries, Local governments, NGO's, and donors. They meetings have been

effective in increasing transparency highlighting shortcomings in the PAF implementation and improving accountability.

Decentralization

Since the bulk of the population is in agriculture in the rural areas, taking services closer to the people would improve on the efficiency with which services are delivered. EPRC/World Bank (1996) show that only 37% of the money released by the Ministry of Finance for non-salary primary school expenditures actually reached the intended schools. But the ongoing decentralization process should dramatically improve this. Although decentralization of responsibilities from the center to the districts have not been matched with flow of resources from the center (Obwona *et al.*, 2000), it is expected that the decentralization learning curve will smoothen out such that we realize resource flows that are consistent with the amount of responsibilities transferred. This consistency is crucial if the shift of donor assistance strategy from project aid to budget support is to enhance rural economic growth. The Medium Term Expenditure Framework for 1999/2000 to 2002/2003 indicate that fiscal transfers will continuously rise throughout this period, especially in sectors that have been identified to be crucial for poverty eradication. The increase in transfers is expected to emanate from increased flow of resources into the Poverty Action Fund.

Plan For Modernization of Agriculture

In as far as poverty is rural based, and because most of the poor people are basically trapped in subsistence agriculture, the Plan for Modernization of Agriculture (PMA) should offer real opportunities for movement out of poverty. Indeed the PMA is intended to be the main instrument for realizing the desired outcomes laid out in the Poverty Eradication Action Plan. Because the PMA targets small-scale producers, if well executed, it can significantly contribute to poverty reduction.

The PMA aims to increase peoples' incomes and improve their livelihoods by: ...

- 1) Developing a sustainable extension service to reach all agricultural households to promote a move out of subsistence production without undermining food security;
- 2) Promoting adoption of modern technologies;
- 3) Rehabilitating key infrastructure: rural feeder roads, rural markets, and storage facilities;
- 4) Encouraging provision of credit and market information to farmers; and
- 5) Removing fiscal measures that are harmful to agricultural production and trade.

While the focus on agricultural modernization is rather recent, there had been other pro-poor government efforts in the sector, notably the liberalization of commodity prices and removal of monopoly powers of government enterprises, namely Coffee Marketing Board (CMB), Lint Marketing Board (LMB) and Produce Marketing Board (PMB). At the time when the CMB was solely responsible for exporting Uganda's coffee, farmers' share of the export price was less than 30%. After liberalization of the coffee sub-sector in 1991 their share rose from 45% in 1991/92 to 82% in 1996/97. This has positive implications for poverty because an estimated 2.5 million people (about 13 % of the total population) depend on coffee for their livelihood through production and marketing. The implication is that focusing on agriculture, especially through a modernization program, presents a real opportunity to reduce poverty and achieve substantial growth in other sectors through consumption and employment linkages.

Universal Primary Education

One of the most successfully implemented poverty oriented programs in Uganda is the Universal Primary Education (UPE) program. Preliminary results coming from ongoing analysis of the 1992 and 1999 national household survey data show huge success rates with the UPE program.¹ There has been tremendous

increase in the primary school enrolment rate of 6 – 12 year old children from households in the poorest 20% of the population. Gender bias in access to primary education has also been wiped out, with enrolment rate of girls from the poorest 20% of the population climbing up substantially. Rural-urban differences in enrolment continue to decline significantly. Most importantly, there has been a significant shift in the reasons for non-attendance from cost factors to "lack of interest" and shocks in the child's family. Increased efforts should, however, now be biased towards quality indicators such as qualified teacher-student ratio and students' grades. In addition educational focus should start shifting towards expanding capacity and access at the secondary level.

3. Inequality and Poverty Measurement

Having looked at an extensive overview of major trends and policies in the Ugandan economy, we shall now turn to assess the extent to which the various policies and programs have in totality impacted welfare levels and distribution over time and across various groups. In this section we briefly highlight some inequality and poverty issues before applying various measures of inequality to the Uganda national household survey data. The issue of poverty is handled in a later section via stochastic dominance analysis of trends in welfare levels.

The common practice in inequality measurement starts by identifying a single indicator of inequality. So far, several measures of inequality have been developed in the literature; all of which have some intuitive or mathematical appeal. In this section, we discuss the axiomatic approach and outline five key axioms, which inequality measures are usually required to meet. These axioms form the basis of our inequality measurement in the next subsection.

¹ These results are forthcoming in a paper on cost of schooling and primary school enrollment in Uganda, by Klaus Deininger of the Development Economic Research Group of the World Bank.

3.1 The axiomatic approach to inequality measurement

The Pigou-Dalton Transfer Principle (Dalton, 1920; Pigou, 1912): This axiom requires an inequality measure to rise (or at least not fall) in response to a mean-preserving welfare spread. That is, an income transfer from a richer to a poorer person should have a non-increasing impact on inequality while an income transfer from a poorer person to a richer person should have a non-decreasing impact on inequality (see Atkinson, 1970, 1983, Cowell, 1985, Sen, 1973). Consider the vector y' which is a transformation of the vector y obtained by a transfer d from y_j to y_i (that is, from individual j 's budget to individual i 's budget) where $y_i > y_j$, and $y_i + d > y_j - d$. The transfer principle is satisfied if and only if, for a given inequality indicator, $I(\cdot)$, $I(y') \geq I(y)$. Most measures of inequality that are in the literature, with the main exception of the logarithmic variance and the variance of logarithms, satisfy this principle (see Cowell, 1995).

Anonymity: This axiom requires that the inequality measure be independent of any characteristic of individuals other than their income (or the welfare indicator whose distribution is being measured). It is sometimes referred to as 'Symmetry'. Hence for any permutation y' of y , $I(y) = I(y')$.

Principle of Population (Dalton, 1920): This principle requires inequality measures to be invariant to replications of the population. That is, merging two identical distributions should not alter inequality. For any scalar $k > 0$, $I(y) = I(y[k])$, where $y[k]$ is a concatenation of the vector y , k times.

Income Scale Independence: Inequality measures are required to be invariant to uniform proportional changes: that is, if each individual's income changes by the same proportion (as it happens, say, when changing currency unit) then inequality should not change. Hence for any scalar $k > 0$, $I(y) = I(ky)$. Again most standard measures pass this test except the variance since $\text{var}(ky) = k^2 \text{var}(y)$.

Decomposability: This requires overall inequality to be related consistently to constituent parts of the distribution, such as population sub-groups. For example, if inequality rises within each sub-group of the population, then it is expected that overall inequality should increase. Some measures, such as the Generalized Entropy class of measures, are easily decomposable into intuitively appealing components of within- and between-group inequality: $I_{\text{total}} = I_{\text{within}} + I_{\text{between}}$. Other measures, such as the Atkinson set of inequality measures, can be decomposed but the two components of within- and between-group inequality do not sum to total inequality. The Gini coefficient is only decomposable if the partitions are non-overlapping, that is the sub-groups of the population do not overlap in the vector of incomes.

Cowell (1995) shows that any measure $I(y)$ that satisfies all of these axioms is a member of the Generalized Entropy (GE) class of inequality measures, hence we focus our attention on this reduced set. We however present the Atkinson class of inequality measures (which are ordinally equivalent to the GE class) and the popular Gini coefficient as well.

3.2. Inequality measures

Given these axioms, several measures of inequality have been generated. Most of the members of the Generalized Entropy class of measures have the general formulation

$$GE(\alpha) = 1/\alpha^2 - \alpha \left[1/n \sum_{i=1}^n (y_i / \bar{y})^\alpha - 1 \right]$$

where, n is the number of individuals in the sample, y_i is the income of individual i , $i=1, 2, \dots, n$, and $\bar{y} = 1/n \sum_{i=1}^n y_i$ is the arithmetic mean income. GE has a value ranging from 0 to ∞ , with zero representing an equal distribution (identical incomes) and higher values representing higher levels of inequality. The parameter α in the GE class represents the weight given to distances between incomes at different parts of the income distribution, and can take any real value. For lower values of α GE is more sensitive to changes in the lower tail of the

distribution, and for higher values GE is more sensitive to changes that affect the upper tail. The commonest values of α used are 0, 1 and 2: hence a value of $\alpha=0$ gives more weight to distances between incomes in the lower tail, $\alpha=1$ applies equal weights across the distribution, while a value of $\alpha=2$ gives proportionately more weight to gaps in the upper tail. The GE measures with parameters 0 and 1 become two of Theil's (1967) measures of inequality, the mean log deviation and the Theil index, respectively – given by:

$$GE(0) = \left[1/n \sum_{i=1}^n \log \bar{y}/y_i \right] \text{ and}$$

$$GE(1) = \left[1/n \sum_{i=1}^n y_i/\bar{y} \log(y_i/\bar{y}) \right]$$

With $\alpha=2$ the GE measure becomes 1/2 the squared coefficient of variation, denoted by CV and given as

$$CV = 1/\bar{y} \left[1/n \sum_{i=1}^n (y_i - \bar{y})^2 \right]^{1/2}$$

The other measure that is commonly used to describe inequality and welfare is the Atkinson coefficient (Atkinson, 1970 for derivation). This index is based on a social welfare evaluation of the expenditure/income distribution. Given a social welfare function, the Atkinson index is constructed by computing the equally distributed equivalent income. This is defined as the level of income per head, which, if equally distributed, would give the same level of welfare as the existing distribution. It is expressed in form of an additive social welfare function, with an inequality aversion parameter *epsilon*. The inequality aversion is always greater than zero and it measures the degree to which social welfare trades off mean living standards on the one hand for equality of the distribution on the other. The choice of a particular value for *epsilon* is a value judgment. As *epsilon* rises, more weight is attached to transfers at the lower end of the distribution and less

weight to transfers at the top. For instance, if $\epsilon=2$, and individual i is twice as well off as j , then the marginal social utility of additional x to j is one fourth the total marginal social utility of additional x to j . As ϵ tends to infinity, the marginal social utility of the poorest dominates over all the other marginal utilities, and policy is usually concerned with only the poorest.

