

UNIVERSITY OF SOUTHAMPTON
FACULTY OF LAW, ARTS & SOCIAL SCIENCES

School of Social Sciences
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Essays on Growth and Absolute Poverty: Evidence from Uganda

by

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ABSTRACT

FACULTY OF LAW, ARTS & SOCIAL SCIENCES
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ESSAYS ON GROWTH AND ABSOLUTE POVERTY: EVIDENCE FROM
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The thesis consists of three papers that deal with poverty in Uganda. The first paper evaluates whether economic growth alone is sufficient for absolute poverty reduction. Using cross-sectional household survey data from Uganda, the paper makes use of the poverty decomposition techniques to identify the main sources of absolute poverty changes. It was found that even in the midst of growth there are possibilities for the persistence of extreme poverty. The effect of growth on poverty reduction was lessened by worsening consumption inequality especially from 1997. Since the redistributive effect is non-negligible, there is a need for an investigation of factors affecting redistribution. This is what the second and third papers attempt to address.

The second paper attempts to investigate the effect of the decentralised mechanism of community targeting on the households' wellbeing using micro-level data from Uganda. Developments in the theoretical literature pitting the efficiency advantages argument against that of local capture have brought the issue to the fore. Particular reference is made to the debate on the importance of contiguity and preference heterogeneity embedded in the Tiebout (1956) sorting versus the recent contribution by Bardhan and Mookherjee (2000) showing that decentralisation could have adverse effects through greater local capture. This is relevant to the debate about the decentralisation reforms going on across the Sub-Saharan Africa. This paper tests the implications of these theories by exploring the empirical question, "Can decentralisation be a useful institutional reform to reduce the absolute poverty in less developed countries (LDCs), or might absolute poverty increase as political power shifts downwards due to greater capture of the programmes by local elites?" It was found that greater local capture, indeed, exacerbated extreme poverty, finding no support for strong efficiency advantages argument in Uganda. This might suggest that decentralisation reforms need to be carefully undertaken if they are to improve the economic wellbeing of households in countries faced with incomplete political markets and information flow constraints.

The third paper evaluates the causal effect of fertility on household welfare using panel data drawn from the Uganda household survey data for 1992/93 and 1999/00, exploring the Malthusian theory in a dynamic context. It was found that, on average, the households that experience a childbearing event have a lower real food consumption compared to the households that did not. This result suggests that high fertility rates can actually lower economic wellbeing and, therefore, are partly responsible for the persistence of extreme poverty in Uganda and many other LDCs with similar fertility trends.

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Abbreviations and Acronyms

AGOA	African Growth and Opportunity Act
AIDS	Acquired Immunity Deficiency Syndrome
ALSMS	Albanian Living Standards Measurement Survey
AU	African Union
B-M	Bardhan and Mookherjee
CPAE	Consumption per Adult Equivalent
CV	Coefficient of Variation
EPAS	Economic Partnership Agreement
ESAF	Enhanced Structural Adjustment Facility
ETHNIC	Ethnic Fractionalisation Index
FGT	Foster-Greer-Thorbecke
GDP	Gross Domestic Product
G-8	Group of Eight
HCI	Headcount Index
HIPC	Highly Indebted Poor Countries
HIV	Human Immunodeficiency Virus
IDA	International Development Association
IFLS	Indonesia Family and Life Survey
IMF	International Monetary Fund
LC	Local Council
LDCs	Less Developed Countries
MDGs	Millennium Development Goals
MS	Monitoring Survey
NCC	National Consultative Council
NEPAD	New Partnership for Africa's Development
NDP	National Development Plan
NPV	Net Present Value
NRA/M	National Resistance Army/Movement
NRC	National Resistance Council
OAU	Organisation of African Unity
OLS	Ordinary Least Squares
PEAP	Poverty Eradication Action Plan
PGR	Poverty Gap Ratio
PRGF	Poverty Reduction Growth Facility
PRSP	Poverty Reduction Strategy Paper
PPP	Purchasing Power Parity
QC	Queen's Counsel
RC	Resistance Council
rf	Baseline (reference) group
RRPs	Rehabilitation and Reconstruction Programmes
SATC	Sample Average effect for the subpopulation for the Controls
SATE	Sample Average Treatment Effect
SATT	Sample Average Treatment Effect for the Treated
SPG	Squared Poverty Gap
SSA	Sub-Saharan Africa
Std-D	Standard Deviation
Std-error	Standard Error

UBOS	Uganda Bureau of Statistics
UIHS	Uganda Integrated Household Survey
UNHS	Uganda National Household Survey
UPC	Uganda Peoples Congress
UPM	Uganda Patriotic Movement
Ushs	Uganda Shillings
VCE	Variance-Covariance Estimator
WB	World Bank

Chapter 1

Introduction

This thesis focuses on the subject of growth and the persistence of extreme poverty in Uganda, a typical Sub-Saharan African country, over the period 1992-2003. This topic has come to the forefront of debate in light of the fact that compared to other developing regions in Latin America, East Asia and South Asia, the problem of extreme poverty remains a serious development concern in this Sub-Region. For example, out of 1.1 billion people who lived in absolute poverty in 2001, over 300 million were from Sub-Saharan Africa (World Bank 2002). It is important to note that this number has risen from below 160 million in 1981, an increase of 87.5%, in only 20 years compared to a dramatic fall from 800 million to almost 250 million, a decrease of 68.7% , in East Asia during the same period (Chen and Ravallion 2004). But first, what is poverty? Economists such as Sachs (2005), Dasgupta (2003), Deaton (2003) and Dasgupta and Ray (1998), for example define it as follows.

"Poverty is hunger. Poverty is lack of shelter. Poverty is being sick and not being able to see a doctor or a nurse. Poverty is not having access to school and not knowing how to read. Poverty is not having a job, is fear for the future, living a day at a time. Poverty is losing a child to illness brought about by unclean water and malnutrition. Poverty is powerlessness, lack of representation and freedom".

It is also worth quoting another influential economist, Qureshi (2005);

"Behind cold data on the MDGs are real people and lack of progress has real and tragic consequences. Every week, 200,000 children under five die of disease. Every week 10,000 women die giving birth. In Sub-Saharan Africa alone this year, 2 million people will die of AIDS. Worldwide, more than 100 million children in developing countries are not in school (Qureshi 2005)."

This seems to be exactly right: the poor cannot afford basic needs required for their survival on a daily basis. There are different kinds of measures that can be used to identify those living in extreme poverty. Consumption-based poverty measure is one of the commonly used measures, and this thesis will keep with this. Defined in this sense, therefore, each of those 1.1 billion individual's consumption expenditure fell below "the \$1.08 a day" poverty line, based on the 1993 Purchasing Power Parity (PPP) estimates. Although many of the countries in Sub-Saharan Africa have

experienced substantial economic growth over the last two and a half decades, a large number of their population remains impoverished.

So, how has the problem of extreme poverty persisted across the Sub-Region, despite the positive growth over this period? The contrasting poverty figures and trends described above suggest that there are a few characteristic paths that might be taken over time, and are relevant to answering this question. They also help to orient the debate about the probable pathways to economic prosperity within a given setting.

This chapter discusses some of the critical aspects of economic development and absolute poverty in the Sub-Region focussing particularly on Uganda, as well as the general structure of the thesis. Section 1.1 presents the research questions. It also briefly discusses some salient issues from theoretical and empirical literature. Section 1.2 presents the crucial aspects of development and highlights the contribution of the research.

1.1 The Research Questions

This thesis aims to explore the following research questions:

- Is growth in itself sufficient for absolute poverty reduction?
- Can decentralisation be a useful institutional reform to reduce the absolute poverty within a Sub-Saharan Africa context, or might absolute poverty increase as political power shifts downwards due to greater capture of the programmes by local elites?
- Does a high fertility level in the household decrease its economic wellbeing?

In this thesis, a micro-level based empirical research is conducted to tackle these questions that hitherto have not been answered clearly in empirical literature. The thesis uses formal models to identify and explain the main determinants of economic wellbeing. It particularly tries to explain the role certain socio-economic and demographic variables play by employing techniques at the cutting-edge, using data from nationally representative household surveys from Uganda.

The empirical literature focussing on some of the above research questions remains scanty but is burgeoning. Recent studies that have assessed the poverty effects of growth in less developed countries include: Kraay (2005), Adam (2004), Krongkaew and Kakwani (2003), Dollar and Kraay (2002), Dagdeviren et al (2002), Warr (2000), Deininger and Squire (1998), Bruno et al (1998), Timmer (1997), and Chen and Ravallion (1997; 2004), among others.

These studies are based on a wide range of methodologies, ranging from regressions to poverty simulation (accounting) approaches. However, they were all based on cross-country aggregate data where issues of parameter heterogeneity (very different countries are unlikely to be drawn from a common surface), outliers (due to the parameter heterogeneity) and measurement errors cannot be easily controlled for. See Temple (1999) for a detailed discussion on the problems associated with cross-country regressions and accounting methods. By neglecting these issues, the inferences drawn from the cross-country regressions become tenuous, and most crucially could be misleading for public policy.

From the theory, changes in absolute poverty can be attributed to various sources: growth component, redistribution component and the residual which captures that bit of poverty change that cannot be explained. The workhorse used to account for these sources in empirical literature has been the double decomposition technique proposed by Datt and Ravallion (1992) and also Datt (1998), analogous to the growth accounting exercise. The present work contributes to the debate by employing this technique to identify and then quantify the pathways from growth and from other sources to changes in absolute poverty within a country. Using the micro-level data, it separates the contribution of general consumption growth from that of the consumption distributional changes and from other sources via the residual. The data used are drawn from the cross-sectional household surveys for Uganda over a period 1992-2003. By using data from the household surveys, it is believed that the problems of parameter heterogeneity and unobserved heterogeneity will be smaller than between countries.

According to Sachs (2005), there are several possible explanations for the persistence of extreme poverty even in the presence of growth. In general, the sceptics of the

growth-induced poverty reduction argue that there are three potential sources of changes in absolute poverty: (1) a high growth rate of average consumption; (2) a consistent poverty-reducing pattern of change in consumption inequality; and (3) other aspects that could directly reduce poverty even if growth does not necessarily increase. The first part of the thesis tries to quantify the contribution of these sources, which will then shed more light as to what are the important contributing factors to absolute poverty changes in Uganda. It might be that although growth contributes to poverty reduction, a significant contribution could be associated with the redistribution effects. There is therefore a need for deeper micro-level investigation of factors affecting redistribution. This is what motivates Chapters 3 and 4 of the thesis.

In particular, Chapter 3 attempts to evaluate the role of the decentralised service delivery mechanism in Uganda. This is one of important institutional reforms that were widely embraced in the Sub-Region in the mid-1990s. Given the political agency issues pertaining to such an institutional change, this could turn out to be a crucial source of changes in absolute poverty that need to be investigated.

Indeed, the issue of decentralised delivery mechanism of community targeting in less developed countries (LDCs) remains a controversial research area as the debate appears to be polarised along the efficiency advantage argument and the local capture view. While some writers such as Tiebout (1956), Oates (1972) and Breton (1996) emphasise the standard efficiency advantages of decentralisation that would lead to a reduction in extreme poverty, the opposing argument is that a decentralisation could easily worsen the problem of extreme poverty - owing to greater capture of the antipoverty programmes by the local elite, see (Bardhan and Mookherjee 2000; Tanzi 2000; Tanzi 2000a; Bardhan 2002; Bardhan and Mookherjee 2002), to mention just a few.

Related to this is another burgeoning strand of economics literature emphasising political struggles between ethnic groups, which might explain the success or failure of a decentralisation within a given setting. Notable examples include – Landa (1994), Alesina and Perotti (1994), Easterly and Levine (1997), Alesina, Baqir and Easterly (1999) and Easterly (2001). According to this literature, ethnic tension reduces the level of public goods and services provided thereby lowering welfare. On

the other hand, however, it might be argued that ethnicity can act as checks and balances as different ethnic groups will tend to neutralise each other in the general tenor of the Grossman-Helpman (1996) prediction.

Despite the importance of these predictions, and given the fact that many LDCs have embraced decentralisation in the past one and a half decade, the theoretical implications of these models have not been empirically tested. There are few studies that have dwelt on some elements of local capture such as in Reinikka and Svensson (2004; 2005), focussing mainly on central government transfers to districts. Their study although focussing on service delivery in some countries in the Sub-region including Uganda, was conducted way back before the decentralisation wave. Thus, they do not actually test the theoretical implications of decentralisation nor do they rely on micro-data that is nationally representative. But nevertheless, their work is a fundamental building block. They have put forward a clear foundation for conducting a comprehensive investigation into the local capture aspects, especially in the post-decentralisation period.

Thus, this research makes a contribution to the empirical literature by testing the theoretical predictions of decentralisation at the micro level using national household surveys data covering both the pre- and post- decentralisation periods. It will particularly evaluate the evidence for Uganda, making use of a household model structure with incomplete markets, and applying the multivariate regressions to identify the effects of household enlightenment in each period. These are before the decentralisation (1992/93), two years after decentralisation (1999/00) and then two years later (2002/03). Access to public information is used as the measure of the enlightenment – lack of it implies ignorance and thus local capture in line with Besley and Prat (2005), for example. In addition, the effect of ethnic diversity is investigated using the ethnic fractionalisation index proposed by Alesina et al (1999).

It could be that the local capture effects are significant, and that ethnic diversity might be important for ensuring the success of democracy, which in turn would ensure higher provision of public goods and services. These assumptions are generally consistent with the theoretical predictions in Bardhan and Mookherjee (2000) and indeed the earlier Madisonian presumptions (1937) of capture of antipoverty

programmes by the local elite. The latter aspect about ethnic diversity draws support from the Acemoglu and Johnson (2006) prediction about ethnic cleavages on democratic outcomes, and hence welfare. The advantages of ethnic cleavages in society arising from heterogeneity are well-articulated in Acemoglu and Robinson (2006). See also Easterly (2007) and Glaeser et al (2006) for greater detail.

Chapter 4 focuses on another determinant of economic wellbeing namely fertility. The chapter particularly attempts to assess the causal effect of fertility on household welfare in Uganda. This aspect is also at the fore of the debate, due to the fact that many LDCs are experiencing high fertility rates and persistent absolute poverty. For example, official statistics show that Uganda's population growth rate is approximately 3.2 percent, with a fertility rate of 6.7 per woman. This is a worrying situation given the threat that the high fertility rates and thus high population pressures can exert on natural and scarce economic resources. In fact, Dasgupta (2003) has argued that the coping mechanisms people adopt such as producing many children could result into vicious circles of extreme poverty, rather than lifting them out of it.

The controversy about the effects of rapid population growth on human wellbeing was initiated by Thomas Malthus in 1798. Malthus had a simple model in which aggregate economic and demographic changes were related to reproductive behaviour. Malthus predicted eventual falling wages and rising food prices as an increasing supply of labour ran up against the fixity of land and that given diminishing returns, labour productivity would fall; the long-run equilibrium standard of living would remain at the subsistence level. This view was re-ignited by the neoclassical economists who first emphasised lack of capital and savings coupled with surplus labour in traditional agriculture before shifting to the efficiency of resource use (Leibenstein 1954; Nelson 1956). The Malthusian view is also supported in Robert Solow (1956) and in Mankiw et al (1992).

The "revisionists", however, downplayed the role of population growth, highlighting the ability of the markets and institutions to adjust (Demeny 1986; Kelley 2001). According to the latter argument, institutional structures would counteract the negative effect of rapid population growth barring clear market failures.

Note, however, that empirical studies focusing on this issue particularly drawing evidence from the micro level data have remained scarce. Few recent ones include - Francavilla and Mattie (2006) drawing data from Albania, Kim, Engelhardt et al (2006) for Indonesia and a comparative study for Albania, Indonesia and Ethiopia in Aassve, Engelhardt et al (2005), among others. However, the first two fail to address the issue of joint determination, given the endogenous process of fertility and the measures of welfare used. Besides, the issue about the effect of unobserved country-specific effects is not addressed well in the latter study.

To contribute to the debate on Sub-Saharan Africa's fertility-welfare puzzle, chapter 4 corrects for endogeneity bias within the household model structure experiencing incomplete markets in a dynamic perspective. Data for this purpose are drawn from the panel household data for Uganda. The emphasis here is placed on identifying the causal impact of fertility, measured by childbearing events, on welfare. In particular, chapter 4 uses two econometric approaches namely: (a) a flexible multivariate regression framework; and (b) a nonexperimental approach particularly based on the pioneering work by Abadie and Imbens (2002) relying on the bias-corrected matching method. These econometric methods do not impose strong restrictions on utility function of the household, and also use a fertility measure that is strictly exogenous. The estimates from the multivariate regression and bias-corrected matching approaches are then compared and contrasted. By doing so, this study provides a more solid foundation for the advancement of empirical knowledge on how household welfare, and hence poverty, and fertility interacts particularly emphasising how these relate in the presence of market failures.

1.2 The Development problem

Although the countries in the Sub-Region were all politically independent by the early 1980s, they increasingly lost the little economic independence that they had achieved. For example, by 1988 the debt-service ratio for Sudan, Zambia and Mozambique was individually greater than 100% of export earnings. This was also the case in Uganda. Shortly before the IMF/World Bank supported stabilisation programmes began in the country in 1980, the Uganda's debt-service ratio was 18.9%. That ratio had jumped to 44% when the first stabilisation and adjustment policy package ended in 1985. It

took close to three year before the second phase could begin, and by the time it started in 1988 it was close to 60%. When this one ended in 1990 the debt-service ratio was 90%. In short it required 90% of the country's export earnings to internally service the debt.

Yet the prices of primary exports plummeted and their terms of trade deteriorated sharply, thereby exacerbating the debt-service problem and at this point, many borrower countries begin experiencing repayment difficulties. The governments thus depended on borrowed money, while the local savings were being transferred to the minority elites (Mamdani 1995). In Uganda, these would later be called *mafutamingi*. This term originally referred to a group of government supporters who benefited from free allocation of business following the 1972 expulsion of Asians by General Amin, and now is used to refer to any one with ill-gotten gains or political rents. Extreme poverty then started biting, and the inequality gap between the peasants and minority *mafutamingi* widened until the mid-1990s.

However, there is little doubt that the serious economic conditions that existed in Uganda in the 1970s and early 1980s have now abated. For example, inflation rates are now well in single digits compared with real hyperinflation of the mid-1970s to the early 1980s. The black market for foreign exchange in which huge stacks of Uganda shillings were being traded, for few dollars, in street markets of Kampala, the capital city, as well as commodity rationing, are all long gone. The negative growth rates that existed earlier have disappeared and are now positive but have slowed slightly at an average rate of about 6% per annum since the late 1990s, as compared to around 7% between 1991 and 1998. In addition, although the country's overall GDP growth averaged 6.5% per year between 1990 and 2003, the rate of per capita GDP growth was much slower due to high rate of population growth. GDP per capita grew by 2.7% per year over the period as the population grew by around 3.2% each year (Uganda Bureau of Statistics 1997, 1999 and 2004). In addition the debt stock continues to grow. In fact, Uganda's Net Present Value (NPV) of debt to exports was raised to 305% in 2004. It should be noted that this is more than double the Highly Indebted Poor Countries (HIPC) debt relief threshold of 150% of export earnings (The Republic of Uganda 2004).

The issues addressed in this thesis are at the heart of development economics and political science, particularly of political economy. However, the questions being asked here are scarcely addressed using the kind of formal models and micro-level data that are used in this thesis. Therefore, the thesis contributes to economics literature by conducting this empirical research that offers explanations for the lack of economic progress and persistence of extreme poverty in Sub-Saharan Africa. In particular, the explanations focus on issues of growth, local capture, ethnicity and fertility within the contexts of incomplete markets and informational constraints typical in Sub-Saharan Africa, using Uganda as a case study.

Uganda provides an interesting case to study for the following reasons: despite the impressive economic growth of approximately 6.0% per annum during the past one and half decades, there was a down-turn in poverty trends since 1999. The absolute poverty (measured by the head count index) rose from 34% in 1999 to 38% in 2003 (Uganda Bureau of Statistics 2003). The 38% poverty rate represents an equivalent of 9.5 million who were living in extreme poverty in 2003. It could be that this was a temporary blip, as recent statistics show that the poverty rate decreased to 31% in 2006 (Uganda Bureau of Statistics 2007). Nevertheless, the increase in absolute poverty by 4 percentage points in a period of less than three years, after the declines in the 1990s, warrants an explanation. This is what chapter 2 of this thesis attempts to address.

Uganda is also a good case to study the issue of decentralised service delivery mechanism in the Sub-Region. Following the 1995 Constitution and 1997 Local Government Act, Uganda fully embraced decentralisation of fiscal and social services delivery in 1998. As it turned out, this eventually created incentives for local politicians and elites to agitate for the creation of new districts. As a result of such centrifugal forces, a number of small and sub-optimal districts have been created since 1999. The number of districts in Uganda has dramatically increased from 38 in 1998 to 86 by 2007. The sub-optimal administrative units raise concerns of economic efficiency (Tanzi 2000; Tanzi 2000a). Not surprisingly, there are already reports suggesting that 75 districts are unable to generate enough cash on their own to deliver services. See for example, <http://monitor.co.ug> of May 18, 2008 on "Districts run broke" (Atuhairi 2008). District fragmentation, as with the case of informational

constraints, also raises fears of potential elite capture of local governance. These motivate chapter 3.

In addition, Uganda is experiencing the fastest population growth rate in the developing world, and yet has no history of strong social protection typical in many other countries in Sub-Saharan Africa. As already discussed, recent official statistics show that the population growth rate is approximately 3.2%, with a fertility rate of 7 per woman (Uganda Bureau of Statistics 2003). The last population census in pre-independence Uganda was conducted in 1959. Since that census, the age composition of the population has changed. The share of children (aged less than 14 years) has increased over time from 44% in 1959 to 52% in 2002. This means that the dependency burden has increased, since it can be argued that every working age adult has more children to look after than before. Besides, Uganda's demographic indicators have shown big changes over time. The infant mortality rate, which was estimated at about 200 per 1,000 in 1959, has since declined to 76 per 1,000 in 2006. However, the total fertility rate has not decreased over time. This situation could mirror the Malthusian argument of high population keeping the consumption of households at a stagnant subsistence level. This issue is empirically investigated in chapter 4.

The thesis consists of five interrelated chapters. The next chapter (Chapter 2) is the first of the main chapters of the thesis, and this focuses on the question of whether economic growth alone is sufficient for a reduction of absolute poverty in Sub-Saharan Africa. The subsequent chapters try to identify what might be the other sources of absolute poverty changes that remain unexplained in the poverty accounting exercise. Chapter 3 evaluates specifically the welfare effect of the decentralised mechanism of community targeting in a less developed country setting. This is crucial given that the quantity and level of public goods provision and service delivery matters for poverty reduction. Chapter 4 evaluates the causal welfare effects of fertility. Finally chapter 5 presents the summary of the thesis, discussion and provides policy recommendations, as well as possible areas of future research.

Chapter 2

2 Growth and Absolute Poverty Reduction: The Case of Uganda

2.1 Introduction

In this chapter, sources of changes in absolute poverty are investigated using household surveys data of Uganda. As already described in chapter 1, the persistence of extreme poverty in many less developed countries remains a serious concern. Many countries in Sub-Saharan Africa began to experience problems from the mid 1960s, after most of them had gained political independence. Following decades of economic decline with negative growth rates, high rates of inflation, and worsening general impoverishment of the population, many of the countries in the Sub-Region were forced to implement comprehensive programmes of socio-economic reforms aimed to salvage their economies and in turn, help alleviate the scourge of extreme poverty. Subsequently, some countries started realising modest economic recovery, and sustained growth over time. However, the problem of extreme poverty has persisted in these countries. This reignites the debate about the role of economic growth in explaining the absolute poverty changes at the household level. In this chapter, the following research question is being investigated: Is growth alone, measured as a positive change in the mean of household consumption, sufficient for absolute poverty reduction?

Whereas some analysts give an optimistic view of the contribution of growth on absolute poverty changes, see for example (Chen and Ravallion 1997; Deininger and Squire 1998; Warr 2000; Dollar and Kraay 2002; Krongkaew and Kakwani 2003; Kraay 2005), critics argue that there is no guarantee emphasising that there are other crucial issues such as redistribution and institutional changes that matter also (Chenery, Ahluwalia et al. 1974; Bhagwati 1988; Khan 1997; Timmer 1997; Bruno, Ravallion et al. 1998; Agenor 2002; Dagdeviren, van de Hoeven et al. 2002; Besley and Burgess 2003; Sachs 2005). So, here are two seemingly irreconcilable opinions as to whether the poorest of the poor can benefit from the economic growth fuelled by

structural adjustment policies, or if growth generally bypassed the poor and only benefited the better-off.

In fact, there is also a view that regional differences in inequality and the inequality changes over time also matter (Ahluwalia 1976; Dagdeviren, van de Hoeven et al. 2002; Adam 2004). These argue that the differences could determine the extent of absolute poverty changes that might come from growth.

Note, importantly, that this debate has been based on theoretical predictions and also on cross-country regressions and accounting. The problems of these methods are highlighted in chapter 1, and the inferences based on cross-country data become tenuous. Besides, such studies cannot say much on how issues such as institutional changes that are context-specific contribute to poverty changes. Indeed, as discussed in the main introduction (Chapter 1), the main sources of changes in absolute poverty will depend on a given setting. It therefore requires country-specific research to help uncover the important sources of variation in changes in absolute poverty.

Thus the purpose of this chapter is to consider using the micro-level data from a given country as this allows examining in greater detail the crucial sources of absolute poverty changes. It particularly ascertains the evidence based on the cross-sectional data drawn from the household surveys from Uganda. In the main introduction (chapter 1, section 1.2), the reasons why Uganda is an interesting case to study have been explained. The country has typical characteristics as many others in Sub-Saharan Africa and the results can be generalised for a number of countries in the Sub-Region.

The paper uses household consumption expenditure data to explain this issue. The crucial assumption made here is that a household's total consumption is highly correlated with its income. There are many reasons for preferring consumption expenditure to income particularly in the less developed country context. These include: (a) where most people work as smallholders in subsistence agriculture or informal enterprises, consumption expenditure may be more accurately measured in household surveys than income is. (b) Household incomes (annual) may fluctuate due to variations in the harvest or other shocks. In such a circumstance, current income is

less than permanent income. Households are likely to use saving and borrowing to smooth the path of consumption, the life cycle hypothesis, so much so that consumption rises nearly one-for-one with current income. (c) Assuming limited consumption choices –as is the case in many less developed countries –what the people actually consume with their money affects their wellbeing more than what they simply earn. As Ray (1998) correctly observes, the poorer the country, the better the consumption based approximation of the well-being of the citizens, as this fulfils some absolute notion of the ability to function in a society. (d) Compared to household consumption, even the National Accounts estimates (GDP estimates), hence GDP per capita, might not represent a true picture due to lack of the relevant data in the less developed countries and aggregation problems.

Thus, the potential sources of poverty reduction that come to mind are: (a) a high growth rate of average consumption; (b) patterns of growth in consumption distribution that are poverty reducing; and (c) other aspects related to institutional changes that can directly increase the consumption of the poor. Following Datt and Ravallion (1992) and Datt (1998), the poverty decomposition technique is employed to identify these sources of changes in absolute poverty. This approach is generally similar to the classic growth accounting exercise. Although it is difficult to infer a causal relationship from such a method, it is possible to identify clearly important sources of absolute poverty changes.

The data used for this exercise are drawn from the 1992/93 integrated household survey (UIHS 1992/93); the 1997 monitoring survey (MS 1997); the 1999/2000 national household survey (UNHS 1999/00), and the 2002/03 Uganda national household survey (UNHS 2002/03). Changes in real household mean consumption expenditure (per adult equivalent), instead of changes in average incomes, are used to measure growth over the study period, from 1992 to 2003. By using household consumption data, one is able to explain clearly the main forces behind the changes in absolute poverty at a micro level.

As discussed in chapter 1, this paper is related to a growing body of empirical literature on the main contributing factors that promote high growth and a poverty-reducing pattern of consumption distribution. Some studies document the crucial

factors that influence the changes in household consumption, which are poverty-reducing (Datt and Ravallion 1998; Dercon 2005; Kraay 2005; Teal 2005). Others such as (Birdsall and Londono 1997; Chen and Ravallion 1997; Aghion, Caroli et al. 1999; Appleton 2001; Ssewanyana, Okidi et al. 2004) focus on the determinants of consumption inequality that matter for absolute poverty changes. These studies all agree that there are complementarities between the redistributive policies- those that promote opportunities for the poor such as access to the assets, public education and health, among others - and those that promote growth. This implies that the absence of any of the two could undermine reduction in absolute poverty.

This paper builds on the scholarly work by Kraay (2005). Kraay uses cross-country data from 80 developing countries over a long period of time, and also measures growth based on average incomes. Interestingly, most of these countries have the survey estimates reported using different measures. Some of them use survey income while others use the survey consumption to construct poverty estimates. The use of different measures in one analysis, particularly if consumption and income growth are not close (or do not move together) could lead to biased and inconsistent estimates.

This paper, however, differs from Kraay (2005) and much of other literature that uses cross-country data by considering the sources of poverty changes at the micro level for a particular country. By doing this, the paper contributes to the current state of knowledge in empirical literature. In addition, by using changes in mean of real consumption expenditure of household and in consumption distribution across the households from the surveys, rather than using real income measures, the paper sheds more light on the country-specific forces driving changes in absolute poverty that are relevant to the less developed countries.

Specifically, the analysis is dichotomised into the long, medium and short term periods, giving a clearer perspective on distributional changes. The existence of short-term distributional mechanisms could cause adverse changes in consumption distribution, gravitating into an increase in absolute poverty. The analysis based on long periods may mask such short-term changes. The reminder of this chapter is organised as follows. In the next section, the recent reform process and developments in some economic indicators in Uganda are briefly discussed. Section 2.3 presents the

theoretical framework for decomposing absolute poverty changes and also analyses the impact of each of the components; section 2.4 provides an empirical investigation of the contribution of growth and distribution to poverty changes; section 2.5 concludes.

2.2 Reforms and Trends in Key Economic Indicators in Uganda 1992 – 2003

In the 1970s, the economy had been characterized by scarcity of essential goods and services. As described in Appendix 3A, Ugandans of Asian origin who were at the forefront of growing economy were expelled and their property expropriated, the East African community collapsed, official trade beyond the borders was banned and illegal (black) markets mushroomed throughout the country. Political turmoil and a liberation war bankrupted the economy. In the early 1980s, economic reforms were launched to bring about economic recovery. The first attempt at foreign supported structural reforms began in 1981, after the liberation war that overthrew the autocratic regime of General Amin. However, this collapsed in 1984. A more successful phase of economic reforms was launched in May 1987 under the National Resistance Movement government.

The reforms and events that followed were dramatic. The successive Rehabilitation and Reconstruction Programmes (RRPs) witnessed privatization of state enterprises, the down-sizing of public service and liberalization of agricultural marketing, in particular the dismantling of the Marketing Boards which previously had market monopolies. The farmers' cooperative movement was also subdued in the process. International trade was restored, there was a resumption of regional integration activities and the expropriated properties were handed back to the returning Asians. See Chapter 1 (section 1.2) and Appendix 3A for greater detail. The country experienced rapid economic growth at an annualized rate of growth of 6.5% per annum in the 1990s and 6.0% in the early 2000s. However, it is not clear whether this was a consequence of these reforms or a coincidence.

Official statistics show that there was a marked reduction in absolute poverty in the 1990s (Uganda Bureau of Statistics 2003). The poverty rate fell from 56% in 1992 to 34% by the end of 1999, but drastically rose to 38% in 2002/03. The poverty gap

similarly declined from over 20% in 1992 to 10% by the 1999, but rose to 11% in 2002/03. The statistics on consumption-based absolute poverty measures and inequality for Uganda over the period 1992/93 to 2002/03 are reported in Table 2.1.

Table 2.1: National, Rural and Urban Poverty Statistics and Gini Index (1992/93 - 2002/03: Poverty measures are Headcount index (HCI), Poverty gap index (PGI) and Squared poverty gap (SPG)

	1992/93			1997			1999/00			2002/03		
	HCI	PG	SPG	HCI	PG	SPG	HCI	PG	SPG	HCI	PG	SPG
National	55.7	20.3	9.90	44.4	13.7	5.91	33.8	10.0	4.3	37.7	11.3	4.82
Rural	59.7	22.0	10.8	48.7	15.2	6.56	37.4	11.2	4.8	41.7	12.6	5.40
Urban	27.8	8.3	3.5	16.7	4.3	1.65	9.6	2.1	0.7	12.2	3.0	1.15
Gini coefficients												
National	0.364			0.347			0.395			0.428		
Rural	0.326			0.311			0.332			0.363		
Urban	0.395			0.347			0.426			0.477		
Percentage Change *												
National				-4.7			0.9			17.6		
Rural				-4.6			1.8			11.4		
Urban				-12			7.9			20.8		

Source: Uganda Bureau of Statistics

Notes: HCI gives the %age of people living below the absolute poverty line, US \$1.08 a day; PG measures how far the welfare of the poor lies below the absolute poverty line; and SPG is sensitive to redistribution amongst the poor). * Own computations with 1992/93 taken as the reference period.

The Table shows that consumption inequality measured by the Gini index fell from 0.364 in 1992 to 0.347 in 1997, but then dramatically rose to 0.395 in 2000 before soaring to 0.428 in 2002/03. This is equivalent to an increase of 18% between 1992/93 and 2002/03, and 23% between 1997 and 2002/03 having declined by 5% between 1992 and 1997. It can be seen from these statistics that the poverty problem is largely a rural phenomenon.

Absolute poverty in rural areas is generally above the national average for all the survey period. It increased in both urban and rural areas between the 1999/00 and 2002/03 surveys. In rural areas, the percentage of people in absolute poverty rose from 37% to 42%. This corresponds to a rise from 7.0 million to 8.5 million of rural people in extreme poverty. In urban areas, the corresponding increase was from 10% to 12%, equivalent to an increase in absolute numbers of the poor from 0.3 million to 0.4 million.

In addition, the four geographical regions had contrasting poverty profiles over the survey period, as reflected in Table 2.2. From this Table, it can be seen that the region with the highest headcount index was Northern, followed by Eastern, while

Central had the lowest in all the survey periods. However, because of the regional population shares involved, the perspective of the poverty profiles gets much clearer when one looks at the contribution to aggregate poverty by region (columns 2, 4, 6 and 8).

Table 2.2: Regional Poverty Rates (headcount index) over 1992 – 2003 Period

Region	Poverty rate (1) and contribution to national poverty (2)							
	1992/93		1997		1999/00		2002/03	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Central	45.6	25.1	27.9	18.9	19.7	16.9	22.3	18.7
Eastern	58.8	29.4	54.3	34.9	35.0	27.5	46.0	35.8
Northern	72.2	22.4	59.8	22.2	63.7	35.9	63.3	25.8
Western	53.1	23.0	42.8	24.0	26.2	19.7	31.4	19.8
Central Rural	54.3	22.1	34.5	16.6	25.2	15.4	27.6	16.9
Central Urban	20.8	3.0	11.8	2.3	6.1	1.5	7.8	1.8
East Rural	60.6	27.6	56.8	33.6	36.7	26.3	48.3	34.7
East Urban	40.4	1.8	25.2	1.3	17.1	1.2	17.9	1.1
Northern Rural	73.0	21.6	61.8	21.4	65.4	35.1	65.0	25.1
Northern Urban	55.2	0.8	34.0	0.9	28.6	0.7	31.4	0.6
Western Rural	54.3	22.5	44.0	23.5	27.4	19.4	32.7	18.9
Western Urban	28.9	0.6	19.7	0.5	5.7	0.2	16.9	0.9

Source: Uganda Bureau of Statistics, national household surveys; 1992/93, 1997, 1999/00 and 2002/03

Note (1) Rounded regional population shares: Northern, 30%; East, 28%; West, 25%; North, 17%

This Table suggests the existence of regional disparities. Between 1992 and 2003, with the exception of 1999/00, when Northern contributed most to aggregate poverty, the largest contributor was Eastern region. Overall, the Central followed by Western regions contributed the lowest. Note, however, that although the Northern region experienced a rise in the headcount index between 1997 through to 1999, it performed well compared to the other regions between 1999 and 2003. During this period, 1999 to 2003, all the other regions had a dramatic increase in poverty incidence.

In general, there is an observed reduction in absolute poverty incidence during the 1990s, and an increase during the early 2000s. Government sources have attributed the reduction to a very high rate of consumption growth, estimated to be 5.5% annually per capita (Ministry of Finance 2004). But this growth continued into the early 2000s, so the question is what could have happened? The other question is whether the growth was spread across regions and all sectors of the economy, in which case the poor in all regions and sectors would have benefited from it, or whether there were differences in mean consumption across regions and sectors that

mattered for aggregate poverty over the 1999/00 to 2002/03 period. If high growth reduces absolute poverty across the board, then there might be regional and sectoral disparities that could have contributed to the contrasting poverty profiles. In any case, there was a drastic increase in absolute poverty between 1999 and 2003 in spite of high growth. But, as this paper will show there is some truth in the growth argument although the fact remains that there could be other forces behind the poverty changes.

From 1992 to 1997, a rise in prices that producers received for their crops, following liberalization of agricultural marketing and also the increase in the world price of coffee, was a critical factor in consumption growth. In real terms, the unit export price for Ugandan coffee tripled from 0.82 US\$ per kilogram in 1992 to a peak of 2.55US\$ per kilogram in 1994/95. More importantly, cash crop farmers (including cotton, tea and tobacco) experienced an increase in incomes between 1992 and 1994/95. During that period, the country also diversified its exports under the non-traditional export promotion drive. The non-traditional exports included fish and fish products, flowers and to an extent beans and cereals.

Despite the diversification drive, the country remained heavily dependent on coffee as the main foreign exchange earner. After the coffee boom in 1994, Uganda's terms of trade started declining because several export crops (including non-traditional exports) experienced dramatic falls in international prices. As the terms of trade declined by about 10% between 2000 and 2003, devaluation partially shielded cash crop producers from the declining world prices. However, this led to an increase in the price of tradable goods, the local prices for exportables caught up quickly, relative to the price of food crops that are largely non-tradable. Farmers who depended on selling food experienced a drop in the real price they were receiving. The ratio of food crop prices to other consumer good prices in the consumer price index fell by 19%. At the same time, within the export sector, the prices of fish and fish products and flowers performed better than the prices of coffee, cotton, tea and tobacco grown more widely in the rural areas. Production of the cash crops dropped due to crop failure and, for coffee, due to the coffee wilt disease in the early 2000s. With no risk insurance available (Fafchamps and Hill 2004) and also limited agricultural extension services, the poor farmers in rural areas became more vulnerable. According to the Background to the Budget for Financial Year 2004/05, poverty among agricultural

households was worse within those practicing crop farming than those engaged in non-crop agriculture such as livestock and fishing.

In addition, the structure of the labour force has been changing. Although most of the households derive much of their income from subsistence agriculture, many are moving into production for market and self employment outside agriculture. Table 2.3 presents the statistics on the household heads' status in five broad economic activities. Columns 1 and 2 report the population shares, whereas columns 3 and 4 report the poverty rates in 1999/00 and 2002/03 respectively. As shown in Table 2.3, the proportion of households whose head was mainly employed in agriculture fell from 71% to 58% between 2000 and 2003.

Table 2.3: Main Activities of Household Head and National Level Poverty Status

Activity status of household head	Population share		%age under the \$ 1.08 a day poverty line	
	1999/00	2002/03	1999/00	2002/03
Self-employed in agriculture	70.8	57.7	39.1	48.8
Self-employed outside agriculture	12.0	25.2	17.0	20.6
Government employment	5.1	4.8	13.7	15.5
Private employment	7.1	6.7	17.3	21.0
Not working	4.9	5.6	42.3	39.4

Source: Uganda Bureau of Statistics 2004-2007 Statistical Abstracts, and Government of Uganda Poverty Action Plan (PEAP), 2004/05-2007/08

There was a corresponding increase in the proportion of those who were self employed outside agriculture from 12% to 25%. The proportion of farming households in poverty rose from 39% to 49% partly due to the fall in farmers' income during the period. Another reason could be due to a composition effect, that is, partly because the better-off, who were more educated self-employed, left the agricultural sector. This was accompanied by an increase in absolute poverty among those in non-agricultural self-employment from 17% to 21%. However, this increase was much lower than the increase observed in self-employed agriculture.

Annual real growth by sector and activity suggest structural shifts in sectoral composition. Table 2.4 reports sector contribution to GDP in percentage terms. The real growth in agricultural output has been consistently declining from an average rate of 6.0% in the early 1990s to 1.6% in 2002/03 (Uganda Bureau of Statistics 1997,

1999 and 2004). This is accompanied by an increase in real growth in industrial output from 5.6% to 8.1% and 2.7% to 8.1% in services sector during same period.

Table 2.4: Sector Contribution to GDP (% ages), 1990/91-2002/03

	1990/91	1994/95	1996/97	1999/00	2002/03
Agriculture	52.7	47.3	44.0	40.9	39.0
Industry	10.8	13.4	16.2	18.6	19.3
Services	36.5	39.8	39.8	40.5	41.7

Source: Uganda Bureau of Statistics, issues of Statistical Abstract for respective years.

Production has been shifting slowly towards services and industry away from agriculture. However, the population share of households in agriculture remains high, at 57.7% in 2003. These shifts have left the majority of the population at a great disadvantage since the majority of the population in Uganda is engaged in labour-intensive agriculture, and depend on this sector as the main source of income. Notice that poverty rose from 39% in 1999/00 to nearly 49% in 2002/03 in farming households (Table 2.3).

In sum, notwithstanding the 13.7% relative decline in agricultural production as a percentage of GDP between 1990/91 and 2002/03, 69% of the labour force was employed in agriculture related activities in 2003. The decline is largely due to the diminishing land productivity arising from depletion in soil nutrient, poor farming practices and crop diseases. Agricultural extension and advisory services have also been inadequate. See Kappel et al (2005) for more detail. This contrasts with an increase in output of 8.5% in industry and 5.2% in services with a combined labour force of around 30%, over the same period.

Contrary to many other countries in the Sub-Region, there was no key derailment of structural adjustment reforms in Uganda. The implication is that one can study the contribution of change in mean consumption at a micro-level to changes in absolute poverty nearly in isolation from the traditional macroeconomic side effects. The only crucial remaining area of concern then becomes expenditure switching policies that are accompanied by substantial cuts in social expenditure, which could have a bearing on the patterns of consumption distribution. Dercon (2005) discusses this issue for the case of Ethiopia. That work shows that the redistributive policies and other aspects could also account for substantial changes in absolute poverty.

2.3 Analytical Framework

In this section, the potential sources of changes in absolute poverty are identified. In compliance with the literature on this issue, this framework attempts to pinpoint two likely crucial sources: changes in average household consumption expenditure and in consumption distribution among households. A detailed review of the existing literature related to these issues is presented in appendix 1A (section 6.1).

The general argument underpinning this framework is as follows. Maintaining historical growth rates might not be sufficient for the reduction of extreme poverty. For the less developed countries, economic growth should be considered as a means but not as an end in itself. So, trying to raise the rate of growth without considering the impacts of distribution that could accompany it might not guarantee absolute poverty reduction. This is exactly what Dagdeviren, van de Hoeven et al. (2002), Bhagwati (1988), Chenery, Ahluwalia et al. (1974), and many others that expressed pessimism about the poverty-reducing impacts of growth have argued. To put this simply, redistribution could play an important role in the poverty changes, and hence prosperity of any given country also. In terms of consumption poverty, the measure of human wellbeing used in this paper, the question that then remains is to determine how much can be attributed to changes in household consumption, and how much to consumption distribution. If there is a portion of the observed change in absolute poverty that cannot be attributed to either of the above components, i.e. Growth and Redistribution, it is then called the "Residual" (Datt and Ravallion 1992).

Should there be a decline in consumption changes or a worsening consumption distribution, could changes in the residual compensate for the decline and ensure that poverty reduction is not reversed? All that is known from the theoretical arguments is that the changes can be achieved through economic growth only, through redistribution mechanisms alone or through the combination of the two. However, the aspects in the residual have not been explored more explicitly. There are issues such as institutional changes that could help to explain this element. These aspects are described in part B of appendix 3A. Hence, in view of the fact that less developed countries are faced with institutional and market failures, it is reasonable to conjecture that substantial reduction in absolute poverty could be achieved only through a

combination of all the three components. This is consistent with the arguments by writers such as (Chenery, Ahluwalia et al. 1974; Bhagwati 1988; Bruno, Ravallion et al. 1998; Aghion, Caroli et al. 1999; Besley and Burgess 2003; Sachs 2005), for example. The following paragraphs discuss each of these components in detail.

2.3.1 Potential Sources of Poverty Changes

The general framework presented is consistent with Kraay (2005), Ravallion and Chen (2003) and Datt and Ravallion (1992), among others. The starting point is to assume that there are at least two potential sources of changes in absolute poverty. Based on using household consumption as the measure of wellbeing these are; a change in mean consumption and a change in consumption distribution. Assume next that there is a third factor that contributes to the poverty changes. All these components can be identified rigorously using the poverty decomposition technique that Datt and Ravallion (1992) proposed.

Now denote the consumption of the p^{th} percentile of the distribution at time t as $C_t(p)$. In this formulation, the consumption distribution over the adult population of a country is divided into percentiles (p), and the mean consumption is (μ). Let the consumption distribution $C_t(p)$ be equal to $\mu_t dL_t(p)/dp$, where the mean consumption over time t is denoted by (μ_t) and the Lorenz curve, defined as the share of the bottom p percent of the population (i.e. least well-off people) in aggregate consumption, by $L_t(p)$. The Lorenz curve is relevant as it captures all the information on the patterns of relative inequalities in the population and is also independent of any consideration of the absolute measures (Datt and Ravallion 1992; Datt 1998).

According to Ravallion and Datt, the theoretical Lorenz curve with a vector of estimable parameters π satisfies the following four conditions:

- $L(0;\pi) = 0$
- $L(1;\pi) = 1$
- $L'(0^+;\pi) \geq 0$
- $L''(p;\pi) \geq 0$ for all $p \in (0,1)$

The first two conditions are the boundary conditions. They imply that 0 and 100 percent of the population account for 0 and 100 percent of the total expenditure (Datt and Ravallion 1992). Notice that if the focus is on consumption expenditure, rather than the total expenditure, there will be a violation of the second condition. However, from the view point of poverty measurement, as argued in Datt (1998), this should not raise much concern because it depends on the correct tracking of the Lorenz curve up to the headcount index only. The last two, first-order and second-order, conditions ensure that the Lorenz curve is monotonically increasing and convex, implying that consumption levels far below the poverty line have a higher weight than the consumption levels close to the poverty line.

Formally let the additively decomposable poverty measure (Pov_t) be expressed as

$$Pov_t^\alpha = \int_0^{H_t} f(C_t(p)) dp \quad (2.1)$$

where $H_t = C_t^{-1}(z)$ denotes the proportion of the population, at any given time, below

the poverty line, z , and $f(C_t(p)) = \left[\frac{z - C_t(p)}{z} \right]^\alpha$. This expression is a homogenous

function of degree zero in mean consumption and the absolute poverty line that is generally satisfied by a large class of poverty measures, including the FGT (1984) family. It particularly captures an assessment of the absolute living standards of the poor. It is also important to note that the FGT class addresses the distributional aspects of poverty. Distributional sensitivity is achieved by raising the power α of the poverty measure in (2.1). Higher values of parameter α will mean greater sensitivity of the poverty measures to inequality among the poor.

The poverty measures Pov_α for $\alpha = 0, 1$, and 2 , define respectively the headcount index (HCI), the poverty gap ratio (PGR) and the squared poverty gap (SPG). As α rises beyond 1, larger poverty gaps begin to acquire greater weight and the measure becomes increasingly sensitive to these gaps. The higher-order poverty measures and the SPG index in particular, penalize consumption inequality among the poor. Those further below the absolute poverty line are poorer than people close to it. The headcount index is especially insensitive to this issue. Thus as Ray (1998) argues, using the head count index only as a poverty measure might systematically bias policy

in favour of those who are very close to the poverty line. Therefore, the analyses concerning aspects of absolute poverty should focus not only on the headcount index but also on the poverty gap index and the squared poverty gap, the more bottom-sensitive poverty measures.

In fact, strong poverty implications can be drawn from using the squared poverty gap index ($\alpha = 2$). If there is no consumption inequality among the poor, poverty could be measured by some simple function of the headcount index and the poverty gap alone. However, a worsening inequality raises poverty (Chen and Ravallion 1997; Ray 1998). The SPG index captures these distributional issues nicely. As an illustration, consider a well-known P_α identity; $P_2 = HCI[PGR^2 + (1 - PGR)^2 CV_p^2]$, where CV_p is the coefficient of variation (or the Gini index) among the set of the poor. Because the coefficient of variation and the Gini index are both Lorenz-consistent, if the Lorenz curve of consumption among the poor worsens, while both the headcount index and the poverty gap index remain unchanged, the coefficient of variation will rise and the SPG will rise as well, raising poverty. Development policy aimed at reducing poverty as measured by the headcount may not cater for the poorest, but rather merely for those who are easily nudged above the absolute poverty line. The poverty gap index measure addresses this to an extent, but again problems remain within the context of the Pigou-Dalton weak transfer principle.

Therefore, using all the three poverty measures will provide a clear picture of what is happening and consequently facilitate effective policy analysis. The FGT family of poverty measures satisfies a desirable decomposability property. The advantage of this property is that one can easily measure the subgroup or region poverty measures when appropriately weighted by their numerical strengths to the total poverty. This enables one to pinpoint how much overall poverty in a country is attributed to various subgroups or regions. The proportional change in the poverty function can be derived from Equation (2.1) by totally differentiating the poverty measure function with respect to time such that:

$$\frac{dPov_t}{dt} \cdot \frac{1}{Pov_t} = \int^H \frac{df(C_i(p))}{dC_i(p)} \cdot \frac{C_i(p)}{p_i} \cdot \frac{dC_i(p)}{dt} \cdot \frac{1}{C_i(p)} dp \quad (2.2)$$

Partitioning expression (2.2) into two segments allows one to draw important implications. The first term, on the left of the bold dot, captures the effect on poverty of an infinitesimal change in mean consumption of individuals at the p^{th} percentile of consumption distribution. The second one is the growth rate of each percentile. Ravallion and Chen (2003) call it the growth incidence curve. It shows how the growth rate for a given percentile varies across percentiles ranked by mean consumption. Since the integration boundary in (2.2) is time-varying, this contribution is important also. Note, however, that if the term involving the derivative of the upper limit of integration is zero as Kraay (2005) argues, the FGT poverty measures would be equal to zero when evaluated at z

To separate out the effects of growth in mean consumption $(\frac{d\mu_t}{dt} \cdot \frac{1}{\mu_t})$ the consumption distribution $C_t(p)$ can be substituted with $\mu_t dL_t(p)/dp$ in the expression (2.2) so that

$$\frac{dPov_t}{dt} \cdot \frac{1}{Pov_t} = \left(\frac{d\mu_t}{dt} \cdot \frac{1}{\mu_t} \right) \cdot \int_0^{H_t} \eta_t(p) dp + \int_0^{H_t} \eta_t(p) \cdot \left[g_t(p) - \left(\frac{d\mu_t}{dt} \cdot \frac{1}{\mu_t} \right) \right] dp \quad (2.3)$$

where

$$\eta_t(p) \equiv \frac{df(C_t(p))}{dC_t(p)} \cdot \frac{C_t(p)}{p_t}$$

is the elasticity of the poverty measure with respect to the consumption of the p^{th} percentile, and captures the effect on poverty of an infinitesimal change in consumption of the individuals at the p^{th} percentile of the consumption distribution (Kraay 2005), and

$$g_t(p) = \frac{dC_t(p)}{dt} \cdot \frac{1}{C_t(p)}$$

This is the growth incidence curve referred to earlier. The first term in the rigorously defined expression (2.3) captures a change in absolute consumption levels, which is the growth component that matters for changes in the additive poverty measures. Therefore, the growth component comprises two subcomponents:

- a product of growth in mean consumption $(\frac{d\mu_t}{dt} \cdot \frac{1}{\mu_t})$ and

- a term summarising the sensitivity of the poverty measure to changes in mean consumption ($\int_0^{H_i} \eta_i(p) dp$).

2.3.1.1 Distributionally-neutral Growth

The question here is about what happens if there is an observed change in the mean consumption without any change in consumption inequality. Or, indeed, what if growth in mean consumption equals the growth rate in consumption of each percentile, represented by the growth incidence curve? In real terms, that is at constant prices of the consumption basket, on impact there will be unambiguous reduction in the poverty function. The positive change in mean consumption and hence in growth would, therefore, obviously be sufficient for absolute poverty reduction. Hypothetically this is so because in this case the growth incidence curve shifts higher upwards at the same pace with growth in mean consumption. In fact, those who are the proponents of growth-induced poverty reduction call this distributional neutral growth (Chen and Ravallion 1997; Deininger and Squire 1998; Warr 2000; Dollar and Kraay 2002; Kraay 2005).

2.3.1.2 Growth with Adverse Distributional Consequences

Having identified the first source, growth in mean consumption with sensitivity to changes in growth, it is now time to look at the second component in expression (2.3). This one, to the right of the plus sign, captures the distributional aspects of poverty changes. These are changes in relative consumption and could end up being a significant source of variation in poverty changes as well. This component is the average (mean per adult equivalent) across all percentiles of the consumption distribution of the product of two aspects: the growth rate of consumption in the p^{th} percentile relative to mean consumption growth and the sensitivity of poverty to growth in that percentile. The latter is the growth incidence curve, and this shows what an important role it plays in the change in the additive poverty measure. The lower it shifts downwards the greater will be the rise in absolute poverty. This fact leads to the argument that a worsening consumption distribution can actually be characterized by a rise in absolute poverty even with growth.

However, some economists have urged caution while interpreting poverty consequences from the growth incidence curve (Son 2004). Son argues that because this curve is derived from the first order dominance, it might not provide conclusive results on what happens to poverty when the curve switches signs. This school argues that the headcount index will be affected by growth in consumption quintiles only when it is binding. In other words, it only matters when the growth does not exceed the absolute poverty line. In that case, poverty will drastically fall if the Squared Poverty Gap index is very sensitive to consumption growth among the poor.

The integrating framework by Essama-Nssah (2005), however, provides a compromise solution. In this framework, ranking individuals according to some criterion in their initial state and then assigning them some social weights would make the curve conform to the Pigou-Dalton principle of transfers. A Pigou-Dalton improvement would thus be consistent with second-order dominance. This implies, therefore, that an upward shift of the growth incidence curve could lead to a fall in poverty for all additive poverty measures, even if there are no absolute changes in consumption growth. If this happened to be the case, then the redistributive mechanisms would be crucial in the reduction of extreme poverty.

Therefore, as Datt and Ravallion (1998) argued, policy debate should also focus on the effects of the consumption inequality that are distinct from those of absolute consumption changes. This could be one of the reasons why Bhagwati (1988), Chenery et al (1974), and Timmer (1997), for example, argued that almost always growth leaves the majority of the poor very impoverished. This is largely due to the opportunity cost in the foregone consumption of raising growth (Dagdeviren, van de Hoeven et al. 2002). The crucial argument from this strand of literature is that the poor people are often disconnected from the growth process which almost certainly culminates into the growth incidence curve shifting downwards. Thus the poor could end up not benefiting from an increase in mean consumption relative to their more affluent counterparts, owing to their inaccessibility to economic opportunities.

To put this simply, there are both short-term and long-run mechanisms that could generate adverse distributional changes. These might be either as a direct consequence of growth or other factors independent of the growth process (Ahluwalia

1976). If the changes are biased against the poor, then poverty would rise even when there is growth. Notice that the long-run studies like Kraay (2005), Dollar and Kraay (2002) and Warr (2000) do not capture these short-term dimensions. On the face of it, the long-run poverty trends may be seen to be declining, whereas in reality the opposite is observed from the short-term perspective. The long-run poverty studies therefore tend to ignore the short-term distributional changes, but yet these could have a play big role on poverty changes. This could hide important things going on. Take an example similar to a business cycle like situation. Consider a case where absolute poverty, measured in terms of the head count ratio, falls over a period of 10 to 15 years but increases somewhere in between, say after 12 years. This volatility often happens in countries where extreme poverty is widespread with low per capita income or low mean consumption. It is important to note that the long-run investigations would not reveal what actually occurred that time, bypassing critical aspects that might have been at play. A shock that changes consumption distribution, in the lower quintiles, primarily alters the average level of consumption. This generates movements across the absolute poverty line. A negative shock will result in an increase in the number of the poor. The individuals just above the poverty line will fall into poverty while those below remain trapped, rather than jump out. Thus, the poverty consequences of the short-term distributional changes are likely to be significant, even though the long-run trends depict a promising picture. Therefore, to examine the long-run aspects, a close eye should be kept on the medium and short-term ones also. Ignoring this could lead to wrong conclusions.