The Atkinson class of measures has the general formula:

$$A_{\epsilon} = 1 - \left[\frac{1}{n} \sum_{i=1}^n (y_i / \bar{y})^{1-\epsilon} \right]^{1/(1-\epsilon)}$$

where ϵ is an inequality aversion parameter, $0 < \epsilon < \infty$: the higher the value of ϵ the more society is concerned about inequality (Atkinson, 1970). The Atkinson class of measures range from 0 to 1, with zero representing no inequality. Setting $\alpha = 1-\epsilon$, the GE class becomes ordinally equivalent to the Atkinson class, for values of $\alpha < 1$ (Cowell, 1995).

The Gini coefficient satisfies axioms 1 to 4 above, but fails the decomposability axiom if the sub-vectors of income overlap. There are ways of decomposing the Gini but the component terms of total inequality are not always intuitively or mathematically appealing (see an attempt at a decomposition with a more intuitive residual term by Yitzhaki and Lerman, 1991). However the Gini's popularity merits it a mention here. It is defined as follows:

$$Gini = 1/2n^2 \sum_{i=1}^n \sum_{j=1}^n |y_i - y_j|$$

The Gini coefficient takes on values between 0 and 1 with zero interpreted as no inequality.

All the various measures of inequality seem relevant to the Ugandan situation. However, we shall apply only a few measures that should provide a robust basis for comparison of inequality over time and across socioeconomic groups. The welfare measure used in the analysis is household consumption expenditure – adjusted for household size using adult equivalent scales.

3.3 Poverty measures

In this sub-section we introduce the standard measures of poverty before proceeding, in the next sub-section, to provide a detailed description of the adjustments made to the household consumption expenditure data and the derivation of the Uganda poverty lines that we use in our analysis of inequality and changes in welfare levels.

Let y denote a welfare measure, which has density function $f(y)$, and cumulative distribution function $F(y) = \int_0^y f(x)dx$. If there is a poverty line denoted by z , then

both y and z are associated with a measure of poverty $p(y,z)$, which is non-increasing in y and non-decreasing in z . An important class of measures have the property that $p(y,z)$ is homogeneous of degree zero in y and z , that is, they are scale invariant.

Following Atkinson (1987) we consider the class of additive poverty measures, implying that the value of aggregate poverty is then given by:

$$P(z) = \int_0^z p(y,z) f(y) dy$$

Additive measures satisfy sub-group consistency, as defined by Forster and Shorrocks (1991). This requires that when poverty increases in any sub-group of the population (such as the rural areas) without a decrease in poverty elsewhere, then aggregate poverty must also increase. The most commonly used measures of poverty are the Forster-Greer-Thorbecke (1984) measure (FGT), expressed as

$$p(y, z) = \frac{1}{n} \sum [(z - y_j) / z]^\alpha$$

where, α is the parameter that determines the particular measure of poverty.

The poverty headcount index is based on the axiomatic approach developed by Sen (1976) and is among the conventional methods used to measure poverty in Uganda. It is based on the poverty line and measures the proportion of the population below a given poverty line. Symbolically if n is the population and if the expenditures are set in ascending order as:

$$Y_1 \leq Y_2 \leq \dots \leq Y_q < Z \leq Y_{q+1} \leq \dots \leq Y_n$$

where, Z is the poverty line, and q is the number of people below the poverty line.

The people who fall below the poverty line, also known as the headcount ratio H can be expressed as:

$$H = q/n, \text{ or } H = F(Z) \text{ in the continuous case.}$$

The headcount is a convenient measure of poverty but for some purposes (including policy or program impact analysis) it has a serious drawback. The problem with the headcount ratio is that it only identifies the number of the poor, but fails to capture its depth (how poor they are). It is totally insensitive to differences in the depth of poverty.

The poverty gap index (PG) is measured by $p(y, z) = \frac{1}{n} \sum (z - y_j) / z$, that is, when

α is set to 1. This indicates the average depth, in that it depends on the distances of the poor below the poverty line. PG indicates the potential for eliminating poverty by targeting transfers to the poor (whether or not the potential can be realised in practice is a different matter). One major drawback of PG is that it neglects income inequality among the poor and may not convincingly capture differences in the severity of poverty.

When α is set equal to 2, we obtain a poverty measure that is sensitive to the distribution of welfare among the poor.

4. Derivation of the Uganda Poverty Lines

Major data adjustments

The use of the available Ugandan household survey data by various researchers to monitor changes in living standards has relied on household consumption expenditure as a measure of welfare. We use adjusted household consumption expenditure generated by Appleton (1999) in all calculations that involve a measure of welfare. Precisely, after data cleaning, the adjustments made ensured that the expenditure data reported by households are comparable across surveys, time and geographical regions.

The first set of adjustments was to do with sampling. All the five surveys that generated the data analyzed in this paper used the same sampling frame based on the 1991 population census to draw nationally representative samples. But because of insecurity, two districts in the north and two in the west of the country were not covered in the 1997 survey. For consistency, the four districts, comprising about 6% of the country's population, were excluded from the analysis.

The consumption expenditure data is measured in 1989 shillings to adjust for intertemporal nominal price changes. The adjustment used the composite national Consumer Price Index (CPI) as the price deflator. Using the national household budget survey data and the 1992/93 integrated household survey data Appleton (1996) demonstrates that the deflator derived from the survey data largely corroborated the CPI. Appleton (1999) used monthly or annual average of CPI in accordance with whether the reference period for a given expenditure item was "the last 30 days" or "the last one year."

Because food prices vary markedly between regions, especially between urban and rural areas, unit values of purchases of major food items were used to construct rural/urban regional food price indices for each survey, which were, in

turn, used to adjust the consumption expenditure data for spatial price variation. Non-food prices were assumed to be constant across regions.

After carrying out the major adjustments outlined above, Appleton (1999) applied the WHO's adult equivalent scales to generate household consumption expenditure per adult equivalent as the welfare measure for generating the widely quoted Uganda poverty trend statistics. For grossing up purposes, the adult equivalent household size was multiplied by the household survey weight to obtain estimates of various poverty statistics for the Ugandan population.

Derivation of poverty lines

A commonly used approach for identifying the poor is the costing of a basket of basic needs (basic food and non-food needs of the poor). The basic needs approach, what Appleton (1999) applied to generated the widely quoted poverty statistics for Uganda, can be described as follows in the context of the Ugandan work.

One of the first steps in the calculation of a poverty line via the basic needs approach is the adoption of a WHO food energy requirement for a given age group by sex. For the Uganda poverty lines, Appleton does not control for variation in energy requirement by sex. He uses WHO's adult male ($18 \leq \text{age} \leq 30$) energy requirement to calculate the value of the per-adult-equivalent daily calorie intake. Using the household consumption expenditure per adult equivalent, together with the cost of meeting the required per-adult-equivalent daily calorie intake (3000 calories per day) as the food poverty line, the non-food basic needs are inferred and the total poverty line is computed. Households are then categorized as poor or non-poor depending on whether their total consumption per adult equivalent is below or above the total poverty line.

Because of the absence of some prior meaningfully derived poverty line for Uganda, Appleton ranks households by their consumption per adult equivalent and identifies 28 major food items that are consumed by the poorest 50% to serve as the reference food basket. Because the food items were reported in various measurement units, Appleton focuses on observations with metric measurements to obtain the unit value in the respective metric measurement (reported value divided by reported quantity). Appleton then gets the median unit value in the respective metric unit, and converts the median unit values into per-kilogram unit values (adopted as the per-kilogram price now). A new set of quantities consumed is then generated by dividing each reported quantity (converted to kilogram) by the per-kilogram price. Finally, the mean daily quantity consumed of each item per person in the household is calculated and multiplied with the corresponding calorific value per kilogram times a scientifically determined retention rate to get the corresponding number of calories taken per person per day by the poorest 50%. The ratio of this number of calories to the WHO recommended 3000 calories is then used to scale the reference food basket in order to get the respective quantities required to provide 3000 calories. The total cost of the resulting food basket (where items are consumed in the same proportion as in the reference food basket) is then obtained and adopted as the food poverty line.