Clearly, there still remains a gap to fill in empirical literature. The empirical issue is whether it is growth in mean consumption only that is an important source of changes in poverty, or the poverty-reducing pattern of growth in consumption distribution on its own right, or a combination of the two and perhaps with other things. This is what this paper attempts to establish. By doing so, this paper contributes to the debate by trying to address this using micro-level consumption data of Uganda.

2.3.2 Summary of Theoretical Model and Expectations from Empirical Results

The framework presented has the following implications for the reduction of absolute poverty.

- A high growth rate of mean consumption is an important source of the reduction in the absolute poverty. According to the theory, most of the change in the poverty measures is attributed to growth in survey-based mean consumption. More importantly, growth alone would be sufficient for poverty reduction if, the observed growth occurs without adverse distributional changes affecting those below and just above the absolute poverty line (or lower quintiles).
- A consistent poverty-reducing pattern of growth in relative mean consumption is a crucial source of absolute poverty reduction. A change in absolute poverty can occur if the observed change in consumption inequality happens, even when growth does not increase.
- Growth, combined with redistribution mechanisms unambiguously reduces absolute poverty. To achieve a reduction in absolute poverty, an increase in mean consumption (growth) should be combined with mechanisms of redistribution. The redistribution of an economy's growth increment is the most effective form of reducing absolute poverty. Hence, growth in itself might not be sufficient, nor is redistribution alone.

These implications are investigated empirically in the next section. This paper bases its analysis on the decompositions of poverty changes into the "Growth component", "Redistribution component", and then the "Residual component". It is important to note that this poverty accounting exercise is similar to a growth accounting approach. In this case the "Residual" can be viewed in a similar way as what the growth literature considers to be total factor productivity (TFP), indicating that bit of growth in output which cannot be easily explained. The accounting experiment is also analogous to the Slutsky decomposition for demand.

2.4 Empirical Analysis

This section provides empirical evidence on the contribution of growth and redistribution towards the reduction in absolute poverty in Uganda. Even though there are several measures of these two components, the focus in this paper is on changes in survey mean consumption and in survey consumption distribution,

respectively. As discussed in section 2.1, these are better measures of human wellbeing for judging economic success or failure in less developed countries.

Three different empirical approaches are used to account for the poverty changes. In the first approach, simple parametric correlation tests are conducted to measure the degree of linear association between the poverty measures and mean consumption. This is based on the regional estimates, disaggregated at the rural-urban levels. These statistical tests provide a snapshot of the direction and magnitude of the relationships. Thus they merely seek to find out whether, on average, absolute poverty falls as the mean consumption increases. No conclusive evidence can be provided from this preliminary exercise. The next approach that decomposes the contribution of each of the components over time is based on Datt and Ravallion (1992). In the third, the simple OLS regressions to the decomposition based on small area estimates (i.e., the county-level poverty and inequality measures), are used to quantify the variation in poverty due to the growth and due to redistribution. The descriptive regression approach has been used in Adam (2004) and Besley and Burgess (2003) in their cross-country poverty analysis, respectively. County-level estimates with 149 observations are used. Despite the weakness of this regression analysis (no strong forecasts can be made), it is reasonable to believe that the endeavour is fruitful, as the aim here is to econometrically estimate the poverty elasticity of changes in consumption (growth) and of consumption distribution and see how close they are to the estimates from the decomposition exercise. In the following subsections, data and statistical issues are discussed first, before presenting the results.

2.4.1 Data and Statistical Issues

The data are drawn from four rounds of the Uganda household surveys: the 1992/93 integrated household survey (UIHS), the fourth monitoring survey of 1997 (MS-4), the Uganda national household surveys of 1999/00 (UNHS1) and 2002/03 (UNHS2), conducted by the Uganda Bureau of Statistics (UBOS). The UBOS is a semi-autonomous statistical agency mandated to collect, coordinate and publish the official statistics for the country. The survey rounds covered 9,925; 6,564; 10,696 and 9,711 households respectively, are nationally representative and have identical definitions, concepts and structure for variables of interest. This makes the estimates comparable

over time. With the exception of the fourth monitoring survey of 1997/98, the other survey rounds collected data on all socio-economic aspects of the household, as well as community characteristics. Because the 1999/00 survey under-sampled the urban areas, it was largely aimed to cover the agricultural sector, data for this period is re-weighted when computing the small area estimates for the urban areas.

The socio-economic module contains among others, consumption and non-consumption expenditure data that provides useful information for monitoring welfare in Uganda. The surveys shared similar consumption sections, with almost the same list of item codes and identical recall periods. Although the UNHS2 includes a few items not separately listed in the previous surveys, these changes are minor and mainly reflect new areas of consumption such as mobile phones. Different recall periods were used to capture information on different sub-components of household expenditures in all surveys. Whereas a 7-day recall period was used for expenditure on food, beverages and tobacco, a 30-day recall period was used for expenditure on non-durable goods and frequently purchased services. For semi-durable, and durable goods and services as well as non-consumption expenditures, a 365-day recall period was used.

The survey data transformation used by the UBOS is very elaborate. The purchases by household members and items received free as gifts were valued and recorded at current prices. The items consumed out of home produce were valued at current farm-gate/producer prices, while rent for owner occupied houses was imputed at current market prices. Food consumptions include food consumed from own production, purchases and free collections or gifts. Given the different recall periods used to collect data on household expenditures, some conversion factors were applied to change the data to a monthly basis. All the different sub-components of expenditure were aggregated to derive the consumption expenditures at the household level. Further adjustments were made in the construction of the consumption aggregates used in the estimation of poverty. These adjustments included accounting for inter-temporal and spatial price variations, revaluation of foods derived from own consumption into market prices and for household composition in terms of sex and age. The nominal estimates of mean consumption were adjusted for inflation at 1997/98 prices to get real mean consumption estimates (Uganda Bureau of Statistics

2003). This is done to adjust for changes in the cost of living over the survey intervals.

The absolute poverty line for the period between 1992 and 2003 is fixed but measured in constant 1997/98 prices. This ensures that it does not vary with the average level of welfare in the country. Thus, the absolute poverty line reflects the cost of meeting calorie requirements given the typical diet of poor Ugandans, and an estimate of meeting non-food requirements. The UBOS applies a standard practice as suggested in Ravallion & Bidani (1994) of making non-food requirements a mark-up on food requirements.

Averaging across Uganda, the UBOS poverty line calculations in 1993/94 came to around US \$ 34 per capita per month in 1997/98 prices. This estimate is comparable with US \$ 1.08 a day, based on the 1993 purchasing power parity estimates. The computations of the poverty measures¹ (the headcount index, the poverty gap index and the squared poverty gap) as well as the inequality measure (the Gini index) from the four survey rounds using standard approach suggested by Datt (1998) yield similar estimates as those published by UBOS.

Thus, this paper does not pursue the task of re-computing the estimates of the poverty measures and inequality. Rather, it uses the published estimates to derive key empirical results of this study.

2.4.2 The Data

Data used in this paper are summarised in Table 2.5. The small area (county) estimates for rural Uganda are computed using the household survey data, with population weights generated from national housing and population censuses. The 1992 estimates are generated from the 1992 UIHS and 1991 census data, while the 1999/00 and 2002/03 estimates are from 1999/00 and 2002/03 UNHS and 2002 census data. The mean monthly consumption per adult equivalent is adjusted for regional price variations and for inflation (1997/98 prices). The national poverty line was Ushs16443 per adult equivalent per month in 1989 prices, which is updated to

¹ The researcher is privy to the entire processes at UBOS for successive surveys.

1997/98 prices for analysis. The robustness of this poverty line is tested, see Appendix 1B. The results appear not to be sensitive to small shifts in the poverty line as shown in Table 6.1.

Table 2.5: Summary Statistics of the Key Variables

Variable	1992		1997		1999/00		2002/03	
	Mean	Std-D	Mean	Std-D	Mean	Std-D	Mean	Std-D
Monthly CPAE (Ushs)	24262	4301.2	28405	5035.7	35702	8846.2	36433	8258.4
Urban Dummy	0.359	0.459	0.307	0.451	0.386	0.474	0.418	0.491
Region	2.398	1.155	2.384	1.148	2.401	1.156	2.396	1.154
Central	0.311	0.463	0.313	0.465	0.315	0.464	0.336	0.472
Eastern	0.258	0.437	0.260	0.439	0.262	0.440	0.273	0.446
Northern	0.244	0.430	0.207	0.417	0.188	0.390	0.155	0.362
Western	0.187	0.390	0.214	0.422	0.236	0.424	0.235	0.424
Enum Area	261.84	358.72	173.35	232.29	281.72	383.31	256.46	348.94
Popmultipliers	349.74	288.54	389.94	323.65	430.14	356.35	508.53	421.29
Household size	4.82	2.16	4.91	2.83	5.18	2.98	5.10	2.88
HH multiplier	2660.11	2872.81	1759.29	1916.04	2866.8	3038.9	2602.8	2849.5
Equiv	3.24	1.84	3.65	2.07	3.81	2.17	3.78	2.15
Apline	16990.20	729.35	18776.34	732.28	20664.5	859.42	21409.5	890.41
Poor	0.427	0.669	0.340	0.533	0.259	0.408	0.289	0.453
HC index	55.7	13.61	44.4	15.6	33.8	19.99	37.7	18.14
Sample Size	9925		6564		10696		9711	
Small area-rural estimates (County-level)								
Monthly CPAE (Ushs)	21040.58	4301.18			29790.1	8846.19	29988.1	8258.4
HCI	63.4	13.61			40.89	19.99	44.4	18.14
PGI	24.32	9.22			14.41	10.86	15.4	9.68
Gini index	0.312	0.032			0.319	0.045	0.346	0.039
Population	96245.2	50949.1			96475.9	51087.5	143114.1	72840.8
No. of Poor	58837.5	28414.1			36090.9	21381.4	61836.1	38710.7
Observation	149				149		149	
Source: Uganda Bureau of Statistics; Integrated Household Survey 1992, Fourth Monitoring Survey 1997, Uganda National Household Survey (1999/00 & 2002/03), and Uganda Housing and Population Census 1991 & 2002.								
Description of Variable								
Region	This represents a geographical area comprising a number of districts within that area							
Enum Area	Enumeration Area; the first stage sampling unit from where households are sampled							
Equiv	Total household size, in adult equivalents							
Popmultipliers	Population multipliers							
HH multiplier	Household multiplier							
Apline	Absolute total poverty line in 1997/98 prices							
CPAE	Consumption expenditure per Adult Equivalent							
HC index	Head count index							
Poor	A household is below or above the specified poverty line (1=poor, 0=non-poor)							
Multiplier	A conversion factor used to infer population estimates from the sample							

2.4.3 The Correlations of Poverty Measures and Survey Mean Consumption

The correlation coefficients between the poverty measures and mean consumption expenditure are based on the regional estimates, disaggregated at the rural-urban

levels for Uganda. Similarly, the correlations of the rate of poverty changes with growth rates of the survey mean consumption are computed for given intervals. The intervals of interest are between 1992/93 & 1997; 1997 & 1999/00; 1999/00 & 2002/03 and 1997 & 2002/03. The correlation measures the degree by which, on average, absolute poverty falls as mean consumption increases (the signs are all negative), but the magnitude of the coefficients varies depending on the poverty measure. From the theoretical point of view, the headcount index has larger correlation than the poverty measures of higher degrees, because the growth in mean consumption is more likely to be insensitive to the bottom-sensitive poverty measures.

The simple correlations of the levels of poverty measures and the survey monthly mean consumption (per adult equivalent) at county-level, are computed for each of the survey periods (1992/93, 1997, 1999/00, and 2002/03). For the growth rates, the correlations between the natural log differences of the poverty measures and the corresponding natural log differences of the survey mean consumption for given intervals are computed. Recall that the absolute poverty line is time invariant throughout the entire periods, but adjusted for inter-temporal and spatial price variations. The results are given in Table 2.6. In the top panel, columns 1 to 4 report the simple correlations between the poverty measures and survey mean consumption for respective periods. The correlations between the poverty measures and growth rate in consumption are presented in columns 5 to 8. The bottom panel gives the correlation averages of the levels and growth rates over the entire survey period, from 1992/93 to 2002/03.

Table 2.6: Correlations of Poverty Measures and Survey Mean Consumption 1992/93-2002/03

Survey period	Levels (survey mean)				Growth rates (survey mean)			
	1992/93	1997	1999/00	2002/03	1992/3-1997	1997-1999/00	1999/00-2002/03	1997-2002/03
HC index	-0.953	-0.956	-0.873	-0.878	-0.449	-0.903	-0.808	-0.877
PG index	-0.917	-0.904	-0.761	-0.801	-0.430	-0.938	-0.774	-0.760
SPG index	-0.898	-0.860	-0.693	-0.749	-0.407	-0.944	-0.797	-0.646
Averages over 1992/93 to 2002/03								
HC index				-0.915			-0.759	
PG index				-0.846			-0.536	
SPG index				-0.799			-0.698	

(i) HC denotes for headcount; (ii) PG stands for poverty gap; and (iii) SPG for squared poverty gap

As expected, the correlations between poverty measures and mean consumption are all negative and strong. The growth rates indicate that there is a strong and significant negative association between the rate of poverty reduction and the rate of growth in mean consumption. However, the correlation results for the period between 1992/93 and 1997 reveal weak negative correlation between growth in mean consumption and the rate of poverty reduction.

Thus far, there are three key results from the exercise:

(1) There is a strong and negative correlation of the poverty measures with the survey mean consumption for all the periods. The periods of 1992/93 and 1997 had very high correlations compared to 1999/00 and 2002/03. Absolute poverty on average significantly falls as mean consumption increases. As expected, the average correlation becomes weaker for the more bottom-sensitive poverty measures.

(2) The rate of growth in mean consumption was negatively and strongly correlated with the rate of absolute poverty reduction during the periods 1997 to 2002/03, but not as strong during the earlier period between 1992/93 and 1997. The results further reveal much stronger negative correlations between the rates of growth in mean consumption with rate of poverty changes for periods 1997-1999/00 than the period between 1999/00-2002/03. This suggests that, absolute poverty declines with increase in growth in mean consumption, and more crucially, that the decline from increased growth was much more during the 1997 to 2002/03 period than between 1992/93 and 1997 period. On the face of it, this result looks to be at odds with what is on the ground: The absolute poverty rate dramatically fell by 11.3% during the 1992/93 to 1997 period, compared to a fall by 6.7% between 1997 and 2002/03. In fact, absolute poverty increased by 3.9% between 1999/00 through 2002/03 period. (3) The correlations of the more bottom-sensitive poverty measures are higher than for the headcount index during the period between 1997-1999/00. This is contrary to the theoretical expectations.

The second and third results imply that there are some other things not captured in the correlation results which could be at play, and are dampening the poverty-reducing effects of growth in mean consumption. Even though the simple correlations do not

provide conclusive evidence, they give a clue as to what could be behind the changes in absolute poverty measures. It is reasonable to believe that the most immediate candidates are the short- to medium-term adverse distributional changes.

Thus, a decomposition of the observed changes in the poverty measures over time into its sources: the “growth” and the “redistribution” components would certainly shed more light. The next subsection presents the decompositions based on the technique proposed by Datt & Ravallion (1992) and also by Datt (1998).

2.4.4 Double Decomposition of Poverty Changes

This section attempts to separate the contribution of changes in household consumption and in consumption distribution to the changes of the poverty measure over time. The two components are separated as follows.

- The change in absolute poverty that would have resulted if the observed change in consumption had occurred without any changes in consumption distribution. This captures the contribution of a distributionally-neutral growth on the changes in the poverty measures. The basic idea of this decomposition is as follows. For any two dates 0 and 1, the growth component of a change in the poverty measure is defined as the change in poverty due to a change in the mean from μ_0 to μ_1 while holding the Lorenz curve constant at $L_0 = L(p; \pi_0)$.

Thus, the distributionally-neutral growth component is constructed as the difference between the initial poverty measure and a hypothetical poverty measure computed using the second period mean consumption with the first period Lorenz curve. In other words, the contribution is simulated as a change in poverty as a result of a change in the mean consumption (from μ_0 to μ_1) without a change in relative inequality (the Lorenz curve is held constant at $L_0 = L(p; \pi_1)$).

- The change in absolute poverty that would have occurred if the observed change in inequality happened in the absence of growth. The redistribution component is defined as the change in poverty due to the change in the Lorenz

curve from $L_0 = L(p; \pi_0)$ to $L_1 = L(p; \pi_1)$ while holding the mean constant at μ_0 .

In other words, the re-distribution component is computed as the difference between the initial poverty measure and a hypothetical poverty measure constructed from the first period mean consumption with the second period Lorenz curve.

- In addition to the two components, there is a residual term also. This is calculated as the poverty change that is not explained by the sum of the growth and the redistribution components. This would capture the remaining sources other than the growth and redistribution components. As shown in chapter one, these could be significant especially for the less developed country context.

The above decomposition is formally expressed as:

$$P(\mu_1 / z, \pi_1) - P(\mu_0 / z, \pi_0) = [P(\mu_1 / z, \pi_0) - P(\mu_0 / z, \pi_0)] \\ + [P(\mu_0 / z, \pi_1) - P(\mu_0 / z, \pi_0)] + \text{Residual} \quad (2.4)$$

It is important to note that apart from the poverty measures at the two intervals, two simulated poverty measures $P(\mu_1, \pi_0)$ and $P(\mu_0, \pi_1)$ are needed to compute the decomposition in (2.4). The simulated poverty measures are computed by estimating the poverty with the Lorenz parameters for one date and the mean for the other. The parameters are derived from the parameterized general quadratic Lorenz curve specification that was first suggested by Villasenor and Arnold (1989). Next, the simulated poverty measures are used to derive the proportional changes in poverty due to each of the components: growth, redistribution and the residual term.

The direct contribution of each of the components is shown in terms of the magnitude (size) and the sign (direction) of the proportional changes due to a given component. The opposite sign from the poverty change would indicate a reverse effect. For total change in the poverty measure, a positive (negative) sign would imply a reduction (an increase) in poverty due to that component.

Tests are conducted for the following intervals: 1992/93 (period 0) to 1997 (period 1); 1997 (period 0) to 2002/03 (period 1); 1997 (period 0) to 1999/00 (period 1); and

1999/00 (period 0) to 2002/03 (period 1). The simulations are implemented using the interactive POVCAL software developed by Datt, Chen and Ravallion; which is available at www.worldbank.org/html/prdph/lsm/povcal website.

The estimates of this experiment are given in Table 2.7 to Table 2.10. In Table 2.7, the results for distributionally neutral growth for national, rural and urban Uganda are reported in Columns 1 to 3, respectively. Next, in columns 4 to 6 are the simulation results for the growth-neutral consumption redistribution, they tell by how much poverty would be if there was no growth at all. The years in parenthesis are the original period in which the Lorenz curve or mean is fixed.

Table 2.7: Decomposition of Poverty into Growth and Redistribution Components

Poverty Measure	$P(\mu_1, \pi_0)$ Lorenz fixed at original period ()			$P(\mu_0, \pi_1)$ Mean fixed at original period ()		
	National	Rural	Urban	National	Rural	Urban
1997(1992/93)						
HC index	46.1	50.3	18	53.9	58.0	26.3
PG index	14.4	16.2	4.4	19.5	20.9	7.9
SPG index	7.5	7.6	1.9	8.12	9.5	3.1
2002/03(1997)						
HC index	38.4	42.6	11	45.9	50.1	18.3
PG index	11.5	12.9	2.2	14.5	15.9	5.2
SPG index	4.4	4.9	-0.2	6.3	7.2	2.2
1999/00(1997)						
HC index	29.3	32.5	4.3	48.2	53.0	20.9
PG index	9.1	10.4	1.2	14.2	15.8	4.8
SPG index	3.4	3.8	-0.2	6.8	7.6	2.5
2002/03(1999/00)						
HC index	23.3	26.5	-0.8	43.6	47.6	19.2
PG index	5.9	7.0	-1.9	13.6	14.7	5.9
SPG index	2.0	2.7	-1.6	6.0	6.4	2.5

HC denotes for headcount, PG stands for poverty gap and SPG for squared poverty gap

The experiment is not conducted for the continuous period (from 1992 to 2003), as decompositions covering long-term periods tend to underestimate the effects due to several intervening factors, such as shocks that might have occurred in between. Note that the simulated poverty measures due to distributionally neutral growth (Lorenz fixed to 1992/93 level) reported in Table 2.7 are higher than the published ones for 1997 (refer to Table 2.1), and they are slightly higher for 2002/03 when Lorenz curve is fixed to 1997 level.

The opposite holds for 1999/00 and 2002/03 where, the simulated poverty measures due to distributionally neutral growth in which the Lorenz curve is fixed to 1997 and 1999/00 levels respectively are lower than the ones published by the UBOS.

There is circumstantial evidence to suggest that consumption distribution has played a role in poverty changes (judging from columns (4) to (6)). But at this moment, no strong conclusions can be made. Hence, this experiment goes further and calculates the medium-term and short-term percentage changes in the poverty measures.

The estimates from the experiment are given in Table 2.8. The total change in poverty, the growth component, redistribution component, and the residual term are estimated; at national (N), rural (R), and urban (U).

Table 2.8: Decomposition of Changes in Poverty (in percentage points)

Poverty measure	Total change in poverty			Growth component			Redistribution component			Residual		
	N	R	U	N	R	U	N	R	U	N	R	U
1992/93-1997												
HC index	-11.3	-11.0	-11.1	-9.6	-9.4	-9.8	-1.8	-1.7	-1.5	0.1	0.1	0.2
PG index	-6.6	-6.8	-4.0	-5.9	-5.8	-3.9	-0.8	-1.1	-0.4	0.1	0.1	0.3
SPG index	-4.0	-4.2	-1.8	-2.4	-3.2	1.6	-1.8	-1.3	-0.4	0.2	0.3	0.2
1997-2002/03												
HC index	-6.7	-7.0	-4.5	-5.9	-6.1	-5.7	1.5	1.4	1.6	-2.2	-2.3	-0.4
PG index	-2.4	-2.6	-2.3	-2.2	-2.3	-2.1	0.8	0.7	0.9	-1.0	-1.0	-1.1
SPG index	-1.1	-1.0	-1.2	-1.5	-1.7	-1.8	0.4	0.6	0.5	0.01	0.1	0.1
1997-1999/00												
HC index	-10.6	-11.3	-7.1	-15.1	-16.2	-12.4	3.8	4.3	4.2	0.7	0.6	0.8
PG index	-3.7	-4.0	-2.2	-4.6	-4.8	-3.1	0.7	0.6	0.5	0.2	0.2	0.4
SPG index	-1.6	-1.8	-1.0	-2.5	-2.8	-1.8	0.9	1.0	0.8	0.0	0.0	0.0
1999/00-2002/03												
HC index	3.9	4.3	2.5	-3.3	-3.4	-3.3	3.1	3.2	3.0	1.4	1.6	1.0
PG index	1.3	1.4	0.9	-1.3	-1.3	-1.2	1.1	1.1	1.2	0.6	0.7	0.3
SPG index	0.6	0.6	0.5	-0.70	-0.65	-0.72	0.56	0.50	0.56	0.3	0.3	0.2

The medium-term periods reveal mixed effects as far as the sources of changes in poverty are concerned. Between 1992/93 and 1997, both the growth and redistribution components were poverty reducing. The largest percentage reduction in absolute poverty was due to the growth component amounting to -9.6%, compared to -1.8% due to consumption redistribution. The negative percentage reduction due to consumption redistribution means that inequality reduced in both rural and urban areas as well as at the national level during the early part of the 1990s. However, this

was not the case between 1997 and 2002/03 where the redistribution effects had a reverse effect on changes in poverty.

During this period, the percentage of poverty reduction due to the growth in consumption was -5.9 compared to a 1.5 percentage point increase due to consumption inequality. It gets even much clearer when the changes in the poverty measures are viewed in proportional contributions from the sources. Table 2.9 below shows the proportion of the change in poverty that is due to each component, estimated at the national level: the total percentage changes in poverty in column (1); the proportion of change in the poverty measures due to the growth component in column (2); due to the redistribution component in column (3) and due to the residual in column (4).

Table 2.9: Proportion of changes in Poverty from the Decomposition (National level)

	Total change in poverty	Due to the Growth component	Due to the Redistribution component	Due to the Residual
Period	1992/93-1997			
HC index	-11.3	0.849	0.159	-0.009
PG index	-6.6	0.894	0.121	-0.010
SPG index	-3.99	0.594	0.446	-0.040
Period	1997-2002/03			
HC index	-6.7	0.881	-0.224	0.328
PG index	-2.4	0.917	-0.333	0.417
SPG index	-1.11	0.451	-0.009	0.541
Period	1997-1999/00			
HC index	-10.6	1.425	-0.358	-0.066
PG index	-3.7	1.243	-0.189	-0.054
SPG index	-1.6	1.556	-0.544	-0.013
Period	1999/00-2002/03			
HC index	3.9	-0.841	0.785	0.369
PG index	1.3	-0.986	0.865	0.437
SPG index	0.55	-1.146	0.938	0.521

Note: The sensitivity analysis of these results is conducting by shifting the poverty line within a given range; see Table 6.1 (Appendix 1B).

Throughout the entire study period, the growth component is poverty reducing. However, the results show that since 1997, the medium-term poverty aspects are characterised by the worsening inequality which penalises the poor. With an exception of the early 1990s, when there is evidence of poverty-reducing patterns of growth in relative consumption, the adverse changes in consumption distribution wiped growth effects since 1999 to 2003. The adverse effect of worsening inequality becomes more evident when short-term poverty trends are analysed. Between 1997

and 1999/00, much as growth had a strong effect on poverty reduction (for all the poverty measures) inequality diminished the net reduction in absolute poverty. It also turns out that the penalising effect, due to adverse consumption distribution, led to an increase in absolute poverty between 1999/00 and 2002/03, growth notwithstanding. This is true for the more bottom-sensitive poverty measures as well, implying that rising consumption inequality dampened poverty-reducing growth effects.

Regarding the residual term, it can be seen that the absolute poverty changes not explained by both the growth and the redistribution components are fairly large during the period when the trend of poverty reduction reversed. This means that in addition to the redistribution component, there is some poverty increase attributable to the residual term. This is the part not easily explained, as with the Solow residual in growth accounting. Of interest, however, is the redistribution component that is capturing consumption inequality in the whole country. Notice that this inequality is a mix of inequality across regions and inequality within regions. Thus, the contribution of each of these subcomponents is not clear from the decompositions in Tables 2.8 and 2.9. This necessitates a further decomposition of the redistribution term, an exercise that is conducted after the next set of analysis that employs the regression method along the lines of Adam (2004) and Besley and Burgess (2003).

2.4.5 Elasticity of the Poverty measures: A Regression Approach using County estimates

This subsection uses a regression approach to quantify the variation in poverty due to regional inequality, captured by the consumption level variable, and inequality within units, which is measured by the Gini/inequality term, as an alternative to the decomposition technique. This approach, though descriptive, allows one to assess the direct importance of patterns of growth in relative consumption which are captured by the second term in expression (2.3). This pinpoints the inequality within units also.

Assume that the logarithm of the poverty measure for the i^{th} region (rural/urban) ($\ln P_i$) is influenced by mean consumption and consumption distribution, or inequality ($\ln g_i$) as expressed

$$\ln P_{it} = \alpha_i + \beta \ln \mu_{it} + \gamma \ln g_{it} + \delta + \varepsilon_{it} \quad (i = 1, 2, \dots, N; t = 0, \dots, T) \quad (2.5)$$

where α_i is a fixed-effect reflecting geographical differences between counties in the distribution, β is the sensitivity of poverty with respect to mean consumption, γ is the sensitivity of poverty with respect to inequality, and δ is the trend rate of change over time. The error term is assumed to be normally and independently distributed with mean zero and constant variance – an aspect that is to be subjected to standard diagnostic tests.