Using a standard procedure, the non-food requirements are derived using the food poverty line. Basically, the non-food expenditure of those households whose total expenditure is equal to the food poverty line is considered to be an expenditure towards meeting other basic needs since at their level of welfare, spending on non-food items occurs at the expense of food energy requirements. In brief, the process of obtaining non-food requirements involves regressing the share of food in household total expenditure on the log of the ratio of consumption expenditure per adult equivalent to the food poverty line, relevant location dummies, and the basic demographic characteristics. The estimated equation is then evaluated at the value of consumption expenditure per adult

equivalent equaling the food poverty line (i.e. to deal with those on the food poverty line only). The share of non-food expenditure for those on the poverty line is therefore obtained and the total poverty line for a given location calculated. As already alluded to, this method allows for the derivation of location specific poverty lines corresponding to the location dummies included in the regression equation. The justification for adopting the regional poverty lines is that the estimated food share (evaluated at the food poverty line) is significantly different between rural and urban areas.

5. Inequality Trends in Uganda

Having outlined some of the standard inequality measures and described the welfare data for our analysis, we now apply the measures to the series of household consumption expenditure data in order to measure the extent of welfare inequality in Uganda. Specifically, we compute the Gini and Theil entropy inequality statistics using household consumption expenditure per adult equivalent (CPAE). The results of the analysis, presented in tables 2 and 3 show that the different measures are in broad agreement; all show that inequality was lowest in 1997 and highest in 1996, and that inequality has thus fallen between 1992 and 1997.

The inequality indices we derived indicate that at the national level inequality increased between 1992 and 1996, before remarkably declining to the 1997 level, which is lower than the 1992 level. However, using DAD software version 3.0, we test for the change in inequality between 1992 and 1997 and find that it is statistically insignificant. This illustrates that although there was a robust and substantial decline in poverty between 1992 and 1997 (demonstrated in a later section using stochastic dominance welfare analysis), very little of the poverty improvements could have been due to redistribution. In general, most of the changes in inequality that we report are statistically insignificant but the statistical insignificance of the changes have important interpretations pertaining to the

Table 2: Inequality by geographical location

	1992/93			1993/94			1994/95			1995/96			1996/97		
	Gini	Theil		Gini	Theil		Gini	Theil		Gini	Theil		Gini	Theil	
National	0.3912	0.2816		0.3946	0.2874		0.4003	0.3040		0.4162	0.3359		0.3842	0.2720	
Rural	0.3450	0.2105		0.3848	0.2728		0.3989	0.2998		0.4154	0.3346		0.3704	0.2524	
Urban	0.3864	0.2719		0.3247	0.1764		0.3261	0.1866		0.3416	0.2020		0.3320	0.1986	
Central	0.3933	0.2893		0.3962	0.3075		0.3910	0.2721		0.4151	0.3563		0.3859	0.2849	
Eastern	0.3650	0.2443		0.3638	0.2333		0.3899	0.3266		0.4134	0.3255		0.3780	0.2512	
Western	0.3716	0.2499		0.3745	0.2430		0.3985	0.3039		0.3785	0.2528		0.3597	0.2342	
Northern	0.4023	0.2943		0.3884	0.2635		0.3383	0.1975		0.4027	0.3135		0.3567	0.2230	

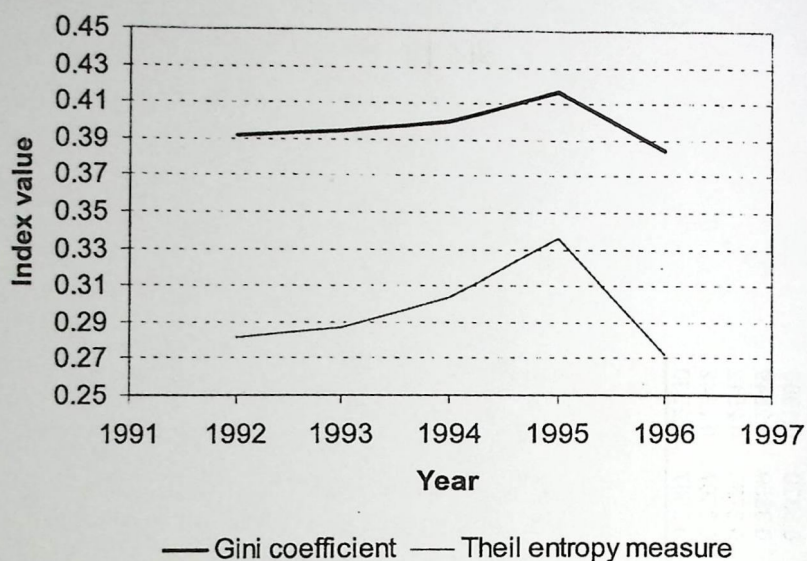
Source: Authors' calculation from 1992 - 97 national household survey data

Table 3: Percentage change in inequality, 1992 - 1997

	Gini		Theil	
	Gini		Theil	
National	-1.79		-3.41	
Rural	7.36		19.89	
Urban	-14.08		-26.97	
Central	-1.90		-1.52	
Eastern	3.57		2.85	
Western	-3.21		-6.30	
Northern	-11.34		-24.21	

Source: Authors' calculation from 1992 - 97 national household survey data

Figure 1: National inequality trend, 1992-1997



The inequality literature indicates that inequality measures should always be interpreted jointly with the mean of the welfare measure adopted in order to assess changes in aggregate well-being. Interestingly, inequality indices rose between 1992 and 1996, a period during which poverty was falling². Given this scenario, the inequality decline between 1992 and 1997 were indeed not significantly linked to the prevailing poverty levels. These estimates provide a good example of the fact that poverty does not always move in the same direction with welfare inequality, that is, inequality can be on the rise when poverty is falling. This is corroborated by Appleton's (1999) decomposition analysis of changes in poverty, which show that the downward trend in poverty in Uganda was largely due to growth rather than distribution.

The Uganda poverty analysis done by Appleton (1999) reveal that increases in living standards were greater in the lower deciles than among the affluent,

² Appleton 1999 shows that poverty headcount fell from 55.5% in 1994 to 48.5% in 1996 and down to 44% in 1997.

leading to a fall in inequality between 1992 and 1997. The decomposition analysis in Appleton's study, which uses the same data set that is analyzed in this paper, shows that the fall in inequality made very little contribution to the remarkable decline in poverty headcount from 56% in 1992 to 44% in 1997. Much of the reduction in poverty is attributable to growth. According to the results in the table below, growth accounted for only 87% of the fall in the headcount index while welfare distribution accounted for only 12% of the poverty reduction.

The pattern of changes in inequality in the 1990s, which is characterized by an initial rise between 1992 and 1996 before declining to its 1997 levels, is conveniently reflected in figure 1. A number of reasons could be advanced to explain this initial rise and subsequent fall in inequality during a period when the country enjoyed consistent falls in poverty. First, using standard decomposition analysis of changes in poverty, the impressive decline in poverty headcount from 56% in 1992 to 44% in 1997 was largely due to growth rather than progressive changes in distribution of welfare (Appleton, 1999). During this period, government policy focused more on economic growth in the initial stages of the period and less on distribution. Consequently, as the country experienced sustained economic growth between 1992 and 1997, the benefits associated with the growth must have percolated the economic fabrics of the country leading to significant decrease in poverty without necessarily improving the inequality situation, especially in the earlier years of the growth period. A second possible explanation is that, over the last several years, the donor community and the government of Uganda have increasingly emphasized the poverty orientation of the development strategies of the country,³ leading to substantial poverty impact of the realized donor-supported growth. As already alluded to, it is plausible to argue that, because the country enjoyed sustained growth, some "trickledown" impact of growth is expected to have resulted in the improvements in the inequality that we observe in the latter part of the period under analysis. This conjecture can be verified by extending the analysis to future survey data.

³ See, for example, the World Bank *Uganda Strategy* 1997 document and Asea *et al.* 1999.

Economic theory suggests that the rise in inequality between 1992 and 1996 in the face of declines in poverty may be associated with two major sets of factors: Long term endogenous and policy related factors.

i) **Long term endogenous factors:** This category includes labor saving effect of technical progress (which reduces the demand for labor and increases the skewedness of the distribution of skills and wages) and the impact of trade liberalization and globalization. Such long term factors have arguable manifested themselves in Uganda in the form of a rapid expansion of the manufacturing and service sectors, thus, providing welfare-improving opportunities to the fraction of the population that already had the necessary human and capital endowment to capitalize on the changing economic environment. With regard to liberalization and globalization, it is worth noting that during 1992 to 1996, the trade liberalization policy implemented by government benefited the coffee sub-sector much more than any other sub-sector, and this could have contributed to the initial increase in inequality, especially in the rural areas; and

ii) **Policy related factors:** Such factors include structural changes in key institutions following the adoption of the structural adjustment programs, long term shifts in macroeconomic policy stances, disparities in geographical or social allocation of public goods and services, pricing policies, and uneven spatial distribution of private sector investment incentives. Relating these conceptual ideas to the situation on the ground raises some interesting conclusions. During the reform period of the 1990s structural changes that occurred in the formal employment sector dealt a final blow to the then already weak abilities of labor organizations to effect wage and living conditions negotiations. For example, the retrenchment that characterized the public service reform of the mid 1990s increased unemployment and resulted in rapid growth of casual labor supply as a coping strategy. All this has depressed the share of labor in total income. In addition, the macroeconomic policy stances that aimed at achieving low inflation and low public budget deficits with minimum amelioration of the associated social and economic costs of restructuring are likely to have contributed to the inequality that our analysis reveal for the 1992/96 period. The abilities and incentives of the private sector to fill the employment gaps created by public

service downsizing and privatization of state enterprises were initially inadequate to stave off deepening inequality outcomes of restructuring.