This regression is used to estimate the elasticity of poverty with respect to mean consumption and the elasticity of poverty with respect to consumption redistribution (a change in inequality) across counties, between 1992 and 2003. In Uganda, the counties are administrative units just below a district level. One or more counties make up a district, whereas a number of districts form a region. The constant coefficient will show whether geographical patterns (and other aspects, such as culture, institutions, etc) are important in explaining poverty dimensions while δ measures the time effect in poverty dynamics. Taking the log differences in Equation (2.5) yields

$$\Delta \ln P_{it} = \delta + \beta \Delta \ln \mu_{it} + \gamma \Delta \ln g_{it} + \Delta \varepsilon_{it} \quad (2.6)$$

In Equation (2.6) the rate of poverty reduction or increase (P) is regressed on the rate of change in mean consumption and the rate of change in the distribution of consumption (Gini coefficient). The coefficient (β) shows by how much in percentage terms poverty will decrease with a percentage point increase in growth, after controlling for the rate of change in the distribution. Similarly, when growth in mean consumption is controlled for, the coefficient (γ) shows by how much in percentage terms poverty will increase (decrease) with a percentage point increase (decrease) in inequality. The regressions are subjected to a battery of standard residual diagnostic tests namely; tests for normality (Bera-Jarque 1981) – checking whether the assumption of first moments, i.e., zero-conditional mean holds, heteroskedasticity (White 1980) and autocorrelation (Durbin-Watson, 1950). The new error process in the differenced Equation (2.6) is correlated within the counties and over time. The respective intervals for a given county are not statistically

independent since they have common household surveys. The errors are not normal nor are they independently and identically distributed. In addition, there is the issue of heteroskedasticity as the distributions of errors vary across county, mean consumption (μ_{it}) and inequality (g_{it}). This might imply that the standard errors calculated from the OLS regressions could underestimate the true sample-to-sample variations in addition to producing unrealistically narrow confidence intervals. This part of analysis therefore, derives heteroskedasticity consistent variance-covariance estimator (White 1980) that accounts for the variance-covariance matrix of the error process $\Delta\epsilon_{it}$. The neighbourhood effects are also accounted for by the cluster -VCE estimator. Hence, the standard errors of the estimator are robust even if the estimation does not rely on the strong assumptions of identically independent distributed errors. Note, however, that such robust standard errors lack the classical interpretation of having a certain likelihood (across repeated sampling) of containing the true values of slope coefficients (Hamilton 2006). However, the robust confidence intervals have a certain likelihood defined upon which recomputed sample coefficient estimates converge. According to Hamilton, the penalty for relaxing the iid errors assumption is to settle for a less impressive conclusion but which have precise point estimates.

The natural log of poverty is regressed on the natural log of mean consumption, natural log of inequality (measured by the Gini index), and the time trend based on rural estimates for the 149 counties. The small area (county) estimates are based on the household surveys for the period 1992, 1999/00 and 2002/03. The county mean consumption estimates are adjusted for regional prices in constant 1997/98 prices. The regression estimates are given in Table 2.10.

Table 2.10: Regression Estimates: Dependent Variable is Natural log Poverty

1992/93-2002/03	Natural log HC index	Natural log PG ratio
Constant	37.58** (6.54)	52.37** (7.16)
Natural log mean consumption	-1.163*** (-32.71)	-1.654*** (-36.54)
Natural log Gini index	0.389* (4.29)	1.005** (8.68)
Time trend	-0.011* (-3.66)	-0.016* (-4.24)
F(3, 443)	562.79	736.15
Adjusted R-Squared	0.7922	0.8318

The figures in parenthesis are t-ratios; *** significance at 1%, ** significance at 5% & * significance at 10% levels. All regressions passed, at 5 % level, tests of the errors for normality, VCE heteroskedasticity (White 1980) –the standard errors are robust and autocorrelation, no lag (Durbin and Watson 1950).

The intercept coefficient, which captures the fixed effects, for the two poverty measures is highly significant both at 0.05 and 0.01 levels. This suggests that the geographical differences as well as other factors are important in explaining the poverty variations across the counties. The results of the time trend that capture the average rate of poverty (trend rate over time) are significant at the 0.05 level. The coefficients of natural log mean consumption and of natural log Gini index are the elasticity of poverty with respect to mean consumption and the elasticity of poverty with respect to consumption inequality within counties respectively.

The regression results show that the elasticity of poverty with respect to mean consumption is estimated at -1.16 between 1992 and 2003. This implies that a 1% increase in the survey mean consumption will reduce absolute poverty by approximately 1.2%, all else being equal. On the other hand, the elasticity of poverty with respect to consumption inequality is estimated at 0.4. All other factors remaining equal, therefore, a 1% increase in consumption inequality within counties will increase absolute poverty by around 0.4%. Note, most crucially, that the elasticity of poverty with respect to inequality within counties becomes stronger and highly significant with the higher poverty measures. The poverty gap ratio, as does the squared poverty gap, reflects the social welfare functions which are sensitive to the consumption inequality among the poor depending on how far away they are from the absolute poverty line. Consistent with the "Pigou-Dalton weak transfers" principle, the presence of consumption inequality among the poor counties raises poverty. Hence, consumption distribution (or even transfer of income) from any person below the poverty line to anyone less poor while keeping the set of the poor unchanged, would raise poverty.

Therefore, the results suggest that a 10% increase in mean consumption (per adult equivalent) would reduce absolute poverty by 11.6 percentage points over a period of ten years. But, a worsening of consumption inequality within counties would lessen the effect of this growth in mean consumption. A 10% increase in consumption inequality within counties results in a 4% increase in absolute poverty over the same period. Thus the long-run growth prospects of a reduction in extreme poverty are dampened by the worsening inequality. Moreover, the fixed effects which capture the unobserved heterogeneity across counties, these could be the geographical and

cultural differences as well as institutional aspects across counties, matter for poverty reduction also.

In what follows are the analyses of the short- to medium- term distribution aspects using the regressions. This is aimed to show how the results from the two approaches, the poverty decomposition and the regression methods, compare and contrast insofar as the periods are concerned.

The regression estimates are obtained by fitting the differences in the natural log of the poverty measures on two variables: (1) the difference in the natural log of real value of survey mean consumption, and (2) the difference in the natural log of the Gini coefficient between the surveys. The observation unit remains the county level.

Table 2.11 presents the regression results based on equation 2.6 above. The top panel reports the results over the 10-year period (1992/93 to 2002/03), the middle panel shows those over 7-year period (1992/93-1999/00), and for the 3-year period between 1999/00 to 2002/03 are reported in the bottom panel. The growth elasticity of poverty explains the extent by which the growth in mean consumption, reduction in regional inequality, would reduce the change in the poverty measure (Besley and Burgess 2003).

Table 2.11: Regression Estimates: Dependent Variable is the Change Natural log Poverty

	Change in natural log head count index	Change in natural log poverty gap ratio
1992-2002/03		
Change in natural log mean consumption	-1.099*** (-23.7)	-1.541*** (-26.26)
Change in natural log Gini index	-0.052 (-0.49)	0.179 (0.92)
R-Squared	0.7802	0.7858
1992-1999/00		
Change in natural log mean consumption	-1.276*** (-18.25)	-1.703*** (-18.55)
Change in natural log Gini index	0.145 (0.73)	0.714* (2.50)
R-Squared	0.7535	0.7535
1999/00-2002/03		
Change in natural log mean consumption	-0.836** (-7.85)	-1.117** (-8.99)
Change in natural log Gini index	0.487* (3.67)	0.978** (5.87)
R-Squared	0.4016	0.5130

The estimates of variance are robust. The figures in parenthesis are t-ratios; *** significance at 1%, ** significance at 5% & * significance at 10% levels. All regressions passed, at 5 % level, tests of errors for normality (Bera-Jarque 1981), VCE heteroskedasticity (White 1980) –the standard errors are robust and autocorrelation, no lag (Durbin and Watson 1950). As expected, results that include the time lapsed between surveys are not significant and are therefore are not reported.

Note the varying elasticity of poverty with respect to the mean consumption over the different periods. In particular, the 7-year period, over 1992 to 1999/00, shows a larger growth elasticity of poverty than the 10-year period, over 1992 to 2002/03. Based on the head-count index, the growth elasticity of poverty is around -1.3 compared to approximately -1.1 respectively. For the 3-year period, over 1999-2002/03, the estimated poverty elasticity of growth is -0.8. Therefore, all else being equal, over the period of seven years (between 1992 to 1999/00) a 7% growth in mean consumption should have led to a 9.1% decrease in absolute poverty (head count). On the other hand, a 3% increase in mean consumption would lead to a 2.4% decrease in absolute poverty over a three-year period between 1999/00 and 2002/03. Thus, going by the latter estimations a 7% growth in mean consumption would lead to a 5.6% decrease in absolute poverty over a seven-year period from 1999/00, all else being equal.

The poverty elasticity (head count) with respect to inequality within counties is estimated at 0.15 over 1992-1999/00, -0.05 over 1992-2002/03, and 0.49 over 1999-2002/03 periods. It is important to note that the inequality elasticity of poverty for longer-term periods, 1992 to 1999/00 and 1992-2002/03, is not significant. However, it is significant during the short-term period, over 1999-2002/03, suggesting increasing consumption inequality within counties.

The regressions of the more bottom-sensitive FGT poverty measure, the poverty gap ratio, have coefficients that are higher than those of the head-count index. The growth elasticity of the poverty gap ratio is estimated to be -1.7 over 1992 to 1999/00, -1.5 over 1992 to 2002/03 and -1.1 for the 1999 to 2002/03 periods. For each of the three periods, the growth elasticity of poverty is all statistically significant. However, this is not the case for the elasticity of the FTG poverty measure with respect to inequality. Whereas the elasticity estimate with respect to inequality between 1992 and 2002/03 is actually not statistically significant and relatively small, those of much shorter periods are large and significant. The shorter the period is the larger is the elasticity and the more it becomes statistically significant. For example, over 1992 to 1999/00 it is nearly 0.7 and slightly significant, whereas it is close to one and highly significant for the period between 1999/00 and 2002/03.

These results particularly for the poverty gap ratio imply that there were important short term distributional consequences that mattered for absolute poverty. As discussed earlier, this is due to the fact that the more bottom-sensitive FGT poverty measures, including the poverty gap ratio, reflect the social welfare functions which are sensitive to the consumption inequality among the poor depending on how far away they are from the absolute poverty line. It is reasonable to believe, therefore, that the worsening inequality within counties had a stronger negative impact on the poverty-reducing growth effects between 1999/00 and 2002/03 compared to earlier periods. It is worth noting that this issue of inequality within counties does not emerge clearly from the decompositions, since (as discussed earlier) in Tables 2.8 and 2.9 the redistribution component captures a mix of inequality across and within regions.

The next step, therefore, further disentangles the redistribution component. The point here is to separate the second term in equation (2.3) into a within county redistribution term and a between (across) county redistribution term using the county estimates. The results of the expanded decomposition for the redistribution term only are reported in Table 2.12.

Table 2.12: Changes in Poverty from the Redistribution subcomponents (County level estimates)

	Due Redistribution component	Of which, the Across- Redistribution term is	Of which, the Within- Redistribution term is	Share of the Within term to Total Redistribution
Period	1992/93-1997			
HC index	0.159	0.183	-0.024	0.138
PG index	0.121	0.137	-0.018	0.149
SPG index	0.446	0.659	-0.165	0.370
Period	1997-2002/03			
HC index	-0.224	-0.254	0.030	0.134
PG index	-0.333	-0.378	0.045	0.135
SPG index	-0.009	-0.011	0.003	0.333
Period	1997-1999/00			
HC index	-0.358	-0.150	-0.208	0.581
PG index	-0.189	-0.043	-0.146	0.772
SPG index	-0.544	-0.191	-0.353	0.649
Period	1999/00-2002/03			
HC index	0.785	0.282	0.503	0.641
PG index	0.865	0.350	0.514	0.594
SPG index	0.938	0.359	0.578	0.616

The two redistribution subcomponents were poverty-reducing during 1997 to 1999/00, but poverty-increasing during 1999/00 to 2003. Note, importantly, that the

term of the redistribution within counties was poverty-reducing during 1992/93 to 1997, whereas it was poverty-increasing during 1997 - 2002/03. The converse is true for the redistribution component across counties during these medium term periods. In addition, much of the changes in redistribution came from the within redistribution subcomponent during the period after 1997, both the medium and short-term periods.

2.5 Conclusion

This chapter used the growth of survey mean consumption (per adult equivalent) to evaluate the contribution of growth on changes in the absolute poverty, using Uganda as a case study. The data is drawn from four household surveys since 1992/93 to 2002/03. The main method employed is that of the decomposition of poverty changes into the growth and redistribution components, which was proposed by Datt and Ravallion (1992). The study identified the main sources of changes in absolute poverty to be: (a) a high growth of mean consumption; (b) a consistent poverty-reducing pattern of growth in consumption inequality; and (c) other aspects that can affect consumption directly that in turn would reduce absolute poverty. These results are also confirmed using the OLS regressions that were conducted on small areas estimates, at county level. The purpose of the regression estimation was to analyse econometrically the effects of growth of survey mean consumption and consumption inequality.

Mixed results are obtained from both the poverty decomposition experiments and the regression approaches for long- to medium-term and also short term periods. The results show that all the sources are relevant at some point, depending on whether poverty is falling or rising over a particular period. The absolute poverty-reducing effects of growth are significant. Growth of survey mean consumption dominates in explaining the poverty changes over the medium-term to long-run period. But, the changes in consumption distribution and other unidentified factors were found to be important for changes in absolute poverty also, especially over the short-term horizon. During the periods when absolute poverty rose, between 1999 and 2003, all the sources of changes in poverty are empirically relevant. Between 1992 through 1997, in addition to the growth component, the poverty reducing-pattern of growth in consumption inequality accounted for a substantial reduction in extreme poverty.

However, this was not the case after 1997. Between 1997 and 2003, for example, the redistribution component was poverty-increasing and actually dampening the contribution from the high growth of mean consumption witnessed then. It appears that the growth of mean consumption might not have been uniformly distributed across the households. See Ssewanyana, Okidi et al. (2004) for greater detail on the inequality aspects in Uganda.

Therefore, the main result from this paper is that although growth is important, it cannot in itself be sufficient for absolute poverty reduction. There are other important sources of changes in poverty, even if growth does not increase. In spite of the positive changes in mean of household consumption, the worsening consumption inequality, which is likely to be exacerbated by institutional factors such as capture of local governance among others, contributed to a substantial increase in absolute poverty between 1999/00 and 2003 period. These results do not come out clearly from previous studies that used cross-country data, see Kraay (2005), for instance.

By applying poverty decomposition method to micro-level data - similar to a traditional growth accounting framework - this chapter has quantified the changes in poverty that is attributed to growth, patterns of changes in consumption distribution (consumption inequality), and other aspects captured by the residual component. The regression analyses based on small area estimates was conducted to augment the decomposition, and the results show that the growth and redistribution effects are both important.

From the short-term perspective, the unequalising effect of some factors measured by the redistribution term is undoubtedly relevant for changes in absolute poverty also. In light of the compelling evidence that the redistribution effect is important, further investigation on factors affecting redistribution becomes inevitable. Given the institutional aspects highlighted in the main introduction chapter (Chapter 1) and in appendix 3A, micro-level research particularly focusing on the political economy issues that affect consumption directly and hence hamper the poverty-reducing growth effects would inform the public policy debate. This is exactly what chapter 3 that focuses on redistribution aspects within local administrative units will attempt to do.

Chapter 3

3 Decentralisation and Household Welfare: Efficiency Advantages or Greater Capture of Local Governance in Uganda?

3.1 Introduction

Decentralisation is widely considered in development circles as that institutional reform which could bring public goods and services nearer to the masses. A far-reaching decentralisation reform should be able to transfer the responsibility for composition and delivery of public goods and services, and the identification of local beneficiaries to local governments. This community targeting objective has implications for absolute poverty reduction particularly in the less developed countries. However, several influential theoretical papers have come up with opposing views. The debate is largely between the standard efficiency advantages and capture of local governance. The former is about the issues of informational advantages owing to contiguity, intergovernmental competition and the resulting checks and balances, whereas the sceptics point to the aspect of greater capture of the decentralised programmes by local elites. Whether or not the advantage of superior information owing to contiguity is compromised by greater capture of the antipoverty programmes by local elites is an empirical issue. This therefore raises a central research question for this paper: Can decentralisation be a useful institutional reform to reduce extreme poverty in less developed countries, or might extreme poverty increase as political power shifts downwards due to greater capture of the programmes by local elites?

This paper evaluates the welfare effect of the decentralised mechanism of community targeting using cross-sectional household data from Uganda. It particularly tests the theoretical implications of two decentralisation models, one by Bardhan and Mookherjee (2000) and the other by Alesina et al (1999). It should be noted that the implications of these models have not previously been tested within a less developed country setting. Theoretical analyses emphasizing the standard efficiency advantages of decentralisation (Tiebout 1956; Breton 1996) considered the economic and political

structures pertaining to the developed countries. In fact, much of the debate on the welfare effects of decentralisation originates from the United States. By the nature of these economies, the prediction relies on the assumptions of the existence of perfect mobility of individuals across jurisdictions and perfect information flow.

However, there are striking differences between the developed and the less developed countries that could make the standard efficiency theory implausible in the latter. Of course, individuals in developed countries are much more mobile across sub-national jurisdictions than in their counterparts in less developed countries, and in Sub-Saharan Africa in particular. In addition, there is a problem of informational asymmetry in Sub-Saharan Africa which is not rivalled anywhere in developed countries.

Therefore, the lack of mobility across sub-national jurisdictions and information asymmetry should limit sorting by tastes for public goods and services in the less developed countries. Moreover, the political economy literature on public choice, which is dominated by aspects of interest groups capture of local governance, renders the effects of decentralisation even less pleasant (Bardhan and Mookherjee 2000). Bardhan and Mookherjee (2000) summarized the predictions thus;

“Greater capture at the local level can jeopardise the superior informational advantages that might arise from contiguity. The local elites receive a larger weight in the local government’s maximand of a weighted sum of welfare - leaving the elites overprovided at the expense of the poor”.

Indeed, the decentralisation reforms are controversial. Governments that embrace these reforms, largely acceding to the influence of the World Bank and also to the thirst of local elites vying for a share of the cake, claim that it is for the betterment of the poor. Yet, scholarly opinion is bitterly divided. Although some analysts provide an optimistic view of the effect of decentralisation on the poor’s welfare, others argue that the effect is not obvious, ambiguous and context-specific –depending on the resulting trade-off between informational advantage and local capture. At the extreme opposite are pessimists who have argued that a decentralisation could worsen the problem of extreme poverty because of greater local capture (Hamilton, Madison et al. 1937; Prud’homme 1995; Bardhan and Mookherjee 2000; Bardhan and Mookherjee 2002; Bardhan and Mookherjee 2006). This strand of theoretical literature emphasises the role of the political agency problem as critical for economic

wellbeing. According to this argument, the lower the level of government the greater is the extent of capture by vested interests and the less the poor tend to be protected by the central authority.

It therefore appears that the case for decentralisation would depend on the resulting trade-off between two important things: the advantage of decentralising delivery mechanisms to local governments with access to superior local information, and greater capture of the antipoverty programmes by the local elites. However, in spite of the importance of this issue, the theoretical implications of the decentralisation models have not been empirically tested. This creates a need for micro-level oriented empirical research to evaluate the effects of decentralisation reforms in the less developed countries.

This paper makes an attempt towards filling this gap by testing the implication of the model by Bardhan and Mookherjee (2000), using a case study of Uganda. Empirical tests in this chapter are based on cross-sectional data from Uganda household surveys. The data covers the pre-decentralisation period (1992) and post-decentralisation period (1999/00 and 2002/03). There is no panel household data that covers the periods before and well after decentralisation (2002/03). Fortunately, these three household surveys cover a largely homogeneous sample, with similar socioeconomic and community modules, and may as well be treated as pseudo panels.

The efficacy of a decentralised service delivery mechanism depends, most importantly, on the informational awareness or lack of it of the targeted individual. It is very worrying that the decentralisation reforms have been implemented in the Sub-region largely inhabited by uninformed citizens. Many households in these countries get their information from the local leaders who have a tendency to withhold sensitive information regarding public programmes (Omar and Livingston 2001). This could have negative consequences. From being organs of the people, the local leaders might turn into organs of the elites with resource absorbing powers. If this happens, then who would hold them accountable given the voters' ignorance and incomplete political markets in Sub-Saharan Africa? It is well-known that in politics the masses would need another form of organ to defend them against exploitation and capture of local elites. This organ could be a vibrant free media coupled with free and fair

democratic elections. Without it, no one should expect the decentralisation reforms to benefit poor individuals.

As discussed in chapter 1 and also later in Appendix 3A (part B), districts with heterogeneous ethnic groups in Uganda have been split up, creating new ones along ethnic (tribal) grounds. The practice seems to resonate well with the Alesina, Baqir and Easterly's (1999) presumption for the cities in the United States. According to these analysts, ethnic fragmentation and interest group conflicts will lead to preference polarisation, and consequently leading to fewer resources that are pooled together to provide non-excludable public goods. Easterly and Levine (1997) and Easterly (2001) hypothesized that more ethnically diverse countries have slower growth. They then argued that the fundamental problem behind poor economic performance in Africa is ethnic fragmentation. Alesina et al (1999) also emphasise this by arguing that interest group polarization leads to rent-seeking behaviour and reduces the consensus for public goods. These arguments could have serious implications for human wellbeing. In spite of this, no previous research has tried to test their empirical validity especially in the less developed countries. Therefore, this paper will attempt to test this theory by investigating the effect of ethnic fragmentation on welfare in the pre-decentralisation period (1992) and post-decentralisation period (1999 and 2002).

The pre decentralisation period in Uganda was characterised by centralized planning and controls of public service delivery, which is typical of all less developed countries. Respective local governments acted as mere agents, an aspect that fits the standard prediction of informational disadvantage theory on welfare effects. However, the reporting and supervisory mechanism by the appointed agents in the local governments was critical to the public service delivery system until after the decentralisation wave of 1997. In the post decentralised period, the supervisory system became less effective with some symptoms of local capture creeping in. Previous studies have analysed sector-specific aspects of local capture in the periods before decentralisation (Reinikka and Svensson 2001; Reinikka and Svensson 2004). By investigating the effect of local capture on welfare in both regimes using nationally representative micro-level data, this paper is able to explain how the decentralisation reform can suit the predictions of the theory.

The model by Bardhan and Mookherjee (2000) predicts that policy biases arise from the existence of uninformed voters. The elite group's utility level for a given public good is reduced if an informed voter also uses it. To avoid undervaluing their utility, elites and political actors tend to withhold public information. This disadvantages a voter whose source of public information is entirely from these political actors. Such a voter will be unaware of how best to access essential public goods and services, such as education, public health and agricultural extension, among others. Policy biases, in favour of the informed voters, will then arise. In the end, the welfare of an uninformed voter is low. Limited or lack of access to public information and household welfare are both decreasing functions of the cost of capture. Ignorance inhibits individuals' ability to make informed choices. With limited information, bad politicians and public officials are never identified, since voters have no ability to screen good from bad or corrupt from clean ones. Therefore, access to public information would be a powerful deterrent to elite capture.

Informational awareness (or household enlightenment) is a critical determinant of average welfare. Voters use the available public information to monitor targeted antipoverty programmes (Besley and Prat 2005). The voters use this information to hold rulers to account. In equilibrium, local capture is greater under voter ignorance than under voter enlightenment. Access to media information is positively correlated with voters' knowledge of the rules governing antipoverty programmes, while elite capture of information is poverty-increasing. To this end, the role of the mass media in raising voter awareness, and thus in shaping public policy becomes crucial (Besley and Burgess 2002; Strömberg 2004; Besley and Prat 2005; Reinikka and Svensson 2005).

As discussed above, the effects of ethnic fractionalisation are also investigated. In this paper, the theoretical implications of model by Alesina et al (1999), which links heterogeneity of preferences across ethnic groups to the amount and type of public goods that the jurisdiction supplies will be tested. The fundamental argument in Easterly and Levine (1997), Alesina, Baqir and Easterly (1999) and Alesina, Devleeschauwer, et al. (2003) is that interest groups with an ethnic base are likely to value only the benefits of public goods that accrue to their groups and discount the benefits for other groups. These authors argue that this would dilute the amount and

quality of public goods being provided. In consequence, therefore, the average welfare for the poor would generally decrease with ethnic heterogeneity.

Indeed, ethnic diversity matters because institutional reforms such as fiscal decentralisation are not immune from political struggles. Alesina, Baqir and Easterly (1999) argue that the shares of spending on productive public goods are inversely related to the jurisdiction's ethnic fragmentation in the United States. Uganda exhibits the first highest degree of ethnic fragmentation in the world. Data from the 2002 Uganda housing and population census, which this paper uses for this purpose, show that Uganda has more than 45 ethnic groups. The ethnic fractionalisation index for Uganda stands at 0.846. Does this therefore give economic prudence to the political process that creates districts based on ethnic group considerations, as is the current case in Uganda? Not yet. It all depends on the context and nature of decentralisation. For example, in the United States where sub-national governments have both the responsibility and the authority to determine tax and spending levels, with limited interference from the federal government, the outcomes can be different. The effect is, therefore, dependant on how the tax and the expenditure levels are determined, the capacity of local governments to mobilise the financial resources and the preference polarisation originating from ethnic struggles.

To sum up, this chapter investigates the effect of local capture on the average household welfare in the pre-decentralisation period (1992) and post-decentralisation periods (1999 and 2002), respectively. It tests the effect of two political economy aspects. First, in accordance with the model by Bardhan and Mookherjee (2000) that characterises the features of local capture, this paper examines the relationship between indicators of information access and household welfare. Second, the paper tests the validity of the Alesina et al (1999) model, and tries to explain the local capture aspects within the confines of interest group cohesiveness and ethnic fragmentation. The remainder of the paper is organised as follows. The next section discusses these issues, and also describes the local capture framework. Section 3.3 covers empirical analysis part; discusses the empirical methodology and also presents empirical evidence. Section 3.4 concludes the chapter.

3.2 Theories of Decentralisation

This section presents a review of theoretical literature relating to decentralisation and welfare. It discusses two conflicting theories: the efficiency advantages versus the local capture theory. The pro-decentralisation literature (Tiebout 1956; Oates 1972; Rondinelli, McCullough et al. 1989; Seabright 1996; World Bank 2000; Fisman and Gatti 2002) argues that because of the reduction of large bureaucracies at the centre, the limited public resources are more effectively and efficiently utilized under decentralisation.

On the other hand, however, the local capture theory does cast a gloomy picture of decentralisation (Prud'homme 1995; Bardhan and Mookherjee 2000; Tanzi 2000; Tanzi 2000a; Bardhan 2002; Besley and Coate 2003). This strand of literature takes a negative view of decentralisation particularly on the grounds of rent-seeking behaviour, bureaucratic incompetence and political market failures pertaining in less developed countries.

In these countries, the aspects of informational constraints and political agency problems are very crucial. Subsection 3.2.1 presents a formal model describing how these issues play an important role in welfare. It specifically reviews the Bardhan and Mookherjee (2000) framework, hereafter referred to as the B-M model. The framework describes aspects of relative capture in the context of public choice and political economy. It explains how relative vulnerability to capture of given levels of governments (at central and local levels of governance) depends on a number of factors which pull in different directions. Thus, the B-M model has attractive features for country-specific empirical research. In the subsection that follows, this model is reviewed to identify the appropriate methods for investigating the extent and limits of capture in practice. Strictly speaking, this paper does not test the B-M model but uses it to identify the extent of local capture and then assess the potential pitfalls of decentralisation in less developed countries. In subsection 3.2.2, the aspects of ethnicity and wellbeing, focussing on ethnic cleavages are presented. Subsection 3.2.3 presents a summary of the theoretical models and expectations from empirical results. A review of theoretical and empirical literature on public choice and political economy aspects related to these issues is presented in Appendix 1A (Section 6.2).

3.2.1 Review of the B-M (2000) Model

Central to the analysis of relative capture at different levels of government, is a two-party electoral competition model of probabilistic voting behaviour and lobbying by special interest groups by B-M (2000). This benchmark model is an extension of the one suggested by David Baron (1994) and Grossman & Helpman (1996). The model considers local governments to be heterogeneous with respect to inequality. The features of the model are as follows: A country has n districts, each with an identical number of voters, divided into three socio-economic classes, namely; poor (p), middle-income (m) and rich (r). Districts differ in demographic composition across the three classes. The proportions of the population of district i are denoted by β_p^i, β_m^i , and $\beta_r^i = 1 - \beta_p^i - \beta_m^i$ respectively. A fraction α_c of voters in class c is informed or politically aware, and vote for different parties partly on the basis of the levels of welfare they expect to achieve under their respective policies. Political awareness is closely related to socio-economic position and education level, so $\alpha_r \geq \alpha_m \geq \alpha_p$. A decrease in the fraction of informed voters in the population is associated with higher fraction of the poor in the population as a whole. If political awareness is a concave function of socio-economic position, i.e., $\alpha_r - \alpha_m \leq \alpha_m - \alpha_p$, the result is increased elite capture and, hence extreme poverty in general. Thus, the higher is the proportion of uninformed voters compared to informed voters; the lower is the welfare in general.

The welfare level of any member of class $c = p, m, r$ is a function $U_c(\pi)$ of policy π . In their initial formulation, Bardhan and Mookherjee assume that there are two political parties A and B, selecting policy platforms π^A and π^B , respectively. Without loss of generality, it can be assumed here that either two major political parties or candidates A and B are contesting in any given election. This is to accommodate a no-party political system that may prevail in some developing countries. However, this does not alter the characterization of the model in any way. An informed voter j in a district i votes for party A if

$$U_{c(j)}(\pi^A) - U_{c(j)}(\pi^B) + a + a_i + \varepsilon_{ij} \geq 0 \quad (3.1)$$

where $c(j)$, denotes the class to which voter j belongs. The voter loyalty to the party A is the sum of three independent random components namely, a nationwide preference a , a zero-mean district-specific preference a_i and a voter-specific preference ε_{ij} . The latter is uniformly distributed within each district in the range $\{-\frac{1}{2}f, \frac{1}{2}f\}$, where $f > 0$ is small.

The uninformed voters are swayed by campaign spending C_i^A, C_i^B of the two parties: an uninformed voter j will vote for party A as long as

$$h[C_i^A - C_i^B] + a + a_i + \varepsilon_{ij} \geq 0 \quad (3.2)$$

where $h > 0$, is an exogenous parameter. Thus, in a jurisdiction dominated by ignorant voters and campaign buying, vote buying will take precedence over service delivery and policy issues. An uninformed voter would be swayed by what goes in the stomach at that moment, and hence cares less about issues of accountability.

Nevertheless, the parties announce their policies prior to an election and are assumed to commit credibly to these once elected. For the case of "no political party," as it has been in Uganda until 2006, two opposing candidates standing on individual merit accordingly announce their policies in the same manner. Meanwhile campaign spending will continue. There is a single organised lobby composed only of the rich/elites. An exogenous fraction l of the set of rich citizens in the district actively contributes financially to the lobby, while the remaining members of this class free-ride on the contributors. Note here that the lobby contributes to the finances of the two parties conditional on their policy platforms. In Uganda's case, the lobbyists also called the schemers or *mafutamingi*, campaign for the candidate with the intention of influence peddling in case of an election victory. Given these contribution strategies, each candidate selects a policy to maximize its probability of winning the election.

Regarding an election to a local government in a given district i , candidate k has a strategy to maximize the objective function:

$$V^i(\pi^k, C_i^k) \equiv W_i^i(\pi^k) + \chi_i C_i^k, \text{ where } W_i^i \text{ denotes the average welfare of informed voters, } \beta_p^i \alpha_p U_p(\pi^k) + \beta_m^i \alpha_m U_m(\pi^k) + \beta_r^i \alpha_r U_r(\pi^k); \quad k = A, B$$

and $\chi = h\{1 - \beta_r^i \alpha_r - \beta_m^i \alpha_m - \beta_p^i \alpha_p\}$ is the effectiveness of campaign spending in winning voter support. It should be noted that the "campaign spending" can take any form in less developed countries as long as it delivers an electoral victory to a favoured party. This is due to the fact that the political markets are incomplete in these countries.

Besides, the equilibrium policy choice π^k of party $k = A, B$ maximizes

$$V^{ik} \equiv \beta_p^i \alpha_p U_p(\pi^k) + \beta_m^i \alpha_m U_m(\pi^k) + \beta_r^i \{\alpha_r + l \chi_i G_i^k\} U_r(\pi^k) \quad (3.3)$$

where G_i^k denotes the equilibrium probability of party k winning an election, and is treated as parametrically given. The implicit welfare weights in expression (3.3) summarise the effects of the political system. In the situation where all the voters are informed, $\alpha_c = 1$, for all c ; $\chi = 0$; thereby reducing expression (3.3) to that for utilitarian welfare. In this case, the public policy platform would be crucial in the elections. This would not be the case with the presence of uninformed voters, and this is the basis for stronger capture of public programmes by elites.

The B-M model identifies key determinants of capture as: (a) Lack of effective electoral competition, resulting from loyalty biases in favour of one party, represented by a higher win probability for the favoured party; (b) Electoral uncertainty, represented by the variability of voter loyalties (the riskiness of the swing factor, $a + a_i$), which also affects the equilibrium win probability; (c) Interest-group cohesiveness, represented by l , the fraction of the class of the rich citizens who contribute to their lobby; (d) Average levels of political awareness, represented by the parameter χ_i , which is increasing in the fraction of uninformed voters in the district; and (e) Disparity in awareness levels within and across classes, represented by the fractions of voters α_c in a given jurisdiction.

The crucial result of the B-M model is that local capture decreases with increasing voter awareness, whereas policy biases arise from the existence of uninformed voters. With capture of local governments, the local elites receive a larger weight in the

district's utility function of a weighted sum of welfare compared to non-elites. Consequently, the local elites end up being over-provided at the expense of the uninformed voters. This is likely to be worse in countries with information asymmetry, with incomplete political markets and most critically, when there are no externalities across sub-national jurisdictions. It is therefore clear that the local capture aspect is an important source of changes in absolute poverty, even if there is growth.

The B-M model also provides a benchmark case under which there is an electoral competition at the level of national government; where all the districts are *ex ante* as well as *ex post* identical -have the same socioeconomic composition, and the swings in different localities are perfectly correlated. Other aspects such as the levels of political awareness, organisation of the rich, and so forth are the same as in the case of a local government. A characterization of equilibrium policy platforms similar to that at local level yields exactly the same outcome of local and national elections.

In Uganda, voters are generally better informed at the national level due to greater media and civil society attention during a national election (Omar and Livingston 2001). According to Omar and Livingston (2001), the reliance on and use of community leaders as the main source of information for local politics by an absolute majority might represent elite capture. People who depend on community leaders as their main source of information are less likely to have heard reports of corruption, compared with those who relied on the media.

The model also provides important predictions regarding the electoral system and campaign spending. In any political system at both levels of government -whether a two-party or no-party system - but where districts vary with respect to inequality, the model predicts that there will be a greater capture in high-inequality districts. The same applies to districts with a more homogeneous ethnic composition. As far as the campaign spending is concerned, there will be disparities in the effectiveness of campaign funds across districts. A bias in the allocation of campaign spending in favour of the illiterate and the poor will result in the incumbent winning an election. The policy platforms will not be an issue in poverty stricken households. The issues

that matter in such households are voter buying and intimidation, while policy platforms will matter among the elites.

As for organising an effective lobby that might succeed in executing the evil plans, or corruption tendencies, the model shows that there will be stronger capture at local level than at the national level. This is due to the fact that since the rich are less-well organised at the national level, because of greater size and heterogeneity of the group and larger communication and coordination costs (Grossman and Helpman 1996), there will be more capture at the local where the groups are small and relatively homogenous than at the national level.

Finally, the B-M model provides a solution for the provision of a welfare programme financed by public tax revenue. It is postulated that each class is a single peaked, strictly concave utility function over the policy space, and the ideal points p_c of the three classes $c = p, m, r$ are ordered: $p_r < p_m < p_p$, as in the classical case of a welfare programme financed by income or property tax. In this case, equilibrium policy platforms diverge more at the national level. However, the resulting policy of the national government is less subject to capture by the rich than the majority of the local governments.

According to Bardhan (2002) and Tanzi (2000), the connection between local revenues and public expenditures on social services is very weak in the majority of less developed countries. Most sub-national jurisdictions in these countries lack fiscal autonomy owing to the very narrow tax base. Therefore, public expenditures on essential public services depend largely on central government transfers. With poor accountability mechanisms and democratic governance that are likely to prevail in these countries, public resources from central government end up being misused. This argument does not insulate the central government from capture, however. Sometimes, the national government can be captured even more than the local governments. At the local level, however, it is reasonable to believe that collusion could be easier to organise and enforce in small proximate groups that involves bureaucrats, contractors and interest groups where there is high voter ignorance. This aspect could make the decentralisation irrelevant unless the discussions focus on a

transparent accounting mechanism and civic education at the lower local levels of government. See appendix 1A, section 6.2 for greater detail.

To put it simply, the Tiebout sorting mechanism could fail in less developed countries due to the following five reasons. First, the majority of citizens in these countries are not fully informed and thus will not move to other local jurisdictions. In any case, the other jurisdictions may not be any different. Hence, superior informational advantage owing to the contiguity assumption might not be helpful (Tanzi 2000; Tanzi 2000a; Bardhan 2002; Bardhan and Mookherjee 2002). Although proximity might reduce the amount of information required to make good decisions, the local policy makers and bureaucrats could instead take advantage to capture useful public information for their selfish reasons. The local political leaders would tend to control critical public information in order to dominate local politics. Omar and Livingston (2001) found that the local people's reliance on local leaders for general public information in Uganda greatly undermined their knowledge of local politics. It is well-known that the localities in which the majority of citizens relied on the media for news of local politics have better service delivery (Strömberg 2004; Besley and Prat 2005).

Second, much as these countries have weak accounting systems and mechanisms of monitoring public bureaucrats, at least the national institutions are generally more developed than the local ones (Tanzi 2000). This is due to the fact that the local governments do not attract highly qualified accountants, auditors and the brightest people because of motivation problems at the lower levels. It is not unusual to find different levels of government in developed countries having similar levels of technical and administrative capacity, whereas some sub-jurisdictions are better resourced than others in less developed countries. In addition, the majority of the members of local council committees in these countries lack analytical capabilities to internalise social returns of economic activities beyond their private returns, creating a window of opportunity for exploitation and corruption. This is not found in developed countries. Third (which is closely related to the second), there are weaker institutions of local democracy and mechanisms of political accountability. This largely explains why much of foreign technical assistance is directed towards the central government and not the local government. Consequently, the central

government is likely to create a more transparent and accountable public administration.

Fourth, there is a tenuous connection between local revenues (local taxes and user fees) and spending in less developed countries. Their local governments have a narrow revenue base and often administer a regressive tax system. If the local governments are captured, the chances are that the non-elites would bear the tax burden of providing services to the free-riding elites. In fact, the 1987 Commission of Inquiry on Decentralisation in Uganda pointed to excessive taxes (*empooza*) on poor peasants by local authorities as one of the major factors hampering rural development (Mamdani 1995). The alternative to *empooza* is user fees. This could be an efficient and a better source of financing the antipoverty programmes. But again as Bardhan (2002) has argued, user charges cannot be used to finance huge investments such as public education and health, water and sanitation. This is because by their very nature, user fees in less developed countries are targeted at groups that do not have the ability to pay for the service. And with local capture the elites are likely not going to pay either. In low need sub-jurisdictions where a given district is not financially constrained, the local elites who happen to be the large users are often provided first-best services on top of them accessing the diverted funds (Bardhan and Mookherjee 2006). As a result, the small users who are generally the non-elites would be underprovided relative to the first-best. Indeed, as Bardhan and Mookherjee (2006) argue, the large users comprise the local elite with a stronger political weight and command superior capacity to form an influential lobby in a manner predicted in the Bardhan and Mookherjee (2000) model. It therefore becomes inevitable that the local governments would depend largely on centrally collected tax revenues for expenditure on public and other social services. This is consistent with Tanzi (2000) who also point to greater local capture tendencies especially with a decentralised service delivery system that is entirely financed by central grants. In turn, the sub-national governments become broke. It is not surprising, therefore, that the districts in Uganda are now begging for more money from the central government. See The Daily Monitor of May 18, 2008 (Atuhaire 2008), for more detail. Fifth, there are more heterogeneous interest groups at the central government level compared to the lower levels of government. The more heterogeneous the elites are, the more their plans and actions would neutralize each other, resulting in lower capture (Grossman and

Helpman 1994). This aspect is related to the debate about the role of ethnic cleavages on the welfare outcome. An overview of the issues related to this matter is presented in the following subsection.

3.2.2 Ethnic Fragmentation and Individual Wellbeing

Ethnic polarization and political struggles, like poor institutions, have recently been used to explain why some nations, regions within nations, areas and even households are rich while others are poor (Alesina and Perotti 1994; Easterly and Levine 1997; Alesina, Baqir et al. 1999; Acemoglu, Johnson et al. 2001; Easterly 2001; Alesina, Devleeschauwer et al. 2003; Acemoglu, Johnson et al. 2005; Acemoglu and Robinson 2006). One strand of this small but burgeoning body of economics literature predicts that public goods provision, and hence welfare is inversely related to ethnic fragmentation.

On the other hand, however, critics argue that the outcome would depend on whether the sub-jurisdictions contribute significant resources towards public goods provisions (Tanzi 2000; Tanzi 2000a). It would also depend on the degree of animosity between the different ethnic groups. Indeed, if local governance relies heavily on central government transfers, what could matter is the interest group cohesiveness. The local capture theory particularly provides some interesting predictions on the role of the heterogeneous preferences and wellbeing outcome (Oates 1972; Breton 1996; Grossman and Helpman 1996). See subsection 6.2.2 (Appendix 1A) for greater detail.

In the context of less developed countries, the collusion may be easier to organise and risks of being caught and reported are easier to manage, because local influential people and elites participate in a positive-sum game. This is due to the intermingled social and economic relationships among local influential people, who belong to the same ethnic tribe. It is well-known that cooperation yields benefits in excess of costs which are shared according to some agreed rule. On the other hand, however, interfacing with other ethnic groups yields a zero-sum game (Landa 1994).

3.2.3 Summary of the Theoretical Models and Expectations from Empirical Results

The theoretical models, due to Bardhan & Mookherjee (2000) and also Alesina et al (1999), that have been discussed provide the following testable implications that are relevant to the paper's research question:

- Household welfare is a positive function of voter awareness. To the extent that policy biases arise from the existence of uninformed voters, welfare is lower in the more ignorant households owing to greater local capture of the antipoverty programmes by the elites. Bardhan and Mookherjee predict a number of factors that favour greater local capture. These include; higher levels of voter ignorance, and greater cohesiveness of interest groups at the local level. With capture of a local government, where elites receive proportionally larger weight in the district's utility function of a weighted sum of welfare, there is a tendency to over-provide the services to the local elites at the expense of non-elites.
- Social services provision, and thus wellbeing, is a positive function of ethnic heterogeneity (diversity). This prediction is consistent with the political economy theory of local capture and the interest groups cohesiveness. The more heterogeneous a given society becomes, the less cohesive are the interest groups. This then should lower local capture. The household welfare is therefore expected to be higher in a more ethnically heterogeneous society than a fairly homogeneous one.
- Following from the ethnic heterogeneity hypothesis, it is reasonable also to postulate that new districts created along tribal lines could be lowering the household wellbeing rather than increasing it.

These implications are investigated empirically in the next subsections. The empirical analysis begins by investigating whether households achieve higher welfare from informational awareness. This is measured by indicators of source of information and political connections in the pre- and post-decentralisation periods. The analysis is then extended and tests for the effect of ethnic fragmentation in the same periods. No previous research has attempted to test the effect of local capture and of ethnic fragmentation on individual's welfare using this approach.

3.3 Empirical Analysis

The section presents empirical analysis of the most crucial variables namely; informational awareness and ethnic heterogeneity. A standard household model faced with incomplete markets such as the absence of robust credit markets, of risk insurance, and in which all kinds of state benefits are all missing is used for testing the above theoretical implications. Thus, this paper uses a flexible, multivariate regression framework linking household's informational awareness and political connections to the log of food consumption outcomes, controlling for socioeconomic and demographic characteristics, household endowments, as well as spatial and community-level characteristics, while allowing for an error term. The estimation strategy is to find whether there is some evidence of greater local capture in the post-decentralisation period than in the pre-decentralisation period. The indicators for local capture used are household source of information, measuring level of enlightenment, and political connections. Later, the study controls for ethnic fractionalization to account for the presence of heterogeneous preferences and a new district dummy to capture the district fragmentation issue.

The standard theory predicts that the absence of voter awareness (Bardhan and Mookherjee 2000; Bardhan 2002; Besley and Prat 2005) promotes elite capture of local governance. All else equal, a high level of voter ignorance favours local capture. The reason is that local political actors - government officials and politicians - can not be held accountable by uninformed voters. With a large number of uninformed households, one should expect strong local capture as political power shifts downwards. The elites succeed in conniving to subvert justice. Local politicians will have incentives to withhold crucial information on antipoverty programmes, for fear of costly protests in case their evil plans were discovered. The consequence is that the few local elites, who are accorded higher utility weights in the objective function maximand, end up being over-provided at the expense of their ignorant counterparts. The effect is lower average household welfare, and hence, an increase in absolute poverty. Therefore, greater local capture is a serious constraint on poverty reduction, directly through its negative effects on the average household's welfare.

Consistent with this theory, the paper measures local capture using indicators of informational awareness and interest group cohesiveness. Cross-sectional data for this purpose is drawn from Uganda household surveys (1992, 1999/00 and 2002/03) as well as population census 1991 and 2002. The regression results will help to establish to what extent local capture affected household welfare in both pre-decentralisation (1992) and post-decentralisation (1999/00 and 2002/03) periods.

The estimation model is discussed in subsection 3.3.1; data are presented in subsection 3.3.2. In subsection 3.3.3, the household-level covariates focusing mainly on informational awareness and other controls are presented. In subsection 3.3.4, the effect of ethnic heterogeneity is analysed; subsection 3.3.5 presents the evidence on the effect of district fragmentation.

3.3.1 The Model

The estimation strategy is to assume that the natural log of food consumption for the i household ($\ln c_i$) is influenced by household characteristics and other factors (X_i) specified as:

$$\log c_i = \alpha + \beta X_i + \varepsilon_i \quad (3.4)$$

where (c_i) is the welfare measure of household i , α is the constant term, β is a vector of coefficients and ε_i is the error term assumed to be normally distributed with mean zero and constant variance. In this paper, monthly food consumption per adult equivalent is used as a measure of individual's welfare. Hence, the dependent variable is the household's mean monthly food consumption per adult equivalent.

A number of analysts have measured household welfare using total household consumption expenditure per adult equivalent (Blinder 1973; Oaxaca 1973; Ravallion and Bidani 1994). Although such an approach seems intellectually attractive, because of its ability to accommodate endogeneity of consumption determination and the random errors, the inclusion of political economy aspects among the vector of explanatory variables creates collinearity problems. In this political economy setting, household's consumption expenditure on newspapers, on dry cells (batteries) or electricity for operating a radio, and on telephone (airtime and other charges) can

influence the level of voter awareness. But accessing information from the print media would require a high level of literacy of the recipient, suggesting that newspapers might not be an appropriate indicator for this type of household model structure.

In the context of less developed countries, the choice of household's food consumption, a nutritional welfare measure, finds strong support from a several seminal works (Lipton 1983; Dasgupta and Ray 1987; Dasgupta and Ray 1990; Deaton and Paxson 1998). These authors have argued that in countries where hunger is persistent, increases in household food consumption is synonymous with improvement in average welfare. Dasgupta and Ray (1990), in particular, show the metabolic pathways that work at the level of the individual person, connecting nutritional status and work capacity among adults, and those connecting nutritional status and physical and mental development among children. The poor individuals especially from Sub-Saharan Africa, suffer from too little food consumption, and hence invest too little in terms of effort as a result of pervasive micro-nutrients deficiencies. By measuring welfare in terms of food consumption, therefore, this paper recognises the importance of synergies between under-nutrition and extreme poverty - through the pathways such as infection or disease incidence and the capacity to work.

The indicator variables for local capture are: household's source of information (local or community leader, an educated household member, radio, and telephone (mobile or fixed or both)). The other crucial indicator variable is a household having a member on influential local council committees (for capturing the effect of political connection). Control variables included are; household's demographic and socioeconomic characteristics such as head's education level, head's sector of employment, gender of the head, and productive assets. Other controls include residence of the household, i.e. spatial aspects (regional, rural or urban) and also community level characteristics. This expression will be used to assess the effect of local capture in the pre- and post-decentralisation periods. While evaluating the local capture effects, the community- level, spatial and other household-specific characteristics have to be controlled for. In the above specification, the coefficient β

in the semi-log model is the partial elasticity of the outcome variable with respect to a given variable (such as informational awareness) after controlling for other characteristics. A contribution of a variable or source is interpreted to measure the effect on the average household's welfare, if a particular variable or source is equalised. The appropriate policy choice would be to promote an even endowment of a relevant variable among all households, if it has a positive effect.

All the regressions are weighted. This simply means that in each of the regressions, the paper uses the sampling weights that are products of the standard sampling weight, as applied by the Uganda Bureau of Statistics, and the household size. The standard sampling weight captures the household's probability of selection. The analyses also take into account the sampling design when calculating standard errors (White 1980; White 1982). It also tests for neighbourhood effects as accounted for by the cluster-VCE estimator.

For every household, monthly food consumption is adjusted to monthly food consumption per adult equivalent in real terms. The adjustment takes account of unbalanced household allocations (normally biased in favour of male adults), and assumes equal shares of food consumption among household members. Therefore, although household food consumption per adult equivalent is used as a dependent variable, the regressions are estimating the effect of each of the explanatory variables on an individual's mean food consumption (Ssewanyana, Younger et al. 2007). A battery of diagnostic tests such as the mean variance inflation factor (mean VIF) for multicollinearity and endogeneity tests is conducted.

3.3.2 The Data

The source of the data is the UBOS, and is drawn from 1992 Integrated Household Survey; 1999/00 and 2002/03 Uganda National Household Surveys; 2002/03 National Service Delivery Survey and 1991 and 2002 Housing and Population Censuses.

The names and definitions of key variables used in this paper are reported in Table 3.1.

Table 3.1: Variables Definitions

Variable Name	Definition/description
Household-Level Issues	
Source of information	Measures the household's main source of information; community leader can be local council (LC) leader, opinion leader, or any other person the household deems as such
Local Councils and Committees (LCI, LCII, and LCIII)	These are political institutions that came into force with the current ruling National Resistance Movement (NRM) in 1986 -until 1995 Constitution were called Resistance Councils. LCI is a village or grass-root council, LCII Parish Council, and LCIII sub-County Council –the largest Geo-political areas –where resources are targeted. Each council has an executive referred to as Committee.
Household size	Number of usual residents in the household – defined as a group of people who normally eat and live together
Head's Gender	Sex of the head of household
Head's education level	Highest level of education of the household head
Main economic sector	Indicator of the industrial sector where household head works
Productive assets	Assets the household is endowed: arable land is land used for agriculture; capital include agricultural equipments such as animals, hoes, forks, etc, and motorised transport, boats, bicycles; livestock are pure-breeding and rearing animals and birds (cattle, goats, etc)
Ushs	Uganda shillings; the currency measure in Uganda
Regional	Geographical regions of Uganda
Community-Level Characteristics	Community social services located within a given distance from a particular household
County-Level Ethnicity	
ETHNIC	Standing for ethnic fractionalisation –following Alesina, et al (1999)
Ethnic fractionalisation 2002	Ethnic Fractionalisation Index in 2002. This index is considered to be the same for the entire study period; 1992 to 2002.
Gandashr, Nkoreshr, Sogashr, Kigashr, Itesoshr, Langishr, Acholishr, Gishushr, Lugbshr and Othershr	Respective ethnic tribe, fraction of population in a particular county or/and district; county an observation unit comprising of a number of sub-counties (range from 6-12)
Ethnic Share (ethnicshr)	The national population proportion of the largest ethnic group in a particular county

Ethnic fractionalisation index (ETHNIC) measures the probability that two persons drawn randomly from the population belong to different self-identified ethnic tribe (Baganda, Banyankore, Basoga, Bakiga, Iteso, Langi, Acholi, Gishu, Lugbra, and others), hence ranges from 0 (complete homogeneity) to 1 (complete heterogeneity).

The summary statistics are reported in Table 3.2. The consumption measure, monthly food consumption expenditure and value of productive assets are in 1997/98 constant Uganda Shillings prices (i.e., the household consumption and assets are measured in real terms). It is important to understand that several minority ethnic groups in Uganda were not self-identified prior to the 1995 Constitution. Consequently, the 1991 population data on the minority groups and in the subsequent 1992 and 1999/00 household surveys are not available. The ethnic shares, and hence, ethnic fractionalisation, is assumed to be similar during the 10-year study period, however.

This assumption, though seemingly strong, comes from the demographic presumption of a uniform natural population growth of these ethnic groups. The self-identified ethnic groups during the 1991 census have had their ethnic share generally unchanged from 1991 to 2002 (see Uganda Bureau of Statistics, 2002 National Housing and Population Censuses Reports). This therefore implies that there is no inter-temporal variation in the ethnic composition between the periods under study.

Table 3.2: Summary Statistics of the Key Variables

Variable	Household-Level Statistics					
	1992		1999/00		2002/03	
	Mean	St-Dev	Mean	St-Dev	Mean	St-Dev
Log food consumption per adult equivalent (Ushs)	9.619	0.723	10.067	0.705	10.082	0.753
Source of information:						
From community leaders	0.712	0.452	0.559	0.497	0.823	0.378
From a radio	0.313	0.464	0.413	0.482	0.634	0.492
From a telephone	0.197	0.398	0.223	0.416	0.260	0.439
Has at least one educated household member	0.257	0.489	0.287	0.466	0.380	0.549
% HH with LC1 member	15.32	12.05	15.43	12.02	15.59	12.17
% HH with LC3 member	0.83	0.31	0.78	0.36	0.79	0.34
Demographics						
Household size	4.82	2.161	5.23	2.201	5.09	2.209
Dependency ratio	0.527	0.176	0.540	0.180	0.542	0.181
Head's Gender						
Male dummy	0.742	0.437	0.729	0.445	0.741	0.438
Head's education level						
No formal education	0.314	0.464	0.265	0.441	0.178	0.383
Some primary	0.414	0.493	0.407	0.491	0.408	0.491
Completed primary	0.094	0.292	0.109	0.312	0.145	0.352
Some secondary	0.096	0.294	0.130	0.337	0.161	0.368
Completed secondary	0.049	0.217	0.050	0.219	0.070	0.256
Post secondary education	0.032	0.176	0.038	0.191	0.037	0.189
Main economic sector						
Crop-farming	0.651	0.48	0.650	0.477	0.492	0.500
Non-crop farming	0.057	0.231	0.029	0.167	0.048	0.213
Construction & Mining	0.018	0.132	0.021	0.144	0.022	0.146
Manufacturing	0.045	0.208	0.035	0.185	0.074	0.262
Trade	0.076	0.266	0.078	0.269	0.150	0.357
Transport & communication	0.016	0.124	0.023	0.151	0.030	0.172
Government services	0.026	0.160	0.055	0.227	0.059	0.238
Other services	0.077	0.267	0.052	0.221	0.060	0.238
Not working	0.034	0.181	0.056	0.230	0.064	0.244
Productive assets (Ushs)						
Log value of arable land	13.171	12.514	13.353	12.696	13.449	12.867
Log value of capital	9.659	11.187	12.144	11.204	12.614	11.957
Log value of livestock	12.776	11.985	13.112	12.279	13.582	12.627
Regional						
Central	0.311	0.463	0.315	0.464	0.336	0.472
Eastern	0.258	0.437	0.262	0.439	0.273	0.446
Northern	0.244	0.429	0.188	0.389	0.155	0.362

Variable	Household-Level Statistics					
	1992		1999/00		2002/03	
	Mean	St- Dev	Mean	St-Dev	Mean	St-Dev
Western	0.187	0.389	0.236	0.424	0.235	0.424
Urban dummy	0.145	0.352	0.156	0.364	0.169	0.376
Community-level Characteristics						
Telephone within 2 km	0.196	0.397	0.160	0.367	0.279	0.448
Feeder road within 1 km	0.709	0.450	0.558	0.496	0.825	0.378
Availability of electricity	0.198	0.399	0.224	0.416	0.261	0.440
Agric inputs within 5km	0.270	0.446	0.420	0.494	0.590	0.493
Produce market within 5 km	0.312	0.463	0.414	0.491	0.633	0.481
Health facility within 3 km			0.409	0.492	0.701	0.459
Prim. school within 3 km	0.853	0.352	0.885	0.318	0.916	0.276
Sec. school within 3 km	0.348	0.477	0.875	0.332	0.817	0.388
Safe water drink within 1km			0.586	0.494	0.675	0.469
County-specific Characteristics						
New District dummy	0.048	0.214	0.055	0.228	0.144	0.352
Ethnic share (fixed)	0.076	0.057	0.076	0.057	0.076	0.057
Ethnic fractionalisation						
Index (fixed)	0.270	0.212	0.270	0.212	0.270	0.212
Sample Size	8,635		8,987		8,063	

Source: Uganda Bureau of Statistics; Uganda National Household Survey (1992, 1999/00 & 2002/03), and Uganda Housing and Population Census 1991 & 2002.