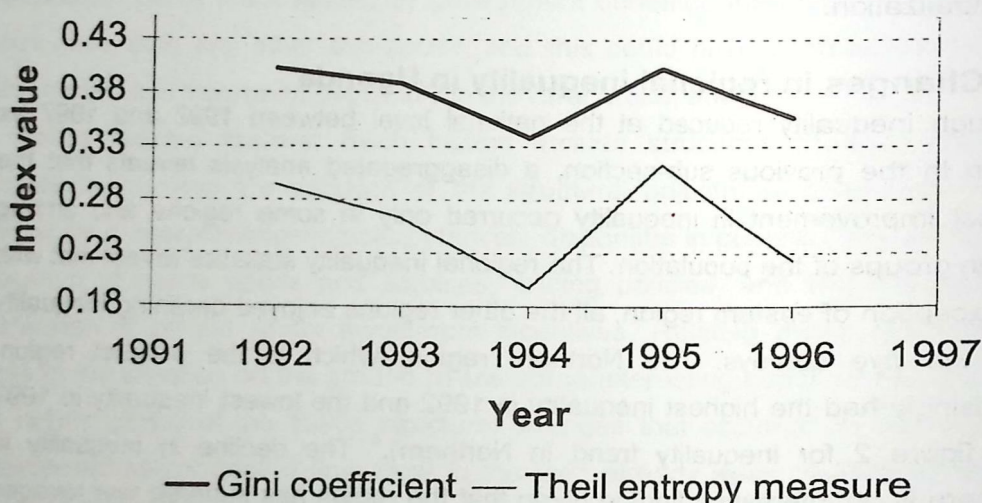
Issues relating to the inequality in the distribution of arable land and human capital, and severely limited access to investment credit, which stifles family enterprise startups, have probably compounded the welfare inequality in the initial stages of the reform in Uganda. Furthermore, the peace that has been sustained in the center of the country and the resulting economic polarization are partly responsible for the conspicuous inter-regional welfare differentials in the country. However, the impact of a given spatial distribution of economic opportunities on intra-regional welfare inequality should be of great interest, especially in the wake of the recently implemented political and fiscal decentralization.

5.1. Changes in regional inequality in Uganda

Although inequality reduced at the national level between 1992 and 1997 as shown in the previous sub-section, a disaggregated analysis reveals that the modest improvement in inequality occurred only in some regions and among certain groups of the population. The regional inequality statistics reveal that with the exception of eastern region, all the other regions enjoyed declining inequality over the five surveys. The Northern region, which is the poorest region, surprisingly had the highest inequality in 1992 and the lowest inequality in 1997 (see figure 2 for inequality trend in Northern).⁴ The decline in inequality in Northern is an interesting finding given that the region has suffered war ravages since the mid 1980s. A possible explanation for this is that, the civil war in the region economically weakened the relatively better off such that there has been no major improvement in their welfare. At the same time there could have been a significant improvement in the welfare of the very poor, shrinking the gap between the very poor and the better off. Results of stochastic dominance analysis presented in a later sub-section support the argument that it was the poor whose welfare markedly improved relative to that of the non-poor, hence

shrinking the inequality gap in the region. The plausibility of this explanation is reinforced by the finding that the headcount ratio for the Northern region declined significantly from 71.3% in 1992 to 58.8% in 1997 (Appleton, 1999). Intuitively, the movements out of poverty by such a large percentage of the households in the region, together with unfavorable security-related conditions for substantial economic progress for those with the capacity to do so, led to a decrease in inequality. However, the results for northern region need to be interpreted with caution because the districts of Gulu and Kitgum were omitted from the analysis since they were not covered during some of the surveys due to security problems (see Table A1 in the appendix for survey details).

Figure 2: Inequality trend in Northern region, 1992-1997

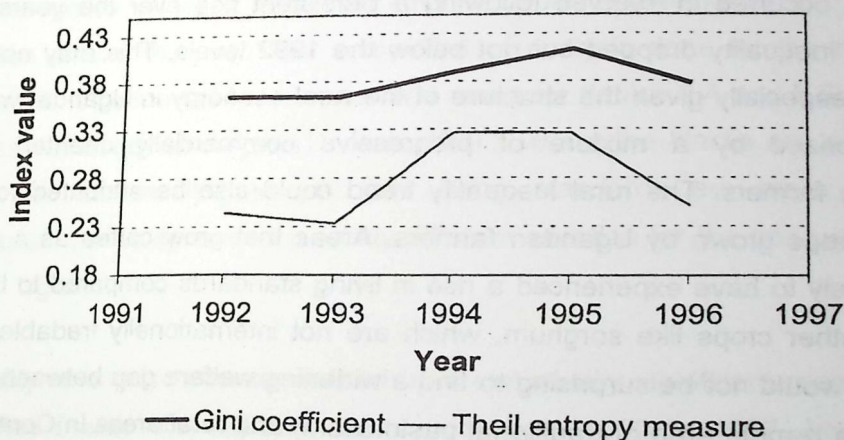


Another surprising result from the regional analysis is the inequality trend in Eastern. Taking the Gini coefficient, table 2 and figure 3 show that inequality persistently increased from 0.3650 in 1992 to 0.3780 in 1997 whereas poverty rates for the region declined from 59.2 to 34.2 percent over the same period. Although the increase in inequality in Eastern region is statistically, it suffices to make some observations about the possible forces that drove the increase. It is

⁴ With the exception of Northern, none of the regions had a statistically significant change in inequality. The decline in inequality in Northern was statistically significant at the 5% level of significance, with a

likely that the benefits of the coffee boom that occurred during the period under study to the coffee growers in one of the Eastern districts, Mbale, may have contributed to the rise in inequality in the region.⁵ The observed inequality pattern in the region could also be explained by the fact that it is a region that is economically very diverse and geographically wide, with a highly industrialized district (Jinja), and some of the poorest districts (Katakwi and Kumi) in Uganda. Another reason for the increase in inequality in Eastern region could be the drought that hit parts of the region during this period. It is therefore likely that welfare declined in drought-stricken areas but was at least unchanged in the others. In brief, the Eastern region is not only one of the poorest regions in the country, but it is also the region with the most unequally distributed living standards.

Figure 3: Inequality trend in Eastern region, 1992-1997



On the other hand, the results for Western region show some decline in inequality, from a Gini coefficient of 0.3716 in 1992 to 0.3597 in 1997, representing a three-percentage point fall. In Central region, inequality fell from a Gini coefficient of 0.3933 in 1992 to 0.3859 in 1997, representing a two-

calculated *t*-value of 4.58.

⁵ Although cash-crop farming was the second poorest sub-sector after food-crop farming in 1992, it experienced dramatic declines in poverty between 1992 and 1996 - by 27%, which is more than twice the national rate of decline over the same period (Appleton, 1997).

percentage point decline.⁶ In a nutshell, Northern region saw the greatest decline in inequality while the contrary is true for Eastern region.

5.2 Changes in inequality by rural/urban categorization

Another important perspective for poverty analysis is by rural/urban categorization. In table 2 and figures A1 and A2 in the appendix, we observe that in 1992 inequality was higher in urban than in rural areas. In the following year, rural areas started experiencing a rise in inequality while urban areas were experiencing a sharp decline. By 1997, rural areas had higher inequality figures than urban areas, meaning that welfare disparities were systematically getting worse in rural areas.

Although poverty fell in both rural and urban areas over the period,⁷ and the mean living standards rose faster in rural areas, the improvements in rural living standards were more unequally distributed. The highest level of inequality in the rural areas occurred in 1995/96 following a persistent rise over the years. In 1997, rural inequality dropped but not below the 1992 levels. This may not be surprising, especially given the structure of the rural economy in Uganda, which is characterized by a mixture of progressive commercially oriented and subsistence farmers. The rural inequality trend could also be attributed to the nature of crops grown by Ugandan farmers. Areas that grow coffee as a main crop are likely to have experienced a rise in living standards compared to those that grow other crops like sorghum, which are not internationally tradable. For example, it would not be surprising to find a widening welfare gap between rural Karamoja (a remote area of traditional pastoralism) and rural areas in Central or Western, that have economically diverse sectors including the coffee sub-sector.

The inequality situation in rural areas can also be explained using the poverty trend in the country. Previous findings by Appleton (1999) show that the poorest 20% of the population did not experience noticeable improvements in living

⁶ Note that Kampala City, the political and economic capital of Uganda is situated in Central region. Isolating the city and analyzing the region as two separate sub-regions would most likely change the results for Central.

standards and that the poorest of the poor got poorer during 1993/94 to 1995/96. Intuitively, the welfare of the core poor could have worsened relative to that of the moderately poor, implying that the gap between the core poor on the one hand, and the moderately poor and non-poor on the other could have increased. Since the vast majority of the poor live in rural areas, these results provide concrete evidence that rural areas are not only poorer than urban areas but their living standards are also more unequally distributed.

The fall in inequality between 1992 and 1997 in urban areas is statistically significant with a calculated *t*-value of 11.8. This indicates that the opportunities ushered into the economy by the various reform programs of the 1990s were much better distributed within the urban population, in contrast to the situation in the rural areas.