3.3.3 Informational Awareness, Political Connections and Household Welfare

This subsection tests the validity of the theoretical predictions summarized in the previous subsection (3.2.3) based on the household survey data (1992, 1999/00 and 2002/03). The 1992 data are used to explain the pre-decentralization aspects while those of 1999/00 and 2002/03 are used for the post-decentralization periods. The standard models predict that in equilibrium, local capture is greater under voter ignorance than under voter enlightenment (Bardhan and Mookherjee 2000; Strömberg 2004; Besley and Prat 2005). It is therefore prudent to analyze the effect of accessing information from the various sources using data in both pre- and post-decentralization periods.

The main relationship established in the theory is that local capture leads to a lower individual's welfare, especially in the decentralised public services delivery regime. In order to test for the effect of informational awareness, the study links the indicators of information access to the log of food consumption outcomes, controlling for all possible factors. The control variables that can directly influence welfare at household level include; demographic factors, gender of the household head, head's

education level, sector of employment, spatial factors, and community level characteristics. Recall that the variable of interest is household's access to information, which this paper proxies by main source of information used by the household. The rationale for taking this approach is to be able to identify which sources are welfare increasing and or welfare decreasing. For example, if depending on information from a local leader really lowers household welfare, then regressing household food consumption per adult equivalent on the local leader indicator should yield a negative significant coefficient.

As a relevant example to this investigation, a source such as voter awareness is expected to produce a positive impact on welfare, and hence poverty reduction so that $\beta > 0$. Highly informed people are likely to have higher consumption outcomes so that the conditional correlation between total consumption and consumption flows from voter awareness should be positive. An increase in household awareness, measured by the quality of information accessed, corresponds to a rise in their welfare, and therefore is absolute-poverty reducing, *ceteris paribus*. In other words, all else being equal, the overall absolute poverty would drop if everyone was to receive the same consumption flow from informational awareness.

To investigate these issues, a reduced form regression method including regressors measuring information vehicles, political participation, and other household's socioeconomic characteristics based on specification (3.4) above is chosen. It should be understood that the main sources of public information at the household level are by word of mouth from a community leader or from an educated member of a household, from news bulletins and announcements on the radio, and from a telephone. The summary statistics in Table 3.2 reveal that these sources of information variables are not mutually exclusive. Thus, to clearly understand how the coefficient on "information from local leaders" indicator variable identifies local capture, a restricted regression model fitting household's food consumption (per adult equivalent) on only the source of information variables is first estimated. The results of this regression for three periods namely; 1992, 1999/00, and 2002/03 are reported in Table 3.3. The coefficients and their standard errors are reported in columns 1 to 3. The results for the null hypothesis tests that the coefficients on respective information

variables for different periods are equal – i.e., for 1999/00 & 1992 as well as 2002/03 & 1992, and for 2002/03 & 1999/00 are given in columns 4 to 6 respectively. Two sample t-tests with equal variance for the three pairs of the regressions are conducted.

Table 3.3: Regression results of natural log Food Consumption Expenditure per adult equivalent, 1992-2002/03: Restricted model, only source of information indicators as the explanatory variables

Variables	Parameter coefficients & standard errors, and t-statistics (absolute ratios) for the paired t-tests					
	1992 Coef.	1999/00 Coef.	2002/03 Coef.	1999 & 92 t-ratio	2003 & 92 t-ratio	2003 & 99 t-ratio
Source of information						
From local/community leaders	-0.051* (0.0149)	-0.075** (0.0139)	-0.144** (0.0232)	1.18	3.42***	2.61**
HH has post primary graduate member(s)	0.029** (0.0078)	0.043** (0.0101)	0.054** (0.0109)	1.09	1.88	0.74
From radio	0.051** (0.0122)	0.047** (0.0089)	0.058*** (0.0054)	0.27	0.51	1.03
From telephone	0.012** (0.0036)	0.017*** (0.0025)	0.020*** (0.0022)	0.27	0.51	1.03
From newspaper(s)	0.006* (0.0028)	0.016* (0.0061)	0.027* (0.0094)	2.53*	3.89***	0.89
Constant	8.392*** (0.2409)	9.981*** (0.2831)	9.765*** (0.2813)			
No. of households	8,635	8,987	8,063			
R-squared	0.371	0.498	0.547			
Sample size	8,635	8,987	8,063			
F-test (p-values)	0.0045	0.0023	0.0032			

(i) Figures in parentheses are robust standard errors (White 1980); (ii) * shows significance at 10%, ** significance at 5%, and *** significance at 1%; (iii) the hypothesis that the coefficients on information variables for each regression are jointly zero is rejected at the 10% level; (iv) the constant term captures time-invariant effects, such as, culture and geography as well as other household characteristics; and (vi) accessing information from newspapers appears to be correlated with post primary graduate household member (variance inflation factor, VIF of 14.15 for newspapers indicator is very high).

The Table shows that there is a negative correlation between the indicator of accessing information from local leaders and log food consumption expenditure per adult equivalent. There is a strong negative relationship between this variable and food consumption per adult equivalent (individual's welfare) in the post-decentralisation period. The coefficients on the other information vehicles are positive and statistically significant at 5% level for all periods. Thus, the results suggest that a household that accesses information from other information sources is expected to be more informed resulting into higher food consumption expenditure, per adult equivalent, compared with the one that receives it from the village authorities.

The paired t tests on the coefficient of accessing information from local leaders for 2002/03 & 1992 and for 2002/03 & 1999/00 reject the null of equal variance (row 1,

columns 5 & 6), indicating that this coefficient is significantly different between 1992 & 2002 and between 1999 & 2002. The null is, however, not rejected for 1999/00 & 1992 (column 4). The null is also not rejected for other variables except for the coefficients on telephone indicator for these periods. Thus, the coefficients for accessing information from local authorities, radios, an educated household member and newspapers in 1999/00 are not significantly different from 1992. In fact, the coefficients on radio and household member are not statistically different for all the periods. Capture of information by local authorities appears to have become greater during the period after 1999, and this is when absolute poverty suddenly increased (see Tables 2.1 & 2.2).

Thus far, the estimations in Table 3.3 help to clarify how the coefficient on "information from community/local leaders" identifies local capture. The next step is to estimate how this indicator variable predicts food consumption expenditure, per adult equivalent, while adjusting for additional factors such as political participation, household's demographic and socioeconomic variables and community level characteristics. In this extended multivariate regression, the indicator of accessing information from newspapers is omitted (excluded) for reasons of possible multicollinearity (between educated member, level of education and reading newspapers). Here, political participation (connections) at the local government administration, an important ingredient of local capture, will be controlled for. In the absence of social safety nets in Uganda, political connection is one measure of a household's social capital and an insurance against possible elite capture. In this chapter, this is measured by dummies for any household member belonging to one or both of the village Local Committee (LCI) & sub-county Local Committee (LCIII).

Other controls include socioeconomic characteristics such as head's gender, head's economic sector, head's education, residence, community level characteristics and the household size. Household size is captured using age composition of the household. This is measured by the proportion of children below 15 and adults above 64 in a household (or dependency ratio), and number of household members in working age bracket (15-64 years). The working members represent the household's labour endowment. The dependency ratio is included in the model given its importance in influencing the household's consumption outcome. These population issues, which

are outside the political economy setting, are a subject of the next chapter. The results of this extended regression models are reported in Table 3.4. As in Table 3.3 above, the coefficients and their standard errors are reported in columns 1 to 3. Two sample t-tests with equal variance for the three pairs of the regressions are conducted. For brevity, columns 4 – 6 report the results for the null hypothesis that the coefficients on individual variables of information and political participation for different periods are equal – i.e., for 1999/00 & 1992 as well as 2002/03 & 1992, and for 2002/03 & 1999/00.

Table 3.4: Regression results of natural log Food Consumption Expenditure per adult equivalent, 1992-2002/03: Extended model (newspapers as a source of information excluded)

Variables	Parameter coefficients & standard errors, and t-statistics (absolute) for the paired t-tests on information and other key variables of interest					
	1992	1999/00	2002/03	1999 & 92	2003 & 92	2003 & 99
	Coef.	Coef.	Coef.	t-ratio	t-ratio	t-ratio
Source of information						
rf: (newspapers)						
From local/community leaders	-0.042* (0.0198)	-0.063** (0.0149)	-0.135*** (0.0118)	0.85	2.39*	2.00*
HH has post primary graduate member(s)	0.035** (0.0109)	0.051** (0.0107)	0.068** (0.0096)	1.05	2.26*	1.17
From radio	0.061** (0.0125)	0.053** (0.0095)	0.085*** (0.0049)	0.52	1.98*	2.90*
From telephone	0.009** (0.0038)	0.015*** (0.0024)	0.023*** (0.0019)	1.35	3.23**	2.29*
HH has a member on LC1 committee	0.019 (0.0137)	0.030* (0.0128)	0.037** (0.0115)	0.59	0.99	0.40
HH has a member on LC3 committee	0.050* (0.0166)	0.096** (0.0103)	0.135*** (0.0078)	2.37*	4.53***	2.97**
Demographic factors						
Dependency ratio	-0.167*** (0.0129)	-0.182*** (0.0121)	-0.206*** (0.0115)			
Members in working age (18-64 years) group	0.096** (0.0175)	0.122** (0.0169)	0.119** (0.0164)			
Head's Gender (Male dummy)	0.123** (0.0169)	0.119* (0.0287)	0.106* (0.0266)			
Head's education (rf: no formal education)						
Some primary	0.122 (0.0353)	0.051* (0.0214)	0.075* (0.0208)			
Completed primary	0.131* (0.0305)	0.207** (0.0265)	0.208** (0.0259)			
Some secondary	0.336** (0.0245)	0.379** (0.0215)	0.373** (0.0214)			
Completed secondary	0.408*** (0.0115)	0.433*** (0.0106)	0.432*** (0.0102)			
Post secondary	0.734*** (0.0268)	0.779*** (0.0175)	0.780*** (0.0165)			
Head's economic sector (rf: not working)						
Crop-farming	0.058* (0.0171)	0.106** (0.0132)	0.029 (0.0179)			
Non-crop farming	0.167* (0.0320)	0.081** (0.0175)	0.102*** (0.0188)			
Construction/Mining	0.021 (0.0139)	0.025 (0.0166)	0.027* (0.0159)			

Parameter coefficients & standard errors, and t-statistics (absolute) for the paired t-tests on information and other key variables of interest						
	1992	1999/00	2002/03	1999 & 92	2003 & 92	2003 & 99
Variables	Coef.	Coef.	Coef.	t-ratio	t-ratio	t-ratio
Manufacturing	0.006 (0.0102)	0.069** (0.0125)	0.111** (0.0128)			
Head's sector cont'd						
Trade	0.192** (0.0290)	0.237** (0.0287)	0.249** (0.0274)			
Transport and Communication	0.313* (0.0437)	0.293** (0.0372)	0.314** (0.0364)			
Government services	0.160** (0.0197)	0.179** (0.0247)	0.192** (0.0237)			
Other services	0.060* (0.0235)	0.078** (0.0184)	0.104** (0.0186)			
Household assets						
Natural log value of land owned	0.023** (0.0101)	0.032** (0.0084)	0.039** (0.0083)			
Natural log value of agric. equipment owned	0.015** (0.0071)	0.019** (0.0056)	0.025*** (0.0046)			
Natural log value of livestock owned	0.018** (0.0049)	0.023*** (0.0024)	0.025*** (0.0023)			
Spatial (rf: Kampala and Wakiso districts)						
Central	0.023** (0.0104)	0.029** (0.0083)	0.048*** (0.0069)			
Eastern	0.029 (0.0247)	0.034 (0.0188)	0.028 (0.0179)			
Northern	0.058 (0.0296)	0.029 (0.0197)	0.031 (0.0180)			
Western	0.018* (0.0109)	0.033** (0.0075)	0.043** (0.0068)			
Urban dummy	0.106* (0.0239)	0.158** (0.0228)	0.128** (0.0231)			
Community Level Characteristics						
Telephone within 2 km	0.128** (0.0218)	0.092 (0.0467)	0.039 (0.0256)	0.69	2.66**	0.96
Feeder road within 1 km	0.019 (0.0142)	0.007 (0.0194)	0.028* (0.0137)	0.49	0.45	1.21
Electricity within 5 km	0.082** (0.0193)	0.085** (0.0160)	0.106** (0.0153)			
Markets for agric inputs within 5km	0.037** (0.0117)	0.046** (0.0158)	0.032** (0.0139)			
Produce market within 5 km	0.064* (0.0228)	0.103* (0.0267)	0.073* (0.0251)			
Clinic/Health facility within 3 km		0.005 (0.0221)	0.068 (0.0273)			
Primary school within 3 km	0.012 (0.0121)	0.007 (0.0109)	0.024 (0.0245)	0.31	0.45	0.66
Secondary school within 3 km	0.004 (0.0250)	0.069 (0.0335)	0.003 (0.0166)	1.55	0.04	1.71
Safe water drinking within 1km		0.018 (0.0276)	0.053 (0.0279)			
Constant	6.689*** (0.0864)	8.706*** (0.0886)	8.757*** (0.0908)			
Sample Size	8,635	8,987	8,063			
R-squared	0.505	0.715	0.754			
F-tests (p-values)	0.0014	0.0018	0.0011			

(i) Figures in parentheses are cluster robust standard errors (White 1980); (ii) * shows significance at 10%, ** significance at 5%, and *** significance at 1%; (iii) the hypothesis that the coefficients on all the variables for

each regression are jointly zero is rejected at 1% level; (iii) tests for multicollinearity: Variance Inflation Factor is equal to 3.18, hence the variables are not collinear.

Controlling for political participation, demographic and socioeconomic variables, and other characteristics weakens the coefficient on “information from community/local leaders” indicator from -0.051 (t-ratio = -3.41) to -0.042 (t-ratio = -2.12) in 1992, from -0.075 (t-ratio = -5.38) to -0.063 (t-ratio = -4.43) in 1999/00 and from -0.144 (t-ratio = -6.21) to -0.135 (t-ratio = -11.44 though now larger) in 2002/03. The “weakening” in the magnitude of the coefficient on the “information from community/local leaders” variable found in the extended regression evidently can be explained by other predictors such as political connections and head’s education level.

The paired t tests on the coefficients of the information variables for 2002/03 & 1992 and for 2002/03 & 1999/00 (except the coefficient on an educated member) reject the null of equal variance (columns 5 & 6). This indicates that the coefficients on information variables for these periods are significantly different. Again, the null is not rejected for 1999/00 & 1992 (column 4), indicating that the coefficients for accessing information from local authorities, radios, an educated household member and telephones in 1999/00 are not significantly different from 1992. It is in the periods after 1999/00 that there is observed differences in the slope coefficients, making these sources of information very important.

The null hypotheses of two sample t tests with equal variance on the variable of political participation at LC1 committee are not rejected, whereas those on political participation at LC3 committee are rejected for the three sets of the paired periods. Thus, the coefficients on the indicator of political participation at LC3 level are significantly different for all periods. This is, however, not the case at LC1 where the coefficients are not significantly different. Notice that the community-level characteristics tested are not significantly different for the survey periods, with the exception of existence of fixed public telephone between 1992 & 2000 periods.

The results are largely consistent with the theory of local capture. Voter ignorance is associated with lower welfare, while social capital owing to household’s political connections is associated with higher welfare. Both measures have features of local capture that matter for the household’s level of wellbeing. All else being equal, the

food consumption per adult equivalent for those who depended on community leaders for crucial information was approximately 4% less in 1992, 6% less in 2000, and approximately 14% in 2003. In other words, if households do not access quality information regarding antipoverty programmes, for instance where to get agricultural inputs and extension services, how to avoid preventable diseases through good public health practices, where to access medical treatment and how to demand for better general government services, their average welfare will be lower compared to their better informed counterparts.

The coefficients for the other alternative sources of information (namely; radio and telephone) are generally positive and highly statistically significant (at 1% level) when information flow from an educated member of the household is controlled for. All else equal, households who accessed information from radios and telephones in 2003 were more likely to have food consumption (per adult equivalent) of approximately 9% and 2% higher respectively. These sources of information could be crucial in the fight against absolute poverty. But in the case of Uganda, the welfare gains from such sources are likely to be tiny, given their limited coverage. According to the UBOS estimates, approximately 60% of households owned radios and less than 10% had access to a telephone (either fixed or mobile telephones) facilities in 2003.

Thus, going by the local capture theory, the communication facilities such as radios and telephones might, instead, have snowball effects. Those who access such information are largely the elites who are the key actors in local capture. The information flow from these sources (radios and telephones) needs to be equalised. The coefficients for political connections (on both committee levels) are positive and highly significant in the 2002/03. Political connection with the village committee is slightly significant in 1999/00 (Table 3.4). Conversely, the coefficients for connections with the LC3 committee (sub-county level), the largest geopolitical jurisdiction just below the district council, are strongly significant for 1999/00 and 2002/03 period. All things being equal, the individual's welfare from the household with connections to LC3 committee was approximately 5% more in 1992, 10% more in 2000 and 14% more in 2003. In the sample, the share of households reporting these connections is higher for the Local Council one committee (village executive), compared to Local Council 3 committee (sub-county executive). This means that the

benefits from political connections to sub-county level are concentrated. Thus, being well connected to the Local Council 3 committee is a good indicator of the benefits of social capital that flow from the concentration of political power. Besides, up to two thirds of the district receipts are remitted to this level, where the political oversight functions are vested in the executive of Local Council 3.

Under the current fiscal decentralisation arrangement, large amount of antipoverty resources are transferred to the sub-county level. It is not surprising therefore that there is greater elite capture at this level than at the village level. Greater local capture benefits the households with political connections. The local elites in weak sub-national governments, finding incentives to broker wealth transfers among them, would like to capture information. This is consistent with the political rent-seeking local capture literature (Hamilton, Madison et al. 1937; Prud'homme 1995; Bardhan and Mookherjee 2000; Bardhan and Mookherjee 2006). It is also in accordance with the welfare literature as advanced by Griffiths & Stuart (2001). Thus, the prospects for absolute poverty reduction seem to be blighted by the increasing local capture, which wipes out growth gains.

The above model is re-estimated when household assets are excluded, and then tests for the differences between the two specifications are carried. This is aimed to check for any possible specification and endogeneity biases of including the assets, as purchasing more food might drive the households to run down their assets. The results showing only point estimates are given in Table 3.5.

Table 3.5: Regression results of natural log Food Consumption Expenditure per adult equivalent, 1992-2002/03: Household assets excluded

Variables	Parameter coefficients & standard errors					
	1992		1999/00		2002/03	
	Coef.	Std-errors	Coef.	Std-errors	Coef.	Std-errors
Source of information (rf: newspapers)						
From local leaders	-0.039*	0.0194	-0.058**	0.0146	-0.129**	0.0135
HH has post primary graduate member(s)	0.036**	0.0107	0.053**	0.0104	0.071**	0.0092
From radio	0.064**	0.0121	0.056**	0.0092	0.083***	0.0047
From telephone	0.007**	0.0035	0.014***	0.0021	0.022***	0.0018
HH has a member on LC1 committee	0.023	0.0138	0.034*	0.0129	0.040**	0.0118
HH has a member on LC3 committee	0.053*	0.0169	0.097***	0.0105	0.138***	0.0079
Demographic factors						

Parameter coefficients & standard errors						
	1992		1999/00		2002/03	
Variables	Coef.	Std-errors	Coef.	Std-errors	Coef.	Std-errors
Dependency ratio	-0.169***	0.0127	-0.184***	0.0119	-0.207***	0.0113
Members in working age (18-64 years) group	0.089**	0.0173	0.114**	0.0165	0.108**	0.0163
Head's Gender (Male dummy)	0.121**	0.0168	0.118*	0.0289	0.108*	0.0269
Head's education (rf: no formal education)						
Some primary	0.125*	0.0352	0.051*	0.0226	0.090*	0.0216
Completed primary	0.132*	0.0305	0.209**	0.0265	0.213**	0.0256
Some secondary	0.343**	0.0249	0.382**	0.0221	0.374**	0.0208
Post secondary	0.744***	0.0248	0.781***	0.0171	0.785***	0.0169
Head's economic sector (rf: not working)						
Crop-farming	0.061*	0.0165	0.104**	0.0128	0.027	0.0178
Non-crop farming	0.165*	0.0318	0.078**	0.0173	0.104***	0.0185
Construction/Mining	0.019	0.0136	0.023	0.0164	0.029*	0.0083
Manufacturing	0.005	0.0103	0.071**	0.0126	0.114**	0.0129
Trade	0.190**	0.0289	0.229**	0.0278	0.250**	0.0275
Transport and Communication	0.311*	0.0435	0.296**	0.0370	0.317**	0.0363
Government services	0.171**	0.0196	0.193**	0.0245	0.199**	0.0236
Other services	0.064*	0.0234	0.080**	0.0185	0.109**	0.0188
Spatial (rf: Kampala and Wakiso districts)						
Central	0.025**	0.0106	0.027**	0.0083	0.050***	0.0069
Eastern	0.030	0.0249	0.035	0.0189	0.029	0.0178
Northern	0.058	0.0298	0.028	0.0196	0.031	0.0179
Western	0.017*	0.0109	0.034**	0.0076	0.045**	0.0069
Urban dummy	0.102*	0.0235	0.155**	0.0224	0.129**	0.0233
Community level characteristics						
Telephone within 2 km	0.129**	0.0217	0.094	0.0468	0.040	0.0259
Feeder road within 1km	0.017	0.0143	0.008	0.0195	0.026*	0.0138
Electricity within 5 km	0.080**	0.0194	0.083**	0.0162	0.105**	0.0154
Agric inputs within 5km	0.038**	0.0119	0.049**	0.0157	0.034**	0.0138
Produce market within 5 km	0.066*	0.0228	0.105*	0.0269	0.075*	0.0253
Clinic/Health facility within 3 km			0.007	0.0222	0.069	0.0275
Primary school within 3 km	0.014	0.0123	0.008	0.0109	0.026	0.0247
Secondary school within 3 km	0.006	0.0251	0.068	0.0335	0.004	0.0165
Safe water drinking within 1km			0.019	0.0273	0.055	0.0278
Constant	5.928***	0.0734	7.906***	0.0627	7.257***	0.0688
Sample Size	8,635		8,987		8,063	
R-squared	0.498		0.708		0.746	
Tests of differences in two models: F(3, N-40)	1.67	0.62	2.03	0.54	1.78	0.36

Notes: (i) All standard errors are cluster-robust; and (ii) endogeneity of household assets: tests of differences between the two specifications (i.e., Table 3.4 and 3.5) fail to reject specification reported in Table 3.4. Thus, assets are exogenous and hence the results in Table 3.4 are not contaminated by the inclusion of assets.

The results on the effects of informational awareness from various sources, in both the pre- and post-decentralisation periods have implications for individual's welfare. Individuals' welfare for those who access information from local leaders, and with no political connections, is lower compared to their better informed counterpart. The welfare losses are higher in the post-decentralisation period. Food consumption losses is likely to be attributable to households' dependence on local leaders (local councillors, opinion and community leaders) as the main source of public information. Many households access information on antipoverty programmes, family planning methods, and on early warning signals about bad weather from this very source. Individuals living in abject poverty would be much lower if the consumption losses from local capture were to be minimised. Gradual replacement of this source by a more vibrant media that is free from capture can have poverty-reducing effects.

Assuming that public information on antipoverty programmes is supplied without being censored and withheld by the local elites, voters use available information to hold local rulers accountable. Voter information and voter welfare are all increasing functions of the cost of local capture (Besley and Burgess 2002; Strömberg 2004; Besley and Prat 2005; Reinikka and Svensson 2005). This emphasises the role of mass media in shaping public policy and political accountability. If the household members are well informed, their monitoring ability increases. In order to guard against censures and ensure re-election or the possibility that costly protests are not staged against them, the local politicians and government officials might respond by reducing capture. Therefore, improved access to public information will significantly reduce local capture, thereby increasing welfare, and in turn, reduce absolute poverty in Uganda.

The results for coefficients on the indicators of capture (i.e., source of information) in the two periods, the pre-decentralisation period (1992) and the post-decentralisation period (1999 and 2002), suggest that the national government is captured less than local governments.

In the decentralised mechanism, public resources are wrongly targeted when there is stronger elite capture of local governance. In this scenario, the local elites

successfully connive to subvert the legal and political processes. There will be increased rent-seeking and corruption practices with devastating welfare effects. In particular, the level and composition of public spending for investments in human capital (public education and health), social infrastructure (water and sanitation), and agricultural extension services become inadequate. This seriously compromises the antipoverty efforts as the non-elites (largely the poor) are the most affected (Omar and Livingston 2001). In fact, results from the previous studies suggest that public spending in primary education and public health in Uganda was regressive (Reinikka and Svensson 2004). These sector-specific studies show that the better-off communities gained more from rapid growth in the share of the poverty action fund (PAF) than the worse-off. Omar and Livingston (2001) also found that village, parish, sub-county and district local council committees engaged in political processes that had symptoms of greater local capture.

3.3.4 Ethnic Heterogeneity as a Determinant of Household Welfare

In this subsection, the paper tests for the effect of ethnic diversity on food consumption per adult equivalent (individual's welfare). County-level ethnic fractionalisation indexes are used to measure this aspect. In addition to all the controls presented in previous subsection (Table 3.4), a new district dummy is used to control for jurisdictional fragmentation. Again, the study uses the household data covering the pre-decentralisation period (1992) and post-decentralisation periods (1999/00 and 2002/03).

In order to test for the effect of fragmentation, the study links the county-specific ethnic fractionalisation index to the log of food consumption outcomes (a measure of household welfare), controlling for all possible factors. In this sub-section, county-specific effects namely; ethnic heterogeneity and district fragmentation, are investigated. There are 149 counties in Uganda. Based on the household identity code, each household in the sample is assigned an ethnic index for the county in which it belonged during the respective survey period (i.e., 1992, 1999/00 and 2002/03). This index is used to test for the effect of ethnic heterogeneity on individual's welfare. To determine whether there is a relationship between district

fragmentation and household welfare, the “new district” dummy is used to capture a household found in a new district.

The recent economics literature on ethnic fragmentation points to the fact that preference polarization and ethnic conflicts lower the level of public goods provision, and hence reduces average welfare (Alesina and Perotti 1994; Easterly and Levine 1997; Alesina, Baqir et al. 1999; Collier 2000b; Easterly 2001). In particular, Alesina and his colleagues argue that ethnic fractionalisation matters because the capacity to leverage institutional change is reduced when society is fragmented along ethnic, linguistic or religious lines. In addition, they have argued that tension between ethnic groups lowers the level of social services provided. More importantly, interest group politics might lead to an increase in the group targeted spending and patronage spending, and, hence, a reduction in the provision of public goods. According to Weingast, Shepsle, and Johnsen (1981), public expenditure could be directed specifically to certain groups especially in the case of targeted transfers or through public employment for patronage.

These arguments are, however, counterintuitive to the standard theory of local capture. For instance, a high degree of ethnic fractionalisation might increase the cost of cooperation among the elites from heterogeneous ethnic groups. Besides, in a more heterogeneous society, with electoral competition and the Tiebout (1956) mechanism, vested interest groups will neutralize one another. In that case, local capture is dampened. In addition, according to economic theory, diversity of ideas may promote competition, innovation, and hence technological progress. So, areas with a higher ethnic fractionalisation index could gain from the decentralised delivery mechanism, while the more homogeneous ones end up losing.

In this empirical part, the paper tests the hypothesis that ethnic fragmentation (diversity) negatively affects public goods provision, and hence reduces household welfare. This is aimed at finding out empirically whether there is prudence in creating new sub-jurisdictions (districts) based on ethnic considerations. Uganda exhibits the first highest degree of ethnic fragmentation in the world (Alesina, Devleeschauwer et al. 2003). According to their data, the country's ethnic fractionalization stood at 0.9302. After decentralisation, various ethnic groups have

continued to exert political pressure on the chief executive by demanding separate districts.

For consistency, the ethnic fractionalisation index (ETHNIC) is computed based on the approach due to Alesina, Baqir and Easterly (1999). These authors define ETHNIC as the probability that the two randomly drawn people from a given jurisdiction (county, district or a country) belong to different ethnic groups. In line with the 1995 Uganda Constitution, the computations are based on the population distribution by ethnic tribe as classified by the Uganda Bureau of Statistics (UBOS) in the 2002 population census. The census data reveal that Uganda has more than 45 ethnic groups. The estimation strategy presented below identifies nine largest ethnic groups, and the rest are classified as others.

ETHNIC is computed as follows. First, the ethnic share of every ethnic tribe, defined as the proportion of the national population is computed. This means that the ethnic tribal shares are based on national population and not on an ethnic group's share of the population in a particular county. The next step is to identify the nine largest ethnic groups. For the purpose of this exercise, this is determined by a cut-off population proportion of 0.03 (3% of the total population). Those tribal groups below this threshold are grouped as others. Third, the proportion of each ethnic group (self-identified in the above 10 categories) for a given county is calculated. Thus, for each county ETHNIC is constructed as follows:

$$ETHNIC = 1 - \sum_i (Tribe_i)^2 \quad (3.5)$$

where $Tribe_i$ denotes the share of population self-identified as of *tribe i* and

$i = (Baganda, Banyankore, Basoga, Bakiga, Iteso, Lango, Acholi, Gishu, Lugbara, Others)$

Lastly, each household in the sample is allocated the ethnic fractionalisation index (ETHNIC) of a county where it belonged during respective surveys. This is made possible by matching location with the household identifier (identification code) as reported in the surveys. This index will capture the ethnic heterogeneity (fixed-effect). Econometric tests are again based on the model specified in equation (3.4) that is extended to include ETHNIC. The tests also control for all the variables used

in the first part, among others in the pre-decentralisation period (1992) and post-decentralisation period (1999/00 and 2002/03).

In each regression, an indicator for district fragmentation (for which the new district dummy is used as a proxy) is also controlled for. This indicator controls for the welfare effect of a household living in a newly created district, and will show whether it is beneficial, in terms of welfare, for a household to live in a new district. The reference period is the previous survey round. If a household lived in a particular county found in a new district during the survey period in question, it is given a value of 1, and 0 otherwise. The same applies to the subsequent period, 2002/03; if in a new district since 1999/00 survey round, it is given 1 and 0 otherwise. The results are reported in Table 3.6.

The results in Table 3.6 indicate that there is a positive correlation between ethnic diversity and food consumption per adult equivalent. In all the regressions, the coefficient on ETHNIC is highly significant with t-statistics ranging from 6.79 to 14.05. The correlation becomes strongly significant in the post-decentralisation period (2003). The magnitude of the coefficient is interpreted as the amount by which individual's welfare would change, in percentage points, going from complete homogeneity (ETHNIC = 0) to complete heterogeneity (ETHNIC = 1).

Table 3.6: Regression results of natural log Food Consumption Expenditure per adult equivalent, 1992-2002/03: Extended model with ETHNIC as a target Variable

Variables	Parameter coefficients & standard errors, and t-statistics (absolute) for the paired t-tests on Ethnicity and the key variables of interest					
	1992 Coef.	1999/00 Coef.	2002/03 Coef.	1999 & 92 t-ratio	2003 & 92 t-ratio	2003 & 99 t-ratio
County-specific factors						
Ethnic index	0.053** (0.0078)	0.091** (0.0127)	0.274*** (0.0195)	2.53*	10.78***	8.02***
HH in a new district	0.072 (0.0652)	0.089 (0.0585)	-0.175* (0.0575)	0.19	2.83**	3.21**
Source of information						
From local/community leaders	-0.039* (0.0194)	-0.060** (0.0144)	-0.129*** (0.0121)	0.78	1.99*	0.47
HH has post primary graduate member(s)	0.029* (0.0107)	0.048** (0.0085)	0.064** (0.0089)	1.08	2.07*	1.30
From radio	0.059** (0.0123)	0.051** (0.0092)	0.079*** (0.0063)	1.09	1.98*	2.73**
From telephone	0.011** (0.0041)	0.017*** (0.0028)	0.026*** (0.0021)	1.58	3.24**	2.25*
HH has a member on LC1 committee	0.011 (0.0127)	0.015 (0.0127)	0.022 (0.0120)	0.43	0.87	0.47
HH has a member on	0.032	0.048* (0.0127)	0.059* (0.0120)	2.56*	4.21**	2.78**

Parameter coefficients & standard errors, and t-statistics (absolute) for the paired t-tests on Ethnicity and the key variables of interest						
	1992	1999/00	2002/03	1999 & 92	2003 & 92	2003 & 99
Variables	Coef.	Coef.	Coef.	t-ratio	t-ratio	t-ratio
LC3 committee	(0.0207)	(0.0235)	(0.0187)			
Demographic factors						
Dependency ratio	-0.170*** (0.0131)	-0.185*** (0.0127)	-0.211*** (0.0125)			
Members in working age (18-64 years) group	0.088** (0.0168)	0.103** (0.0158)	0.096** (0.0153)			
Head's Gender (Male dummy)	0.120** (0.0158)	0.115* (0.0279)	0.104* (0.0273)			
Head's education (rf: no formal education)						
Some primary	0.107* (0.0352)	0.045* (0.0226)	0.068* (0.0219)			
Completed primary	0.126* (0.0303)	0.195** (0.0263)	0.203** (0.0261)			
Some secondary	0.331** (0.0247)	0.374** (0.0218)	0.370** (0.0211)			
Completed secondary	0.403*** (0.0118)	0.417*** (0.0109)	0.436*** (0.0110)			
Post secondary	0.729*** (0.0262)	0.765*** (0.0175)	0.775*** (0.0168)			
Head's economic sector (rf: not working)						
Crop-farming	0.042* (0.0166)	0.095** (0.0128)	0.033 (0.0174)			
Non-crop farming	0.155* (0.0313)	0.088** (0.0169)	0.096** (0.0179)			
Construction/Mining	0.023 (0.0141)	0.012 (0.0163)	0.029 (0.0155)			
Manufacturing	0.011 (0.0107)	0.056* (0.0119)	0.095** (0.0126)			
Trade	0.177** (0.0285)	0.223** (0.0284)	0.251*** (0.0271)			
Transport and Communication	0.218** (0.0433)	0.279** (0.0367)	0.294*** (0.0359)			
Government services	0.112** (0.0194)	0.157** (0.0243)	0.170** (0.0234)			
Other services	0.055* (0.0249)	0.084** (0.0179)	0.099** (0.0178)			
Household assets						
Natural log value of land owned	0.019** (0.0096)	0.024** (0.0078)	0.030* (0.0079)			
Natural log value of agric. equipment owned	0.018** (0.0064)	0.011** (0.0062)	0.022** (0.0051)			
Natural log value of livestock owned	0.021** (0.0046)	0.019** (0.0029)	0.028*** (0.0026)			
Spatial (rf: Kampala and Wakiso districts)						
Central	0.020* (0.0071)	0.023* (0.0078)	0.043** (0.0074)			
Eastern	0.024 (0.0251)	0.033 (0.0169)	0.026 (0.0173)			
Northern	0.054 (0.0298)	0.026 (0.0194)	0.033 (0.0187)			
Western	0.016* (0.0079)	0.031* (0.0078)	0.040** (0.0069)			
Urban dummy	0.103* (0.0237)	0.155** (0.0226)	0.125** (0.0229)			
Community Level Characteristics						

Parameter coefficients & standard errors, and t-statistics (absolute) for the paired t-tests on Ethnicity and the key variables of interest						
	1992	1999/00	2002/03	1999 & 92	2003 & 92	2003 & 99
Variables	Coef.	Coef.	Coef.	t-ratio	t-ratio	t-ratio
Telephone within 2 km	0.118** (0.0243)	0.071 (0.0427)	0.044 (0.0263)	0.73	2.41**	1.06
Feeder road within 1 km	0.013 (0.0139)	0.005 (0.0143)	0.024 (0.0139)	0.84	0.92	1.32
Electricity within 5 km	0.078** (0.0188)	0.081** (0.0164)	0.099** (0.0167)			
Markets for agric inputs within 5km	0.041* (0.0122)	0.049* (0.0156)	0.050* (0.0143)			
Produce market within 5 km	0.059* (0.0225)	0.093* (0.0258)	0.062* (0.0248)			
Clinic/Health facility within 3 km		0.009 (0.0217)	0.076* (0.0269)			
Primary school within 3 km	0.023 (0.0118)	0.014 (0.0103)	0.046* (0.0235)	0.29	0.78	1.10
Secondary school within 3 km	0.009 (0.0246)	0.081* (0.0235)	0.097** (0.0162)	1.67	0.06	1.83
Safe water drinking within 1km		0.026 (0.0249)	0.085* (0.0257)			
Constant	4.563*** (0.0936)	5.218*** (0.0834)	5.071*** (0.0861)			
Sample Size	8,635	8,987	8,063			
R-squared	0.714	0.845	0.873			

(i) Figures in parentheses are robust standard errors (White 1980; Rousseeuw and Leroy 1987); (ii) *** significant at 1%, ** significant at 5%, and * significant at 1%. (iii) tests for multicollinearity: Variance inflation factor is 2.85.

It should be noted, however, that there is no complete heterogeneity in this sample data because the analysis has only nine tribal groups. ETHNIC is limited to a maximum of 0.755. However, the results show that a move from complete homogeneity to heterogeneity would increase individual's welfare by around 0.3 (30 percentage points) in 2003. The same move would increase the welfare by nearly 0.09 (9 percentage points) in 1999 and approximately 0.05 (5 percentage points) in 1992. Thus, households located in counties with a high degree of ethnic fractionalisation are found to have higher welfare, compared to those in counties which are largely homogeneous.

The null of hypotheses of two-sample t tests with equal variance on ethnicity for 1992 & 1999, 1992 & 2003 as well as for 1999 & 2003 are all rejected. The same applies to district fragmentation for 1992 & 2002/03 and 1999 & 2002/03, but the null hypothesis of two-sample t test with equal variance on district fragmentation for 1992 & 1999 cannot be rejected. These results show that food consumption per adult equivalent unambiguously increases with ethnic diversity in Uganda. This simply

implies that ethnic heterogeneity is good for individual's welfare in the decentralised mechanism of "community targeting" in Uganda.

The results are in stark contrast to the one by Alesina et al (1999) for the United States cities. The explanation for their result originates from the fact that in the United States, preference polarization fuels interest group and political conflicts over public policies. These conflicts are fought along ethnic lines, because of the racial cleavages between the Black and the White races, with an observable hostile and unequal relationship. Alesina and his colleagues use an example of language instructions in public schools and reactions of the different ethnic groups. When such polarisation exists, the amount of public goods provision (in this case, public education) is seriously affected. A jurisdiction spends less on public education than it would have in the absence of such polarisation. However, for the case of Uganda, there is no observable preference polarisation arising from ethnic heterogeneity.

Political economy commentators might instead argue that income inequality, not ethnic diversity, inversely affects the pattern and level of provision of productive public goods and services in less developed countries. In fact, the local capture theory provides an explanation for the positive and highly significant relationship between individual's welfare and ethnic heterogeneity in the post-decentralisation period.

According to the local capture theory (Baron 1994; Grossman and Helpman 1996), it is difficult to organise a watertight interest group from numerous heterogeneous ethnic groups, because of high coordination costs and divergent policy platforms. In heterogeneous societies, the elites are usually more divided, with more competing and heterogeneous ethnic groups neutralizing one another. In such diverse society, there is a constant fear of being reported by a member from the opposite ethnic tribe in case of corruption. In this case, the costs of local capture are internalised to a greater degree, which brings down corruption.

Ethnicity supplies a natural basis for group formation (Landa 1994). Shared behavioural norms and repeated interaction facilitate the development of stable networks and credit markets. These networks neutralise each other in a zero-sum game, thereby making capture of local governments difficult. The higher the degree

of ethnic diversity, the larger would be the number of groups that render connivance difficult. On the other hand, with complete ethnic homogeneity, collusion may be easier to organise because local influential people and elites participate in a positive-sum game.

Neo-classical economics literature also provides explanations for the positive relationship. First, diversity promotes competition, innovation and productivity. Higher welfare in large heterogeneous societies could be due to the fact that, the pace of technical progress – production, invention, or application of new methods (innovation) – may be affected by heterogeneity of society. In that sense, technical progress is endogenously affected by ethnic heterogeneity. Ethnic diversity may spur technical progress out of competition and the pressures created by high degree of ethnic fractionalisation in a particular locality. This is synonymous to the demand-driven view advanced by Boserup (1981), who argued that technical progress can be spurred out of the pressures created by high population density. In addition, ethnic diversity may create a large stock of ideas and innovations that can be put to economic use. In fact, Kremer (1993) also argues similarly. According to Kremer, in a diverse population chances are higher that someone will be lucky enough or smart enough to come up with an idea that benefits every body else.

3.3.5 New Districts (Jurisdictional Fragmentation) and Welfare

It is worthy noting that there were very few districts such as Kiboga, Kisoro and Ntungamo that were created way before the decentralisation on consideration of geographical location. These could be crucial in the understanding of the current process of district fragmentation. The new district dummy is statistically not significant in 1992 and 1999/00 (see second row, Table 3.6 above). On the other hand, the coefficient on the new district dummy is negative and slightly significant (at 10% level) in 2002/03. The tests show that a household living in a new district in 2002 has food consumption per adult equivalent (individual's welfare) that is around 18% lower compared with a household that lived in a new district in 1992 and 1999. The notion of homogeneity of preferences, and the lack of mobility across districts that limit the Tiebout sorting in Uganda, can be applied to explain why district

fragmentation could reduce individual welfare (and hence, is absolute poverty increasing).

According to Oates (1972), decentralisation should be preferred when tastes are heterogeneous. The more the districts are demarcated along tribal lines, the higher are the chances that inhabitants will be largely homogeneous. This implies that, within such a district, residents are likely to have similar preferences for public goods and social services, while at the same time preferences are likely to differ across districts. The standard efficiency advantages of decentralisation would then apply under these circumstances. In Uganda, however, the lack of mobility across districts most likely limits the sorting by tastes for public goods and services. Although there might be differences in preferences across districts in Uganda, coming from differences in tribes, local languages and culture, the lack of mobility prevents Ugandans from sorting themselves (voting with their feet) along dimensions, such as level and composition of public goods and services. The median-voter preferences for public goods and services in Uganda are likely to be similar and more so with the ethnically-biased fragmented districts. To the extent that this is so, there is therefore no strong efficiency argument for decentralisation. Rather, one should expect to see greater capture of the antipoverty programmes by local elites with the decentralised service delivery mechanism in Uganda.

It is noted from the summary statistics in Table 3.2 that there have been some drastic changes over time in the way that households access information. Could this be possibly in response to changes in capture, thereby raising concerns that the results reported above might be subject to reverse feedback from capture to the choice of information source by households? The remaining part of this chapter tries to conduct an investigation of this possibility. First, each 1992 source of information dummy is regressed on a bunch of household characteristics and county dummies in each survey year. The household characteristics chosen are head's education level and area of residence, as well the variables of political participation. This regression yields the predicted values ($\hat{y}_i$)s for each household in survey years 1992, as well as 1999/00 and 2002/03 respectively. A regression of the household's food expenditure per adult equivalent on these predicted values in lieu of the contemporaneous responses by the

households on the “source of information” questions for the respective survey periods is run. The results are reported in Table 3.7.

Table 3.7: Regression results of natural log Food Consumption Expenditure per adult equivalent, 1992-2002/03: Explanatory variables are the predicted source of information values for each household in respective periods

Variables	Parameter coefficients & standard errors, and t-statistics (absolute ratios) for the paired t-tests					
	1992	1999/00	2002/03	1999 & 92	2003 & 92	2003 & 99
Predicted values of source of information (rf: newspapers)	Coef.	Coef.	Coef.	t-ratio	t-ratio	t-ratio
Local/community leaders	-0.034* (0.0163)	-0.036* (0.0159)	-0.035* (0.0169)	0.08	0.04	0.04
HH has post primary graduate member(s)	0.020 (0.0132)	0.019 (0.0129)	0.021 (0.0143)	0.05	0.05	0.11
Radio	0.048* (0.0115)	0.047* (0.0109)	0.049* (0.0116)	0.06	0.06	0.13
Telephone	0.021* (0.0042)	0.020* (0.0040)	0.022* (0.0039)	0.17	0.18	0.35
Constant	9.184*** (0.7220)	9.721*** (0.8385)	9.875*** (0.9845)			
Sample Size	8,635	8,987	8,063			
R-squared	0.423	0.441	0.450			
F-tests (p-values)	0.0004	0.0011	0.0015			

Note: (i) Figures in parenthesis are robust standard errors; (ii) * shows significance at 10%, ** significance at 5%, and *** significance at 1%; and (iii) the hypothesis that the coefficients on all the variables for each regression are jointly zero is rejected at 1% level.

The coefficients of the information variables are not varying for the respective survey periods. The three regressions are not significantly different - their significance levels are largely the same and the hypothesis of equal variances cannot be rejected. This suggests that households did not switch to more formal sources of information (media) as a response to changes in local capture. The explanation for the dramatic changes in the way that households have accessed information might lie in the fact that there has been an increase in radio stations and mobile phone penetration in many parts of the country since 1996, rather than the reverse feedback concerns.

3.4 Conclusion

This paper uses indicators of households' source of information to assess the effects of awareness on an individual's welfare. The measure of welfare used is real mean monthly food consumption (per adult equivalent). Lack of awareness would imply greater local capture of antipoverty programmes. Econometric tests show that a stronger negative relationship exists between receiving information from local leaders and food consumption per adult equivalent in 1999/00, compared to 1992. The

negative correlation is even much stronger in 2002/03; approximately four years after the decentralised mechanism of community targeting began in Uganda. On the other hand, there is a strong positive correlation between receiving information from mass media, as well as between a politically connected household and food consumption per adult equivalent.

Policy biases in favour of the elites arise when there are uninformed or politically unaware individuals/households in the decentralised sub-national jurisdiction. An individual's welfare depends on what the individual actually knows about government programmes, not on the ability to react to new public information. In the case of Uganda, there is a substantial reduction in welfare for the individual receiving information from local leaders, after decentralisation reform in particular. That the individual's welfare is lower during the decentralised regime is really a serious pitfall of decentralisation. Uninformed individuals will have very little knowledge, if any, concerning public funding for the antipoverty programmes to which they are entitled. The consequence will be greater capture of these programmes by local elites. This result therefore supports the theory that a lack of access to improved public information increases local capture, and hence is absolute poverty increasing.

In the subsequent tests an analysis of the effect of ethnic heterogeneity, using ethnic fractionalization index, is undertaken. The district fragmentation using a dummy for a new district is controlled for in addition to all the characteristics in the model above. Again, econometric tests showed that a stronger negative relationship exists between receiving information from local leaders and food consumption per adult equivalent in 1999/00 compared to 1992. The effect of political connection gets weaker, though. The results show, most importantly, a positive relationship between ethnic diversity and household food consumption expenditure per adult equivalent. Thus, an individual residing in a more ethnically diverse jurisdiction has a higher food consumption outcome compared to the one in a more homogeneous jurisdiction. Individual welfare is positively related to ethnic diversity. Other things being equal, average food consumption is higher in areas with a higher degree of ethnic diversity but lower in those which are close to complete homogeneity.

Decentralisation should be preferred when tastes are heterogeneous (Oates 1972). While there may be differences in preferences within sub-national governments in

Uganda stemming from differences in tribal languages and culture, the lack of mobility prevents Ugandans from sorting themselves along the level and composition of public goods and services. Because of this, the median-voter preferences for public goods across sub-national governments are likely to be similar (Garcia-Mila and McGuire 2003). Ethnic homogeneity deprives the affected areas of the advantages associated with costs of interest group capture and population diversity alluded to earlier. The higher the degree of ethnic diversity, the larger would be the number of groups that have useful ideas (diverse culture, customs, work ethics, etc, etc), and so the higher is the rate of technical change, and hence, economic prosperity. To the extent that ethnic homogeneity is associated with a number of constraints to technical progress, and to the extent that it is also associated with the political agency problems that promote greater capture of the antipoverty programmes by local elites, demarcating districts along tribal lines could exacerbate absolute poverty. That the coefficient of the dummy for the new district is negative and significant at 10% level in 2002/03 whereas it positive though not statistically significant in earlier years 1992 and 1999/00 suggests that fragmenting districts on ethnic groups lowers average welfare. Thus, demarcating the districts along tribal lines could exacerbate absolute poverty, rather than reducing it.

In general, therefore, the Tiebout 'Sorting' Model justifying decentralisation in Uganda fails, and suffers from the fallacy of two issues: inter-jurisdictional competition (there is lack or very limited mobility) and superior informational advantages (local elites withhold public information for their selfish ends). This paper finds no strong efficiency advantages argument for decentralisation. Instead, decentralisation might occur because of political demands related to differences in ethnic identity as well as local capture incentives. Consistent with local capture theory, decentralisation in the first and consequent negative shocks led to increased elite capture of local governance in Uganda, thereby exacerbating absolute poverty in the immediate post-decentralisation era in the country. The argument here is not that decentralisation should be done away with. It is, rather, that there is need to consider how to hold the local governance accountable, socially, democratically and economically while delivering services to the poor.

Chapter 4

4 Household Welfare and Fertility: An Assessment of the Causal Effect of Fertility on Wellbeing in Uganda

4.1 Introduction

The relationship between economic wellbeing and fertility is a long contested issue in development economics. The macro level view on rapid population growth has been that its effects on per capita welfare are negative. Thomas Malthus first observed that whenever wages rose above subsistence, they were eaten away in an orgy of procreation –people marry earlier and have more children, an aspect that depresses the wage to its minimum. In the long run, therefore, the endogeneity of population keeps per capita income at some stagnant subsistence level (Ray 1998). However, this view faced much criticism particularly from those emphasising the role of technical progress, arguing that population growth may spur technical progress and thus economic development. Others argued that differences in the negative effect of rapid population growth depend on differences about the pervasiveness and relevance of market and institutional failures.

It is worth noting that these normative views are theoretical arguments. Yet, general theoretical assertions are not sufficient for clear understanding of the relationship between demographic and economic developments. Only micro-level and case study research might be useful to unpack these issues, and hence help shed more light as to the extent by which fertility may lead to changes in economic wellbeing. Therefore, the central research question for this paper is, does high fertility decrease the welfare of households, and hence matter for extreme poverty in the less developed countries?

Economics literature on this issue gained much prominence during the 1960s and 1970s; re-echoing the fact that higher population growth rate depressed wages and capital accumulation. The argument was that high birth rates prevented families and countries from making appropriate long-term investments in critical areas such as health, education and other social infrastructure, that are important for long term

poverty reduction. However, critics disagree with this neo-Malthusian argument. First, they argued that population growth may spur technical progress out of pressures created by high population density. This is the "demand-driven" view explored by Boserup (1981) for agriculture. Second, in the "supply-driven" view taken by Simon (1977; 1981) and Kuznets (1966), population growth creates a large pool of potential innovators and therefore a larger stock of ideas and innovations that can be put to economic use. Others, such as Kelley (2001), however, have argued that demographic developments are largely irrelevant to poverty reduction.

The revisionists, on the other hand, view population change as the aggregate outcome of many individual decisions at the micro or family level, and thus as one aspect of a larger complex system. These argue that differences in the negative effect of rapid population growth depend on differences about the pervasiveness and relevance of market and institutional failures (Demeny 1986). In fact, lack of state benefits, social security and pensions, for example, have been cited as playing an important role in the increase in the demand for children. This is because poor parents look at children as a means of insurance or security in old age. In turn, poverty is considered as a crucial factor driving high fertility and therefore high rates of population growth, consequently delaying the demographic transition. Deaton and Muellbauer (1986), for example, have argued that the demographic transition from high to low fertility is associated with the contrast between economic benefits of children in poor, traditional rural societies and high economic costs of children in rich, westernized industrial societies. Related to this argument is that households relying on primitive farming technologies have greater need for cheap labour, and will thus have a higher demand for children.

This literature therefore produces several seemingly opposing hypotheses. A first strand of the literature that puts emphasis on micro decisions leads to three related conclusions about the endogenous process of fertility and economic wellbeing: (a) high fertility is not a primary impediment to economic development, but can exacerbate the effects of failings in economic and social policy; (b) the negative effects of high fertility are likely to be mitigated by family and social adjustments especially in the long run; and (c) the associated pressure on land stemming from high population size and density can induce technological improvements or adoption of

new existing technologies, and hence economic progress. A second strand argues that the endogenous process of fertility keeps per capita income at some stagnant subsistence level. It also emphasises the inability of the carrying capacity of the mother earth, the continuing natural resource depletion and environmental degradation which threaten the long-term sustainability of any social gains.

There is a fairly substantial economics literature concerned with the interaction of welfare and fertility. However, the great majority of studies have relied either on aggregate data sources, see for example (McNicol 1997; Schoumaker and Tabutin 1999), or cross-sectional data. What comes from such studies is that the relationship between welfare and fertility is not unidirectional but depends on the stage of economic development. Some have suggested a positive relationship, others find it to have an inverted J-shaped relationship, and others find it to be negative. Other studies find very little evidence of any relationship at all. A negative relationship was particularly found within less developed countries. It is well understood, however, that studies that rely on aggregate level data or on cross-sectional micro-level data cannot provide robust causal information about fertility and well-being (Birdsall and Griffin 1988; Birdsall 1989; Birdsall, Kelley et al. 2001; Merrick 2001). Birdsall and Griffin (1988) and Birdsall et al (2001), for example, provide excellent overviews of these issues of poverty and fertility.

Clearly many factors that influence fertility also determine household welfare. These include education and employment status of parents, health and family planning services, among others (Moav 2005). In addition to joint determination, reverse causation might also take place. As already observed, for example, the demand for children among poor household is high since they rely on their children's labour, in addition to the prospect of getting support in old age. In turn, higher fertility is associated with low investment in education, demand for quantity-quality trade-off, and consequently lower earnings potential for children fostering intergenerational transmission of poverty (Moav 2005; Kim, Engelhardt et al. 2006). The present paper will revisit these important issues by exploiting existing micro-level panel data from Uganda. It will try to evaluate the extent to which childbearing might lead to changes in households' economic wellbeing, in a dynamic perspective using household

surveys data. By emphasising the dynamic perspectives, this paper produces new insights which cannot be derived from cross-sectional data.

The main complication in this literature is the issue of measuring a variation of fertility that is exogenous to the welfare measure. In order to provide clear insights into the relationship, it requires that the question of exogeneity is taken seriously. Finding strong instruments from the micro level data is not that easy. Natural experiments, such as the one performed by Angrist and Evans (1998), in which mixed sibling (twins)-sex composition are used as instrumental variables for fertility while estimating the effect of childbearing on labour supply, have been criticized on grounds that they require some restrictions to be imposed on utility function such as separability of leisure and consumption (Rosenzweig and Wolpin 2000). Moreover, it is well understood that sibling-sex composition does affect earnings through labour force participation particularly of females, and hence, can not be a valid instrument. Using exogenous events such as twin birth, or unintended death of an infant would clearly identify the causal effect. The problem is that data on these truly exogenous events are not available in the household surveys. Yet, the paper's estimations rely on the micro-level panel data from household surveys.

The exogenous event used in this chapter is a lagged childbearing event in a household to identify the causal effects of fertility. Food consumption expenditure is used as a measure of welfare. Since childbearing is a choice variable, the chapter assumes a set of assumptions about household behaviour/ parental preferences, which satisfy the criterion of randomness. The revealed preference theory suggests that couples have optimally chosen the number of children. Thus, the first assumption is that poor parents derive utility from the number of children and children are utility substitutes for material consumption. The poor prefer having many children because having children is cheap. Second, it is the poor parents that are most likely to invest less in their children's education, preferring quantity to quality, and low food consumption would persist. Third, parents who like to have many children are those who care less about material wellbeing, and consequently have a lower food consumption level. These assumptions are necessary for the causal interpretation of the results in this chapter. In addition, since preferences are strictly convex and locally nonsatiated, past childbearing indicator would be orthogonal to the

unobservable factors that could affect food consumption expenditure, dispelling endogeneity concerns. Note, importantly, that in spite of the above behavioural assumptions, using a childbearing event for the same period when the food expenditure is observed does not satisfy the criterion of this event being orthogonal to factors that could affect food expenditure. This is where using past childbearing event becomes crucial.