5.3. Changes in inequality among the poor in Uganda

Another policy relevant dimension that is worth exploring is the inequality situation among the poor. The same kind of analysis done for the rural/urban categories is performed for the poor and non-poor (tables 5.4 and 5.5). Unlike in the case of South Africa (see Deaton, 1997), where the blacks are poorer than any other community and yet their living standards are more unequally distributed, our study reveals a totally different situation for the poor versus non-poor in Uganda.

Inequality among the poor decreased by a statistically significant margin (with a calculated *t*-value of 4.22) among the poor from 1992 to 1997, implying that during this period the hard core poor got better off as the moderately poor also experienced improvements in living standards. The welfare gap between the moderately poor and the core poor (estimated by the poorest 20%) has therefore dwindled over time. To elaborate on this trend, we apply stochastic dominance analysis in a later section to examine the robustness of the intertemporal changes in the welfare of the poorest 20% and the better off segments of the

⁷ Poverty headcount ratio declined from 59.4 and 28.2 percent in 1992 to 48.2 and 16.3 percent in 1997 for the rural and urban areas respectively.

population. Even though our analysis does not emphasize the distribution of welfare among the non-poor, it is worth noting that the inequality levels among the non-poor increased between 1992 and 1997. Our findings show that, over time, inequality has worsened for the non-poor but improved for the poor.

5.4. Changes in inequality by socioeconomic group

The analysis presented so far shows that over the 1992-97 period, the degree of welfare inequality changed in different directions in different regions and among the poor versus the non-poor sub-groups. As demonstrated above, there are substantial differences in the degree of changes in welfare distribution across the different geographical regions that we have considered. To further our understanding of inequality breakdown in Uganda, we extend the analysis to a set of socioeconomic groups in the economy. The groups are distinguished by gender and main economic activity (in terms of the amount of time spent) of the household head. Each of the socioeconomic group constitutes more than 10% of the households. By gender, we find that inequality fell for both male- and female-headed households between 1992 and 1997 but the fall was greater for female-headed households. Accordingly, the differences in inequality by gender decreased over time. The differences in the contribution to inequality by gender are therefore not pronounced enough to warrant major inferences. Furthermore, the changes in inequality in the gender sub-groups are statistically insignificant.

Table 4: Inequality by socioeconomic groups

	1992/93		1993/94		1994/95		1995/96		1996/97	
	Gini	Theil	Gini	Theil	Gini	Theil	Gini	Theil	Gini	Theil
Poor	0.1888	0.0581	0.1683	0.0461	0.1637	0.0442	0.1750	0.0512	0.1578	0.0417
Non-poor	0.2906	0.1707	0.3107	0.1920	0.3229	0.2123	0.3367	0.2379	0.3129	0.1922
Female-headed	0.3950	0.2774	0.3945	0.2718	0.4017	0.2952	0.4287	0.3327	0.3835	0.2539
Male-headed	0.3893	0.2830	0.3943	0.2937	0.3994	0.3070	0.4104	0.3363	0.3844	0.2797
Agriculture	0.3468	0.2110	0.3442	0.2250	0.3422	0.2151	0.3774	0.2887	0.3268	0.1975
Retail trade	0.3718	0.2569	0.3568	0.2221	0.3500	0.2181	0.3618	0.2268	0.3493	0.2125
Public service	0.3787	0.2822	0.3733	0.2470	0.3792	0.3055	0.3864	0.2675	0.3507	0.2043
Other sectors	0.3842	0.2654	0.3825	0.2721	0.4103	0.3075	0.4066	0.3558	0.3672	0.2448

Source: Authors' calculation from 1992 - 97 national household survey data

Table 5: Percentage change in inequality, 1992 - 1997

	Gini		Theil	
Poor	-16.4		-28.3	
Non-poor	7.7		12.6	
Female-headed	-2.9		-8.4	
Male-headed	-1.3		-1.2	
Agriculture	-5.8		-6.4	
Retail trade	-6.1		-17.3	
Public service	-7.4		-27.6	
Other sectors	-4.4		-7.8	

Source: Authors' calculation from 1992 - 97 national household survey data

A similar situation is obtained when we categorize households by the main occupation of the household head (tables 4 and 5). Inequality declined between 1992 and 1997 in public service, retail trade, agriculture, and all other sectors combined, in that order of magnitude. However, the only sector that experienced a statistically significant change (decline) in inequality is agriculture (with a calculated t -value of 2.37). Overall, these trends suggest that the population in the different socioeconomic groups have increasingly got integrated into the national economy and are gradually beginning to reap some trickledown benefits of the aggregate economic growth that the country has enjoyed.

6. Stochastic Dominance Analysis

Although the measures and results discussed above generally meet the set of desirable axioms, they may rank the same set of distributions in different ways, simply because of the differing sensitivity of the measures to the levels of consumption expenditure in different parts of the distribution of the welfare measure. Another way to monitor welfare changes is through stochastic dominance analysis, which, applied to poverty analysis, plots and compares the cumulative distribution function of a given welfare measure. Stochastic dominance is about ranking distributions and it works by treating economic agents as a continuum, with a welfare measure that is continuously distributed across the population. This is in contrast with dealing with concepts such as the fraction of people whose welfare level is less than a given value. Stochastic dominance ranges from *first* to n^{th} order dominance, where n is a positive integer. *First order stochastic dominance* occurs if distribution Y is at least as large as distribution X, that is, distribution X lies no higher than distribution Y. In this case X is said to first order stochastically dominate Y. First order stochastic dominance of distribution X over Y therefore implies that any social welfare function that is increasing in income, will record higher levels of welfare in distribution X than in distribution Y (Saposnik, 1981, 1983).

Figure 4: Cumulative distribution functions of CPAE for Uganda.

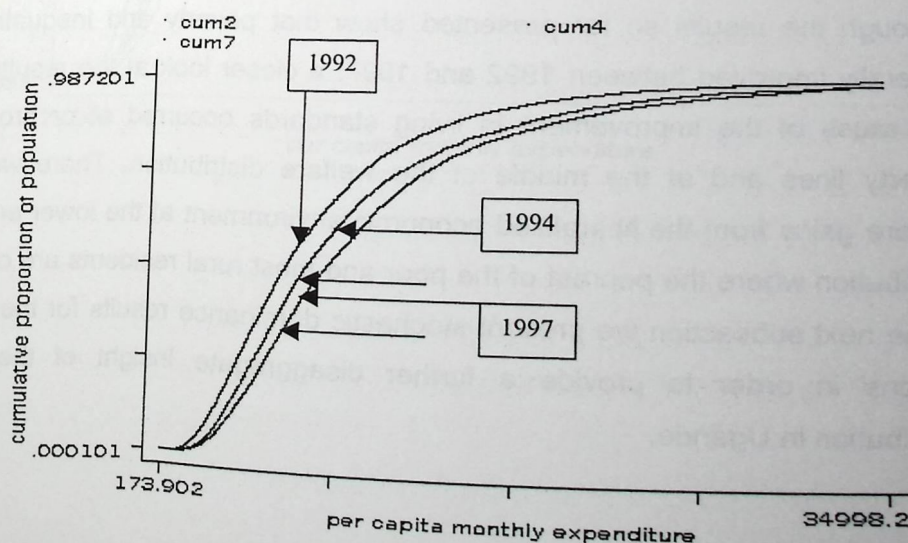


Figure 4 presents the stochastic dominance analysis for Uganda for 1992, 1994 and 1997. Clearly, the figure shows that 1997 distribution dominates both the 1992 and 1994 distributions. This implies that there was a general improvement in living standards in Uganda between 1992 and 1997 as measured by consumption expenditure per adult equivalent. However, we also recognize the fact that the improvement was not quite pronounced as shown by the narrow gap between the three distributions. Since poverty lines at the very top of the distribution are usually implausible, it is not necessary to apply stochastic dominance criterion over the entire distribution of consumption expenditure per adult equivalent. We truncate the distribution to include adult equivalent expenditure levels no higher than Uganda Shillings 35,000 (about twice the highest regional poverty line). Given the decline in poverty over the years, it is not surprising that the dominance analysis reveals that the welfare levels of the households in this expenditure bracket improved gradually over time. Although the distribution functions for the three years selected are quite close, it is clear that welfare was higher in 1994 and 1997 compared to 1992. The distribution function for 1997 lies strictly below that of 1994, which, in turn, lies strictly below that of 1992. These findings, which are robust to choice of poverty line, confirm the results from past studies, which show that poverty has been decreasing in Uganda since 1992.

Although the results so far presented show that poverty and inequality have generally improved between 1992 and 1997, a closer look at the results reveal that much of the improvement in living standards occurred at or around the poverty lines and at the middle of the welfare distribution. There were little welfare gains from the liberalized economic environment at the lower end of the distribution where the poorest of the poor and most rural residents are clustered. In the next subsection we present stochastic dominance results for the different regions in order to provide a further disaggregate insight of the welfare distribution in Uganda.

6.1 Changes in household welfare by region 1992-97.

As demonstrated in the previous section, there are clear differences in inequality and household welfare among different regions. To examine if the changes in national welfare are reflected in the regional levels, the stochastic dominance analyses are conducted for different regions. We analyze them jointly to provide within-year inter-regional comparisons that are robust to the choice of poverty line, and individually, to highlight inter-temporal changes in welfare distribution within each region. The results are shown in figures 5 to 7 and A3 to A6 in the appendix.

Figure 5: Cumulative distribution functions of CPAE by region, 1992

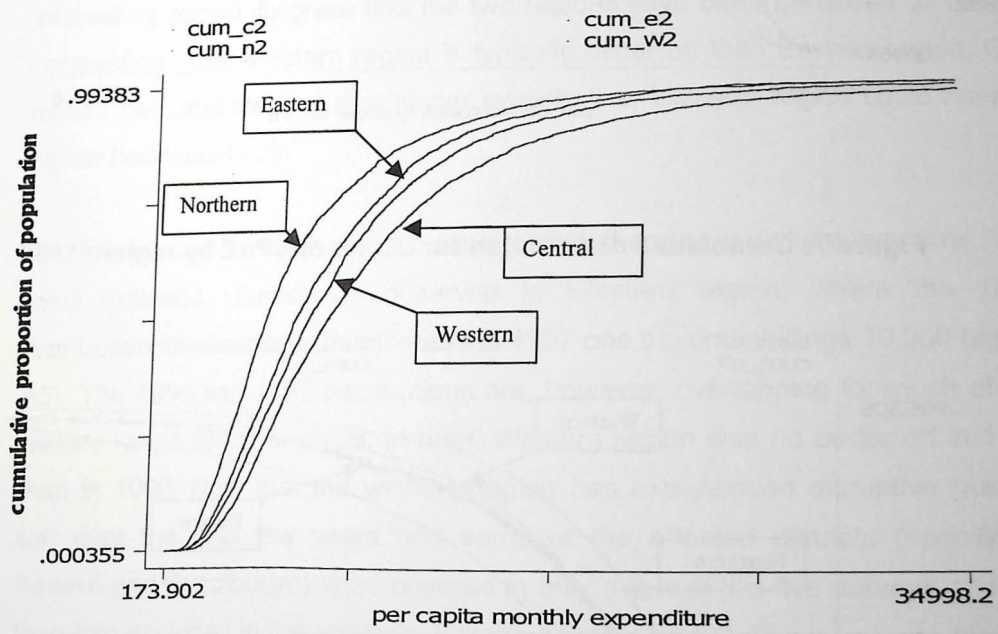


Figure 6: Cumulative distribution functions of CPAE by region, 1996

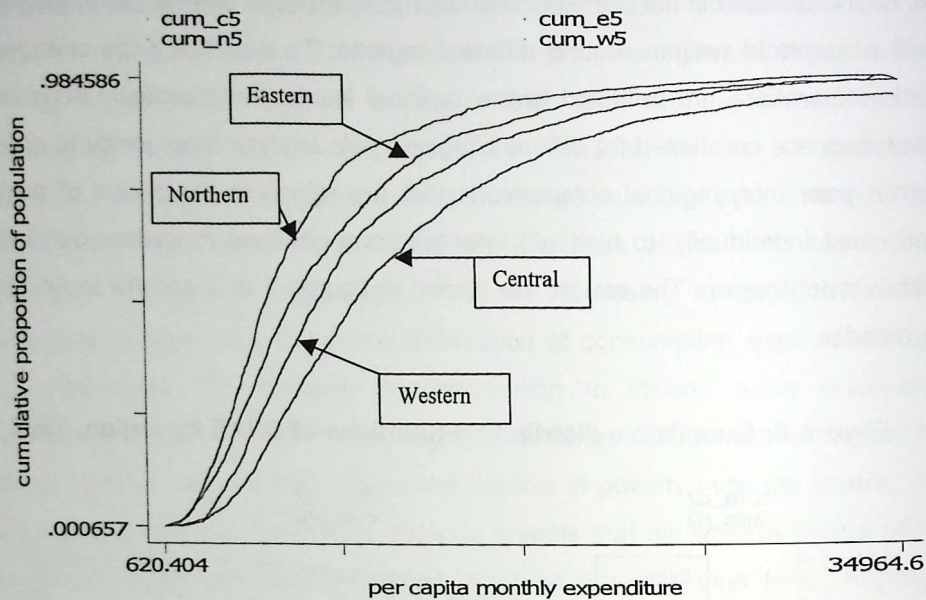
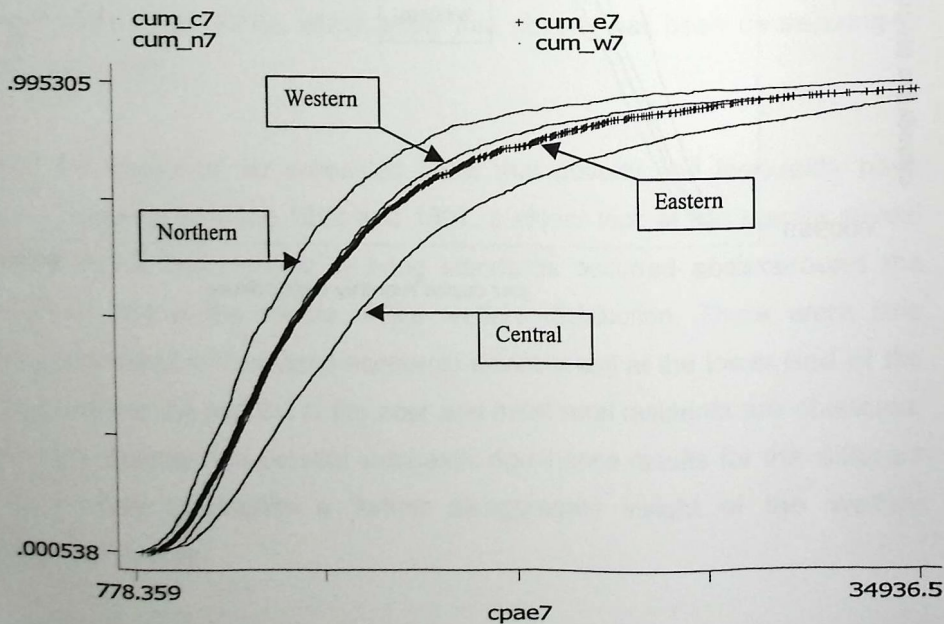


Figure 7: Cumulative distribution functions of CPAE by region, 1997



The distributions in figures 6 and 7 confirm the widely known poverty story in Uganda that living standards in Central region dominates those in the rest of the country. Again, as expected, Northern region ranks the poorest, irrespective of the poverty line chosen, and is dominated by all the other regions. The welfare distribution ranking is consistent with findings of previous studies that used specific poverty lines in the sense that Central enjoys the highest standard of living, followed by Western, Eastern and lastly Northern. However, what is striking is the distribution function for 1997, which shows that first order stochastic dominance does not conclusively rank Eastern against Western. Beyond shillings 9,000, Eastern region dominates the Western region, and for per capita expenditure levels below this, Western dominates. We find this interesting especially given that the two regions have been perceived as clearly contrasting - that Western region is typically better off than Eastern region. Our results demonstrate that at a higher poverty line, Western region could have a higher headcount ratio.

Within each region, there are some interesting changes in welfare over time. The most dramatic situation is observed in Western region, where the 1996 distribution stochastically dominates the 1997 one beyond shillings 10,000 (figure A5). The 1996 and 1997 distributions are, however, overlapping for much of the welfare range under analysis. In brief, Western region was no better off in 1997 than in 1996. Note that the western region has experienced disruptive guerilla war over the past few years and some of the affected districts (specifically Kasese and Bundibugyo) were covered in only a few of the five surveys and are therefore excluded in the analysis. For the Eastern and Northern regions (figures A4 and A6 respectively), there were virtually no improvements for the middle and high income groups; whereas substantial improvements were experienced in the lower levels of the distribution. For the Central region, although there were clear improvements between 1996 and 1997, it was not so pronounced, as shown by the narrow gap between the respective distribution functions.

As pointed out earlier, the largest regional fall in welfare inequality between 1992 and 1997 occurred in Northern region. As already mentioned in the previous sections, a detailed analysis shows that there were larger improvements among the lower expenditure groups compared to the higher expenditure groups in Northern region.

Figure 8: Cumulative distribution functions of CPAE 1992, 1996 and 1997, Northern non-poor.

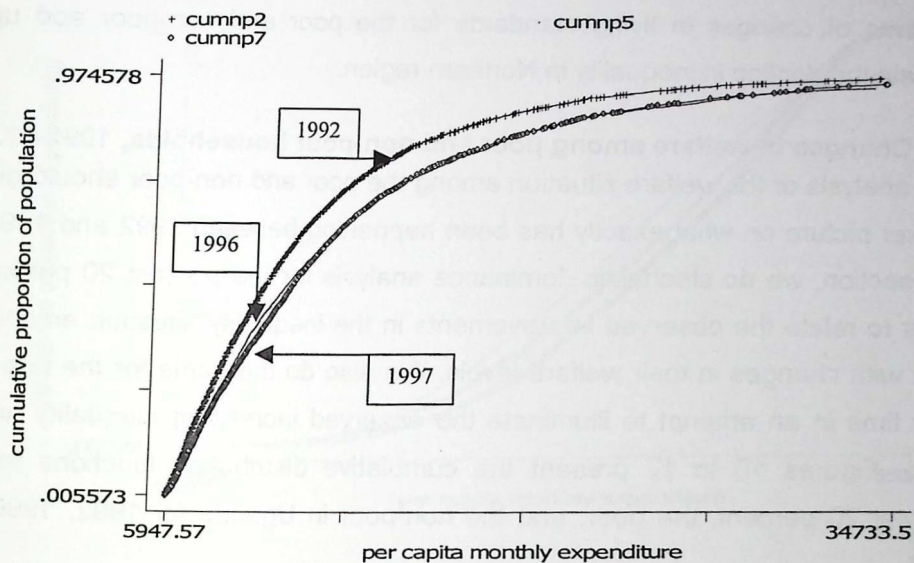
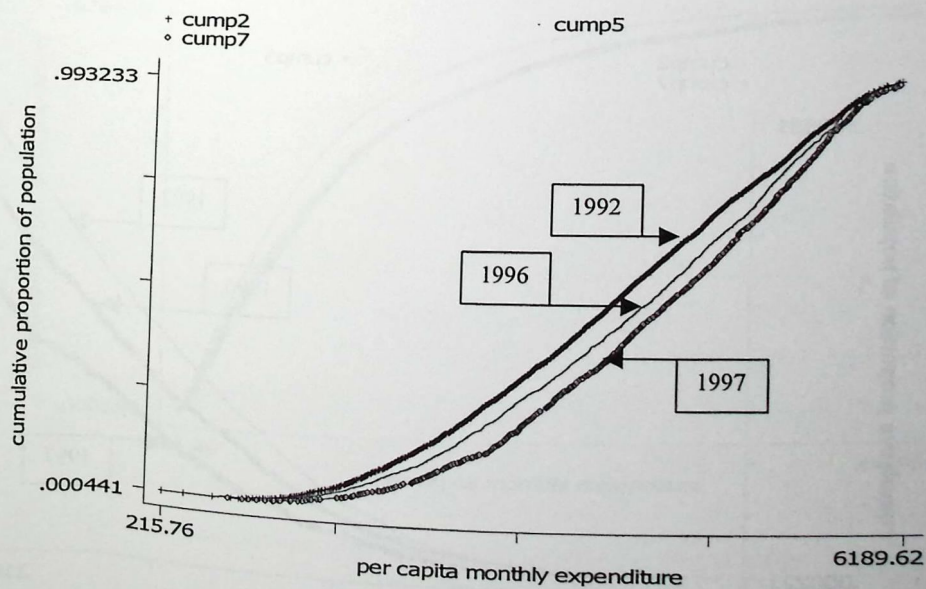


Figure 9: Cumulative distribution functions of CPAE 1992, 1996 and 1997, Northern poor.



The cumulative distribution functions presented in figures 8 and 9 show that living standards among the poor in Northern region improved between 1992 and 1997. For the non-poor, while they were better off in 1996 and 1997 than in 1992, their 1997 living standards were not conclusively different from those in 1996. These patterns of changes in living standards for the poor and non-poor add up to explain the decline in inequality in Northern region.

6.2. Changes in welfare among poor and non-poor households, 1992-97.

The analysis of the welfare situation among the poor and non-poor should give a clearer picture on what exactly has been happening between 1992 and 1997. In this section, we do stochastic dominance analysis for the poorest 20 percent in order to relate the observed improvements in the inequality situation among the poor with changes in their welfare levels. We also do the same for the non-poor over time in an attempt to illuminate the observed increasing inequality among them. Figures 10 to 12 present the cumulative distribution functions for the poorest 20 percent, the poor, and the non-poor in Uganda for 1992, 1996 and 1997.

Figure 10: Cumulative distribution functions of CPAE 1992, 1996 and 1997, the poorest 20%

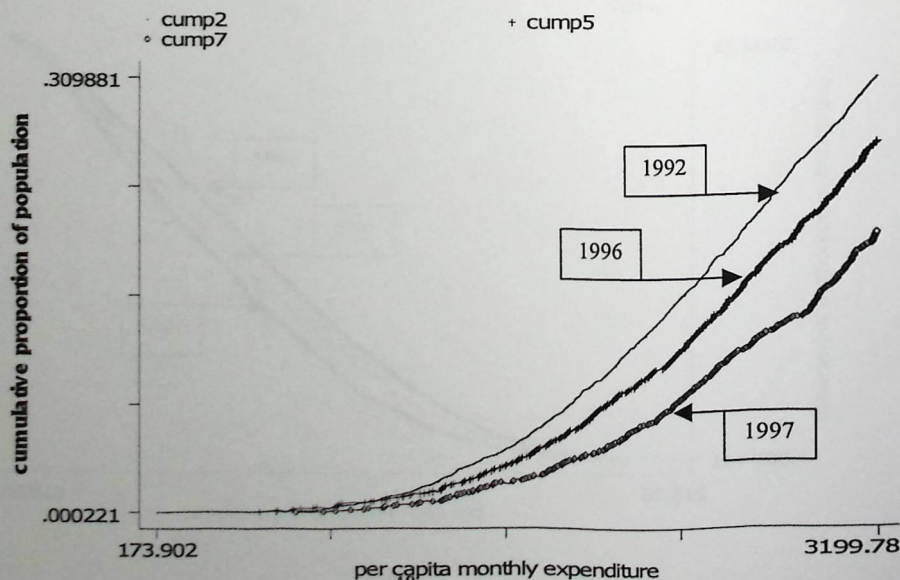


Figure 11: Cumulative distribution functions of CPAE 1992, 1996 and 1997, the poor

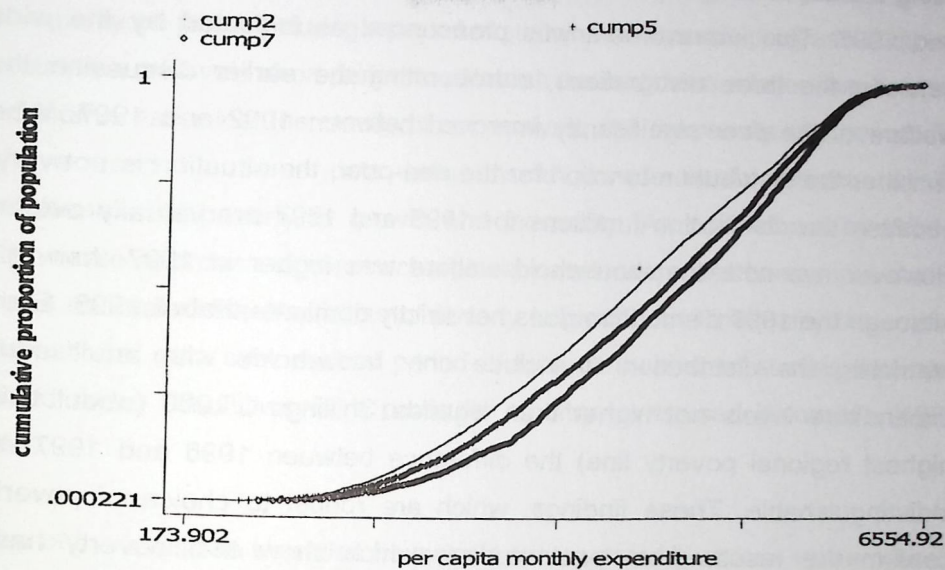
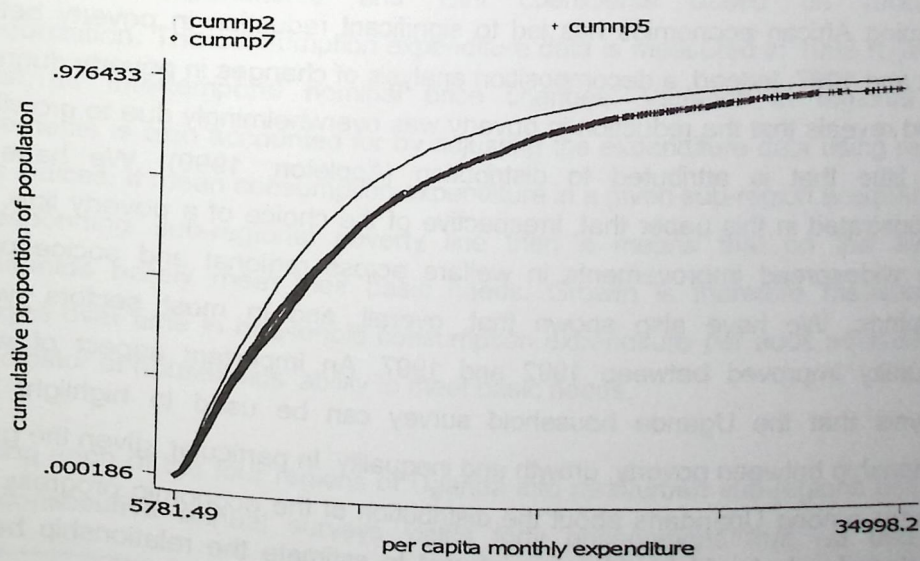


Figure 12: Cumulative distribution functions of CPAE 1992, 1996 and 1997, the non-poor



It is clear from figures 10 and 12 that 1997 distribution dominates both the 1992 and 1996 distributions. This shows that there was a general improvement in living standards for the poorest 20%, and for the poor in general, between 1992 and 1997. This improvement was pronounced as indicated by the wide gap between the three distributions, corroborating the earlier discussion that the welfare of the poor significantly improved between 1992 and 1997. When we consider the distribution function for the non-poor, the situation is not very clear because the distribution functions for 1995 and 1997 are virtually overlapping. However, we note that household welfare was higher in 1997 than in 1992, although the 1997 distribution does not strictly dominate that of 1996. Even after restricting the distribution to include only households with adult equivalent expenditure levels not higher than Uganda Shillings 35,000 (about twice the highest regional poverty line) the difference between 1996 and 1997 remains indistinguishable. These findings, which are robust to choice of poverty line, confirm the results from past studies, which show that poverty has been decreasing in Uganda since 1992.

7. Impact of Growth and Inequality on Poverty

The impressive economic turn around that Uganda has enjoyed relative to other reforming African economies has led to significant reduction in poverty between 1992 and 1997. Indeed, a decomposition analysis of changes in poverty during this period reveals that the reduction in poverty was overwhelmingly due to growth and very little that is attributed to distribution (Appleton, 1999). We have also demonstrated in this paper that, irrespective of the choice of a poverty line, there were widespread improvements in welfare across regional and socioeconomic groupings. We have also shown that, overall, and in most sectors, welfare inequality improved between 1992 and 1997. An important aspect of welfare analysis that the Uganda household survey can be used to highlight is the relationship between poverty, growth and inequality. In particular, given the growing concern among Ugandans about the distribution of the economic progress of the last decade, it should be of policy interest to estimate the relationship between inequality and growth on the one hand, and poverty incidence on the other.

In this section we exploit a five-year time series of household surveys to construct rural/urban sub-regional panels to form a basis for estimating the impact of growth and inequality on poverty during a period of sustained economic progress. Although five years is a relatively short period to establish the long term relationship between key economic variables, the results of our analysis, like the results of other studies that have used the same data sets, should provide useful insights on the responsiveness of poverty to growth and inequality. As pointed out by Wodon (1999), whose approach to construct regional panels we adopt here, most studies that have estimated the elasticities of poverty to growth and inequality have relied on international data over a short period of time. A number of studies that have estimated these elasticities for a particular country have used Kakwani's (1993) formulae.

The use of the available Ugandan household survey data by various researchers to monitor changes in living standards has relied on household consumption expenditure as a measure of welfare. We use adjusted household consumption expenditure generated by Appleton (1999)¹ to calculate sub-regional mean consumption expenditures and Gini coefficients based on rural/urban categorization. The consumption expenditure data is measured in 1989 shillings to adjust for intertemporal nominal price changes. Variation in regional price movements is also accounted for by adjusting the expenditure data using regional price indices. If mean consumption expenditure in a given sub-region is equal to the corresponding sub-regional poverty line then it means that on the average households barely meet their basic needs. Growth is therefore measured as changes over time in household consumption expenditure per adult equivalent as an indicator of households' ability to meet basic needs.

Dividing each of the four regions of Uganda into rural/urban sub-regions using the five consecutive annual surveys yields forty observations that we use in a

¹ A description of the derivation of the poverty lines from the survey data is presented in Appendix B.

regression equation to estimate the impact of growth and inequality on poverty headcount. We estimate a double log equation such that the estimated correlation coefficients are directly interpreted as the elasticities of poverty with respect to growth and inequality. The results of the estimated correlation are presented in table 6 and illustrated in figure 13. The various specification test statistics presented in the table show that: (i) at the four percent level of significance, the null hypothesis that there are no sub-regional fixed effects is accepted; (ii) there are no random effects that are sub-region specific; and (iii) the differences in correlation coefficients in the fixed versus random effects models are not systematic. These test results dictate that the ordinary least squares estimates are not only consistent but are the most efficient. We therefore base the interpretation of the poverty impact of growth and inequality on the OLS results with robust standard errors.

Figure 13: Relationship between poverty and consumption expenditure

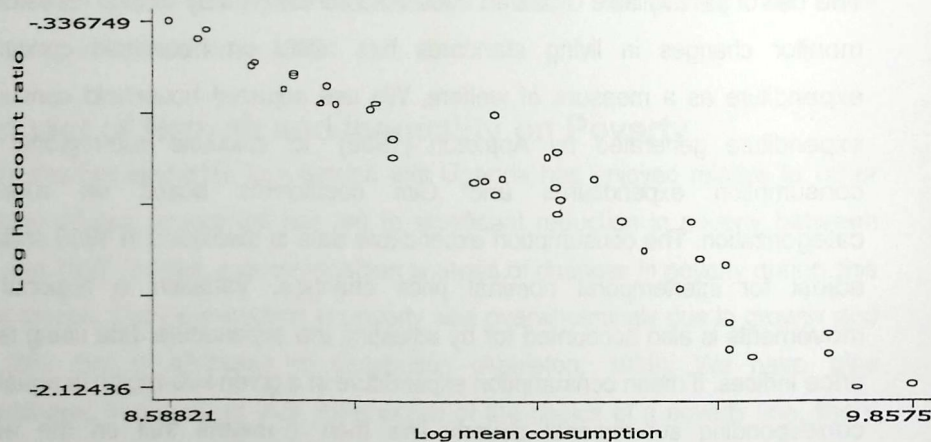


Table 6: Impact of growth and inequality on poverty

Dependent variable: Log of poverty headcount index						
	OLS		Fixed Effects		Random Effects	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Log of mean consumption per adult equivalent	-1.6681	0.0000	-1.8739	0.0000	-1.6750	0.0000
Log of Gini coefficient	1.3622	0.0000	1.1550	0.0000	1.2972	0.0000
Constant	15.6148	0.0000	17.2846	0.0000	15.6098	0.0000
Number of observations = 40						
F-test for fixed effects $F(7, 30) = 2.511$; P-value = 0.037						
Breusch and Pagan Lagrangian multiplier test for random effects, $\text{chi2}(1) = 1.58$; P-value = 0.2086						
Hausman Chi-squared specification test for fixed versus random effects, $\text{chi2}(2) = 2.76$; P-value = 0.2511						

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Source: Authors' estimation using 1992 - 1997 survey data

The results in table 6 indicate that mean consumption expenditure per adult equivalent and the degree of inequality are strongly correlated with poverty incidence at any level of statistical significance. Controlling for inequality, a one-percent increase in real mean consumption expenditure per adult equivalent reduces poverty headcount index by about 1.7 percent. From Appleton's (1999) adjusted consumption expenditure data, there was a national increase of 16.5% in mean consumption expenditure per adult equivalent between 1992 and 1997. During this period, poverty headcount ratio declined by 21% from 0.56 to 0.44. Using our estimated elasticity of poverty to distribution-neutral growth, the 16.5% increase in mean consumption expenditure would have resulted in a 28% decline in the poverty headcount index (more than the above-referred 21% fall). The difference between the two figures of the percentage decline in the headcount index could be explained as follows. Whereas the estimation procedure for the 28% decline controls for inequality, the 21% decline is arrived at without holding inequality constant. Furthermore, in as far as the increase in inequality between 1992 and 1996 (table 2) can be considered as a reflection of the state of initial inequality for the 1997/98 period, we can appeal to Ravallion's (1997) proposition that the higher the initial level of inequality, the less elastic poverty will be to growth. That is, the increase in inequality between 1992 and 1996, and the modest overall decline between 1992 and 1997 (1.79%) did not enable a fuller response of poverty to growth during this period.

On the other hand, the estimated elasticity of poverty with respect to inequality indicates that (using the Gini index) a one-percent improvement in growth-neutral welfare distribution reduces poverty headcount by about 1.4 percent. Given that between 1992 and 1997 the Gini index of inequality fell by 1.79% (table 2), the gross impact of this improvement in welfare distribution on poverty is estimated to be about a three percent decline in the headcount index. This is further evidence that welfare redistribution in Uganda between 1992 and 1997 was not large enough to have a pronounced impact on poverty – the realized poverty reduction was almost wholly attributed to growth.

8. Conclusion

This study exploited available national household survey data to investigate trends in inequality and changes in living standards in Uganda from 1992 to 1997. At the national level and in rural Uganda, inequality increased from 1992 to 1996, a period when the country began enjoying the growth benefits of economic liberalization. In urban areas, there was an initial fall in inequality between 1992 and 1994 before tapering off to its 1997 level. Regionally, Northern, which is the poorest part of the country, experienced the largest decline in inequality between 1992 and 1997 owing to the remarkable movement out of poverty that households in the region enjoyed.

Stochastic dominance analysis revealed that irrespective of the poverty line used, Ugandans enjoyed continuous improvements in welfare during the 1990s. The improvements, which were more pronounced in the middle parts of the welfare distributions, were geographically widespread except in Western region, where much of the 1997 welfare distribution dominates that of the 1995/96.

Using aggregated data at the sub-regional level we also showed that a growth-led poverty alleviation program is capable of significantly impacting poverty incidence in the long run. Our stochastic dominance results together with the findings of previous studies confirm that the initial focus on growth in the economic reform process in Uganda has had a significant poverty reduction impact. But our regression results demonstrate that without systematic attention to distribution, the economy can not fully capture the poverty alleviation benefits of growth. The implication is that if the current emphasis of policy statements on the poorest of the poor is translated into deeds, and the general mission of poverty eradication through (appropriate) modernization of agriculture is realized, then growth with redistribution will be achieved. This could bring within reach the country's vision of poverty eradication by the year 2017.

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