In this chapter, two approaches will be used. As an alternative to a classical multivariate regression framework, a nonexperimental approach, based on a matching method will be employed. First, the paper will estimate a multivariate regression model, fitting the welfare measure to indicator variables of interest, while controlling for relevant background characteristics. Second, the paper will estimate the Average Treatment effect for the Treated subpopulation, based on the bias-corrected matching estimator. Consistent with the arguments in Rosenzweig and Wolpin (2000), the estimates from the multivariate regression and bias-corrected matching approaches will then be compared and contrasted. By combining information on natural events within a nonexperimental context with empirical information on the household model structure, this paper provides a more solid foundation for advancement of empirical knowledge on how household welfare, and thus poverty, and fertility interact, in particular emphasising how these relate in the presence of incomplete markets (such as credit, insurance and pension constraints).

The economics literature relying on a matching approach is still small but growing quite rapidly. There are a few data sets from panel household surveys that have been used to study the causal relationship based on this method. Examples of this literature include Kim et al (2006) using a two-wave panel data from the Indonesian Family and Life Survey (IFLS) on the issue of fertility and household welfare; Francavilla and Mattei (2006) using three waves of the Albanian Living Standards Measurement Survey (ALSMS) gives an assessment on the causal effect of childbearing on economic wellbeing in Albania. However, these two studies fail to clearly handle the endogeneity problem, whereas the present paper attempts to address this. Despite some practical limitations of the matching approach that Morgan and Harding (2006) highlight, it nevertheless is an effective technique that can be exploited to explain the causal relationship of fertility and economic wellbeing.

Panel data for the analysis are drawn from the 1992/93 Uganda Integrated Household Survey (UIHS1992/93) and 1999/00 Uganda National Household Survey (UNHS1999/00). Both surveys contain useful socio-economic information that is relevant for the purpose.

Uganda is interesting for a range of reasons. As already discussed, the country has experienced rapid economic growth in the past two decades and yet, high poverty rates still persist. The results from the poverty accounting exercise from the first paper (see chapter 2) showed that, besides growth the redistribution aspects are crucial for absolute poverty changes. The local capture study in chapter 3 provides a political economy explanation for the persistence of extreme poverty, even amidst growth. However, there still remains more to discover about other likely sources of absolute poverty changes in Uganda. So far, no studies have looked at the link between welfare and fertility in a dynamic perspective. This is rather unfortunate because the welfare effect of fertility is a central element of the Malthusian argument. As highlighted in the main introduction chapter (Chapter 1, section 1.2), Uganda is among the three countries with highest fertility and population growth rates. Whether high fertility rates are responsible for the persistence of extreme poverty in less developed countries is an empirical issue, and this is what motivates this chapter.

In particular, this study will provide evidence in the context of typical less developing economies in sub-Saharan Africa, using Uganda as a case study. The chapter is presented in five sections. The reminder of the chapter is organized as follows. The next section briefly discusses the theory about the relationship between welfare and fertility, and presents a summary and implications of fertility models. In Section 4.3, an analytical framework is presented, and section 4.4 covers the empirical results. Finally section 4.5 concludes.

4.2 Theoretical Literature

This section presents a synopsis of the macro and micro level arguments on the relationship between population growth and economic wellbeing. It also presents a summary and implications of fertility models on wellbeing that will be empirically tested. The theoretical literature on this subject is reviewed in Appendix 1A.

As discussed earlier, the controversy about the effects of rapid population growth on the standard of living dates back to Thomas Malthus era and the subsequent neoclassical period. Malthus predicted eventual falling wages and rising food prices as an increasing supply of labour ran up against the fixity of land and that given diminishing returns, labour productivity would fall; the long-run equilibrium standard of living would remain at the subsistence level. This view was also recognised by the neoclassical economists who argued that rapid population growth was detrimental (Leibenstein 1954; Nelson 1956). See also Robert Solow (1956) and Mankiw et al (1992) on a one-sector growth model, and then the two sector growth models of Lewis (1954) as well as Fei and Ranis (1964).

Appendix 1A (subsection 6.3.1) provides a detailed discussion on this literature, as well as the other strands of economics literature critical of neoclassical theory, which include; the overlapping generation argument by Samuelson's (1958), endogenous technical progress view (Kuznets 1966; Boserup 1981; Simon 1981), and that emphasising the ability of the markets and institutions to adjust (Demery 1986; Kelley 2001).

It is worth noting that the demand-driven fertility theory (Becker and Lewis 1973) and the supply-determined theory (Rosenzweig and Schultz 1985) thereafter, that explicitly addresses the fertility issues also underscored the importance of costly and missing markets. In fact, their emergence ignited the debate about the role of human capital in general. According to Becker and Lewis (1973), in spite of the normality of the demand for children, if preferences are non-homothetic, the observed relationship between quantity of children and income can be negative implying a positive relationship between fertility and poverty. See also Moav (2005). Moav (2005) argues that the ratio between the price of quantity and the price of quality increases with the individual's wage, which generates a comparative advantage for the poor in child quantity and a comparative advantage for the wealthy in raising quality children. A detailed discussion on this issue is presented in Appendix 1A (subsection 6.3.1).

In addition, it may be argued that a decline in parental education will most likely lower their income, thereby leaving fewer resources for the offspring's education. The increased fertility would further reduce resources for education that are spread

more thinly among more children. To poor parents, many children are expected to bring more resources as they grow older through work. The productivity of these uneducated children is very low and their labour earnings will be below subsistence level, though. Consequently, extreme poverty will persist in the dynasty. The converse is true for richer parents (Birdsall and Griffin 1988; Moav 2005).

Another strand of literature spearheaded by Rosenzweig and Schultz (1985) argues that fertility level is determined by the allocation of resources required to limit the biologically determined fertility supply. Lack of adequate resources, poor availability of family planning information and services mean that, women in particular, will not be able to plan their fertility career very well. The end result is a significant amount of unintended pregnancies. In the absence of perfect markets, there is likely to be a lower contraceptive prevalence rate among households with lower human capital and wealth. However, as in Aassve, et al (2005), it is well understood that the identification of supply side effects from demand side effects are difficult to establish. Fertility is also determined by unobserved heterogeneity in both the biological supply of births and in preferences for family size. These preferences have been discussed in section 4.1 above.

4.2.1 Summary and Implications of Fertility Models

Two theories have been presented; the demand- and the supply- determined models of fertility, or births.

- In the demand for births model, a simple dynamic system generates multiple steady states that emerge from comparative advantage of educated workers in the production of educated children. Couples/individuals with a high level of human capital would invest highly in their offspring's education, even in countries where market failures are present. In contrast, a decline in parental education is associated with weak economic power, leaving fewer resources for the children's education. Poor parents will prefer quantity to quality and these "cheap" children are substitutes for material consumption. Moreover, when some people consider children as luxuries, they might like having many children and care less about material wellbeing. Consequently, the

relationship between having children and food consumption expenditure is negative, at least in the short-run.

- The reproduction technology model, on the other hand, identifies the supply function for births in the presence of costly and imperfect fertility control. It also incorporates uncertain fertility and persistent heterogeneity in preferences and positive shocks in fertility (fecundity). Couples alter their mix of fertility control over their life cycle in response to their fertility supply experience. This experience, or couple's age as well as number of children in the household, could be crucial in fertility decisions, which in turn would affect their food expenditure.

Therefore, in evaluating the causal effect of childbearing on welfare, it is important to be mindful of all the above issues. This is even more critical when considering a household model structure where markets are missing. These implications are yet to be tested, and this is the aim of this chapter. Specifically, they are tested on data for a typical less developed country, in which there has been sustained economic growth and high fertility rates. A review of empirical literature focussing on the issue of endogeneity of the relationship between household welfare and occurrence of life events such as childbearing is presented in Appendix 1A (subsection 6.3.2). In particular, there is still a need to clarify the conditions under which an estimated effect can be considered causal. In addition, no studies have applied panel data sets from countries with strong growth, while at the same time having high fertility and absolute poverty rates. Identifying the dynamic relationship between wellbeing and fertility in such economies would provide a strong basis for assessing commonalities and differences, pinpointing the various channels through which poverty and fertility interacts, emphasising how they relate to the country-specific characteristics. This is exactly what the remaining part of this chapter attempts to do.

4.3 Analytical Framework

This section presents an analytical framework used in the estimation of the causal effect of a childbearing event on household welfare. Although the paper uses two methods, the simple multivariate regression analysis and the matching approach, this

section dwells more on the matching framework. This is due to the fact that the regression framework employed in this chapter is exactly the same as that one used in earlier work (as in Chapter 3, subsection 3.3.1). The critical aspects of the empirical regression model will be highlighted in the appropriate section where the estimation strategy is outlined. The matching approach generally estimates the average treatment effects of subjects participating in a “programme” using information from non participants or controls. This approach has gained popularity in programme evaluation studies. For example, see (Heckman, Ichimura et al. 1997; Ravallion 2005; Ravallion, Galasso et al. 2005), among others. In fact, this approach has recently been used by Francavilla and Mattei (2006) and Kim, Engelhardt et al. (2006) in explaining the relationship between household wellbeing and occurrence of life events. Indeed, if implemented well, it is very helpful in evaluating the causal effect of a childbearing event on household welfare.

Given the underlying endogenous processes that characterize this relationship, a prudent starting point is to ensure that the treatment indicator used is strongly exogenous to the outcome measure. As observed earlier, previous studies such as in Francavilla and Mattei (2006) and Kim, Engelhardt et al (2006) do not address the endogeneity problem clearly. Instead of considering the current period childbearing event, this paper will use a lagged event as the treatment indicator. In particular, to ensure that the paper’s matching estimator identifies and consistently estimates the treatment effect of interest (in this case: birth of a child in previous period, t_0), it is considered that assignment to treatment is independent of the outcome (here: the welfare measure in period t_1), conditional on given covariates, and also that, there is sufficient overlap in the distribution of the pre-treatment variables (Abadie and Imbens 2002; Abadie, Drukker et al. 2004). Following Abadie and Imbens (2002), part of the paper will estimate Sample Average Treatment effect for the Treated based on the bias-corrected matching estimator. The estimator will be applied to a panel context using Uganda’s household survey data.

The results from this exercise will be compared with those from a classical multivariate regression analysis. The flexible multivariate model tries to link welfare measure to childbearing event, for a household model structure typical of a less

developing country. A set of variables capturing issues related to the theory of fertility, including non-homothetic preferences among the households will be controlled for. Of course, such a regression framework requires that the familiar assumptions of independent identically distributed error terms, for the participants and comparison groups, hold. How to handle this issue will be revisited in the empirical analysis section.

In the meantime, subsections 4.3.1, 4.3.2 and 4.3.3 present a theoretical framework for the matching approach in a nonexperimental context. The empirical bias-corrected matching estimator is presented in subsection 4.3.4. Subsection 4.3.5 describes data and data sources.

4.3.1 Matching Framework: a Nonexperimental Approach

Matching methods based on both parametric and nonparametric setup date back from the early 1970s. Those applying matching method in parametric form include Cochran and Rubin (1973), Rubin (1973), Rosenbaum and Rubin (1983), Rosenbaum and Robin (1985), Rosenbaum (1995), among others. There are also those implementing this in nonparametric form. These are Hahn (1998), Heckman, Ichimura and Todd (1997), to mention only a few. Of particular interest to the present paper is the more recent matching approach that Abadie and Imbens (2002) have proposed. Abadie and Imbens (2002) introduce a bias-corrected estimator that matches all units, treated as well as controls. This kind of approach explicitly allows a unit to be used as a match more than once while estimating Sample Average Treatment effect for the Treated (SATT).

In fact, Abadie and Imbens (2002) show that this estimator is more robust compared to estimators based on regression adjustment without matching, such as (Heckman, Ichimura et al. 1997), or indeed estimators due to Hirano, Imbens et al (2000) that are based on weighting by the inverse of their assignment probabilities - termed the propensity score following Rosenbaum and Rubin (1983). This is because the bias-corrected matching estimator need not (and ensures that it does not) rely on the asymptotically correct specification of the regression function or the propensity score for consistency. This is the matching strategy that is adopted in the present paper.

4.3.2 Review of Basic Concepts and Definitions

The form of estimators presented here is gratefully credited to Abadie, Drukker et al (2004). For household $i, i = 1, \dots, N$, with all units exchangeable, let $\{W_i(0), W_i(1)\}$ denote the two potential outcomes such that; $W_i(1)$ is the level of outcome of household i when it is exposed to the treatment, and $W_i(0)$ is the outcome level for household i when not exposed to the treatment. The treatment in this case is a childbearing event and the outcome is the welfare measure. Thus, the variable F_i , for $F \in \{0,1\}$ indicates the treatment received. Note that, if both $W_i(0)$ and $W_i(1)$ were observable, the effect of the treatment on household i would be directly observable as $W_i(1) - W_i(0)$. The analyst could then use this data for the whole sample N to estimate the Sample Average Treatment Effect (SATE):

$$\tau^{sample} = \frac{1}{N} \sum_{i=1}^N \{W_i(1) - W_i(0)\}.$$

Alternatively, one could also estimate the sample average effect for the subpopulation of the treated (SATT) as

$$\tau^{sample,T} = \frac{1}{N_1} \sum_{i|F_i=1} \{W_i(1) - W_i(0)\}$$

where $N_1 = \sum_i F_i$ is the number of treated households. If one was to estimate the Sample Average effect for the subpopulation for the Controls (SATC), i.e., $F_i = 0$, the number of control units would be $N_0 = \sum_i (1 - F_i)$. See Abadie, Drukker et al. (2004) and Abadie and Imbens (2002) for a more detailed discussion. This study will be estimating the SATT specifically.

In the real world, it is important to understand that only one of the two outcomes is observed for each household i . That is, for each treated unit i one observes only the level of outcome under treatment $W_i(1)$. For now express the observed outcome W_i by:

$$W_i = W_i(F_i) = \begin{cases} W_i(0) & \text{if } F_i = 0, \\ W_i(1) & \text{if } F_i = 1. \end{cases}$$

To get the sample average treatment effect of interest, the unobserved potential outcome for each observation in the sample is the one to be estimated. This can be viewed as estimating the untreated outcome; that is, the missing potential outcome, $W_i(0)$, for household i with covariate X that was as exposed to the treatment (i.e., using background variables for each household that experienced childbearing). If the decision to give birth to a new child was purely random for households with similar values of the covariates, the researcher could use the average outcome of some similar households that did not experience a childbearing event and then derive the missing outcome. This is exactly what matching estimators are all about. Thus, for each household i , matching estimators impute the missing outcome by finding other individuals in the data whose covariates are similar but who were exposed to the opposite treatment.

To ensure that the matching estimator identifies and consistently estimates the sample average treatment effect of the treated, it has to be assumed that the assignment to treatment is unconfounded (Rosenbaum and Rubin 1983; Rosenbaum and Rubin 1985; Heckman, Ichimura et al. 1997), or that

$$F \perp (W(0), W(1)) \mid X, \quad (4.1)$$

that is; F is independent of $W(0)$ and $W(1)$ conditional on $X = x$; and that the probability of assignment is bounded away from zero and one: for some $c > 0$

$$c < \Pr(F = 1 \mid X = x) < 1 - c, \quad (4.2)$$

for all x in $\mathcal{X}$, the support of X , which is a compact subset of $\mathcal{R}^k$ (Abadie, Drukker et al. 2004). The dimension of X plays a crucial role in the properties of the matching estimator. In such a formulation, most of the covariates are assumed to have a continuous distribution. In addition, the number of discrete variables does not affect the analysis, as they can be easily dealt with (Abadie and Imbens 2002). The combination of these two assumptions has been referred to as strong ignorability assumptions by Rosenbaum and Rubin (1983). See also, (Abadie and Imbens 2002; Abadie, Drukker et al. 2004), for greater detail. The first assumption (4.1) requires

that all variables that affect the unobserved outcome (but not the other way round) and the likelihood of receiving the treatment are observed. The other assumption (4.2) is an identification one. The importance of the restriction on the probability of assignment is well documented in Heckman et al (1997), among others. It is acknowledged here that using a lagged childbearing indicator as fertility measure does not satisfy the assumption of strong ignorability. This is because past childbearing indicator is a pre-treatment variable not an adjusted treatment variable, and this is a potential limitation of this approach. The next paragraphs present the notations used in matching models.

Recall that, for each observation i , the unit-level treatment effect will be $\tau_i = W_i(1) - W_i(0)$, and also that only one of the potential outcomes $W_i(1)$ or $W_i(0)$ is observed. The other one is missing and is to be imputed. How? By using the average outcomes for treated households with similar values for the covariates of the opposite treatment units as follows: First, consider the set of observed covariates for a household i , denoted by X_i . Let $\|x\|_V = (x'Vx)^{1/2}$ denote the real-valued function (or vector norm) with positive definite matrix V . Note that, alternative norms may be used: either the norm with V equal to the inverse of the diagonal matrix with the variance of X on the diagonal, or with V equal to the inverse of the covariance matrix of X (often called the Mahalanobis metric). Define $\|z - x\|_V$ as the distance between the vectors x and z , where z represents the covariate values for a potential match for observation i . Also, let $d_M(i)$ denote the distance from the covariates for unit i , X_i , to the nearest M^{th} match with the opposite treatment. Allowing for possibility of ties, at this distance fewer than M units are closer to unit i than $d_M(i)$ and at least M units are as close as $d_M(i)$. Formally, $d_M(i) > 0$ is the real number satisfying

$$\sum_{l \in F_l = 1 - F_i} 1 \left\{ \|X_l - X_i\| \leq d_M(i) < M \text{ and } \sum_{l \in F_l = 1 - F_i} \|X_l - X_i\|_V \leq d_M(i) \right\}$$

where $1\{\cdot\}$ is the indicator function equal to one if the expression in brackets is true and zero otherwise. Next, let $\mathfrak{S}_M(i)$ denote the set of indices for the matches for unit i that are at least as close as the M^{th} match:

$$\mathfrak{S}_M(i) = \{l = 1, \dots, N \mid F_l = 1 - F_i, \|X_l - X_i\|_v \leq d_M(i)\}.$$

This expression is the well-known balancing condition. For simplicity assume there is no possibility of ties. Therefore, the number of elements in $\mathfrak{S}_M(i)$ is M but might as well be larger. Express the number of $\mathfrak{S}_M(i)$ as $\#\mathfrak{S}_M(i)$. Suppose $K_M(i)$ represents the number of times i is used as a match for all observations l of the opposite treatment group, each time weighted by the total number of matches for observation l . Finally, let $K_M^*(i)$ denote a comparable measure in which the square of the number of matches is used as the weight:

$$K_M(i) = \sum_{l=1}^N 1\{i \in \mathfrak{S}_M(l)\} \frac{1}{\#\mathfrak{S}_M(l)} \quad (4.3)$$

$$K_M^*(i) = \sum_{l=1}^N 1\{i \in \mathfrak{S}_M(l)\} \left\{ \frac{1}{\#\mathfrak{S}_M(l)} \right\}^2 \quad (4.4)$$

Note that $\sum_i K_M(i) = N$, $\sum_{i \in F_1} K_M(i) = N_0$, and $\sum_{i \in F_0} K_M(i) = N_1$, where N_0 and N_1 is the number of control and treated units respectively and hence; $N_0 + N_1 = N$. Armed with all necessary definitions, concepts and matching notations, one can now proceed with presenting the matching estimator of interest. Before presenting the bias-corrected matching estimator, the simple matching estimator is first discussed.

4.3.3 The Simple Matching Estimator

To estimate the pair of potential outcomes, the simple matching estimator uses the following approach:

$$\hat{W}_i(0) = \begin{cases} W_i & \text{if } W_i = 0 \\ \frac{1}{\#\mathfrak{S}_M(i)} \sum_{l \in \mathfrak{S}_M(i)} W_l & \text{if } W_i = 1 \end{cases} \quad (4.5)$$

and

$$\hat{W}_i(1) = \begin{cases} \frac{1}{\#\mathcal{S}_M(i)} \sum_{l \in \mathcal{S}_M(i)} W_l & \text{if } W_i = 0 \\ W_i & \text{if } W_i = 1 \end{cases} \quad (4.6)$$

Thus, given that only one potential outcome is observed for each household i , the observed outcome $W_i(1)$ or $W_i(0)$ is for one potential outcome (Abadie and Imbens 2002; Abadie, Drukker et al. 2004). As shown above, the unobserved outcome is estimated by averaging the observed outcomes for the observations l of the opposite treatment group that are chosen as matches for household i . Using these estimates of potential outcomes, the simple matching estimator is

$$\tau_M^{sm,t} = \frac{1}{N_1} \sum_{F_i=1} \{W_i - \hat{W}_i(0)\} = \frac{1}{N_1} \sum_{i=1}^N \{F_i - (1 - F_i)K_M(i)\}W_i \quad (4.7).$$

This simple estimator estimates Average Treatment Effect for the Treated subpopulation. It is important to understand that this estimator is based on assumption that the decision to take the treatment is “purely random” for units with similar values of the pre-treatment covariates. See Abadie, Drukker et al (2004) for more detail.

However, subjects experiencing a childbearing event might be self-selecting. Therefore, large differences in observable and unobservable covariates may exist between households experiencing birth and those that do not. Thus, the simple matching estimator (4.7) will be biased in finite samples when the matching is not exact (Abadie and Imbens 2002). Abadie and Imbens (2002) have shown that, with k continuous covariates, the estimator will have a term corresponding to the matching discrepancies -the difference in covariates between matched units and their matches – that will be of the order $O_p(N^{-1/k})$. Therefore, one has got to try to remove this bias term which remains after matching. This is what the simple bias-corrected matching estimator due to Abadie and Imbens (2002) seeks to address.

Abadie and Imbens (2002) show that the bias-corrected matching estimator has very attractive and important features: first, units can be used as matches more than once,

matching is carried out with replacement leading to a lower variance; second, the distribution of $K_M(i)$, the number of matches, is important in terms of the variance of the estimator; and third, bias-adjustment removes the asymptotic bias. Thus, in the estimation of the Average Treatment Effect for the Treated, the present paper implements the bias-corrected matching estimator. Its form and description is presented in the subsection that immediately follows.

4.3.4 The Bias-Corrected Matching Estimator

In general, the adjustment is based on an estimate of the two regression functions: $\mu_F(x) = E\{W | X = x\}$ for $F = 0$ or 1 . These regression functions are approximated by linear functions and then estimated by using least squares on the matched sample (Abadie and Imbens 2002). Thus, the estimated regression function is of the form: $\hat{\mu}_F(x) = \hat{\beta}_{f0} + \hat{\beta}'_{f1}x$ for $F = 0, 1$,

$$\text{where } (\hat{\beta}_{f0}, \hat{\beta}_{f1}) = \underset{\{\beta_{f0}, \beta_{f1}\}}{\operatorname{argmin}} \sum_{i=F_i=f} K_M(i) (W_i - \beta_{f0} - \beta'_{f1}X_i)^2 \quad (4.8)$$

Since it is the sample average treatment effect for the subpopulation of the treated (SATT) that is to be estimated, this paper will only estimate the regression function for the controls $\mu_0(x)$. The observations in the regression are weighted by $K_M(i)$, the number of times the unit is used as a match. This is because, as Abadie et al (2004) observe, the weighted empirical distribution is closer to the distribution of the covariates of key interest. Consequently, only the matched covariates in the sample should be used. By doing this, units that are sufficiently dissimilar from the sample of interest are excluded. In this setup, with both treated and control units matched, it is important that units can be used as matches more than once.

The predicted missing potential outcomes $W_i(\bullet)$ from the regression functions are:

$$\tilde{W}_i(0) = \begin{cases} W_i & \text{if } F_i = 0 \\ \frac{1}{\# \mathfrak{S}_M(i)} \sum_{l \in \mathfrak{S}_M(i)} \{W_l + \hat{\mu}_0(X_l) - (\hat{\mu}_0)X_l\} & \text{if } F_i = 1 \end{cases} \quad (4.5b)$$

and

$$\tilde{W}_i(1) = \begin{cases} \frac{1}{\#\mathcal{S}_M(i)} \sum_{l \in \mathcal{S}_M(i)} \{W_l + \hat{\mu}_1(X_i) - \hat{\mu}_1(X_l)\} & \text{if } F_i = 0 \\ W_i & \text{if } F_i = 1 \end{cases} \quad (4.6b)$$

Notice that, expressions (4.5) and (4.6), and (4.5b) and (4.6b) respectively, differ thanks to bias-adjustment process. Based on these estimates, (4.5b) and (4.6b), the corresponding estimator for the Average effect of Treatment for Treated (SATT) is:

$$\hat{\tau}_M^{bcm,t} = \frac{1}{N_1} \sum_{i: F_i=1} \{W_i - \tilde{W}_i(0)\} \quad (4.9)$$

where *bcm* is bias-corrected matching.

4.3.5 Data sources

This subsection describes the data sources, in which the unit of analysis is the household. The data are the 1313 panel households from the 1992/93 Uganda Integrated Household Survey (UIHS) and 1999/00 Uganda National Household Survey 1 (UNHS1). The Uganda household surveys are of exceptional quality and are ideal for the purpose of this paper, particularly for constructing a quasi experiment of the type implemented here. As discussed in earlier chapters, the surveys, conducted by the Uganda Bureau of Statistics, contain extensive modules on a range of issues of household economy covering a period of steady economic growth. These are stratified sample surveys and the lowest stratum is a cluster of households. The sample is nationally representative covering both rural and urban areas. The surveys contain a wealth of information collected at individual and household level, including indicators of economic wellbeing such as, consumption expenditure, food prices, as well as information on education, working status and fertility. Since households living in close geographic proximity will tend to have some unobservables (e.g. climate, soil or culture) in common, the standard errors of all estimates are cluster-robust (Deaton 1997).

4.4 Empirical Analysis

This section presents empirical evidence on the fertility effect of household welfare, and hence poverty in Uganda. It focuses on using a childbearing experience as a measure of fertility. Subsection 4.4.1 describes the statistical properties of the

variables. In subsection 4.4.2, results from a flexible multivariate framework are presented; while the results from the bias-adjusted matching model (Sample Average Treatment effect for the Treated) are presented in subsection 4.4.3.

4.4.1 Statistical Properties of Variables

To motivate the empirical work, it is necessary to start with a discussion of full sample summary statistics of the variables of interest in the observed panel household data for 1992/93 and 1999/00. There is no retrospective fertility information in the Uganda household survey data sets other than the number of head's own children living, and new births. Therefore, in this paper children are matched to household heads using the relationship code for "child". This paper considers households experiencing a childbearing event in a particular period as those having a child aged 1 or below at the end of respective survey period. This is because fieldwork for any given survey lasts for one year. The descriptive statistics are reported in Table 4.1.

Table 4.1: Summary Statistics: Expenditure is measured in constant 1997/98 shilling prices

Variable	1992/93		1999	
	Mean	Std. Dev.	Mean	Std. Dev.
Head's demographics				
Age	43.105	15.507	49.893	15.425
Female	.237	.425	.283	.450
Single	.057	.232	.041	.199
Married	.743	.437	.658	.475
Cohabiting	.011	.103	.033	.178
Divorced/separated	.078	.269	.069	.254
Widowed	.110	.314	.199	.339
No. of own children	2.759	2.567	3.060	2.759
No. of own sons	1.442	1.598	1.553	1.661
No. of own daughters	1.316	1.492	1.507	1.624
Two youngest sex same	.563	.496		
New birth dummy	.318	.466	.479	.500
No. of newborn children between periods			1.373	1.457
Household Size				
No. of adults	5.612	3.298	5.944	3.375
Children under age of 5 years	2.632	1.546	2.664	1.577
Between age of 5 & 15 years	1.087	1.119	.870	1.055
Between age of 5 & 15 years	1.893	1.818	2.410	1.988
Between age of 5 & 7 years			.503	.734
Head's main economic sector				
Not working	.057	.233	.053	.229
Crop farming	.667	.471	.664	.474
Non-crop farming	.027	.161	.029	.138
Mining	.001	.028	.001	.027
Manufacturing & construction	.059	.236	.061	.234
Trade	.060	.238	.064	.240
Transport and communication	.017	.131	.019	.133
Government services	.090	.286	.085	.283
Other services	.022	.147	.024	.149

Head's education status				
Some primary	.867	.340	.851	.357
Completed primary	.034	.182	.039	.193
Some secondary	.087	.282	.094	.293
Completed secondary	.021	.145	.010	.099
Post secondary	.025	.157	.041	.199
Household members working				
No. of adult male who worked	.946	.639	.944	.714
No. of adult female who worked	1.153	.711	1.178	.721
No. of male children who worked	.214	.569	.342	.791
No. of female children who worked	.243	.557	.362	.851
Educational Attainment				
No. of adult male with post-primary	.284	.604	.171	.497
No. of adult female with post-primary	.130	.419	.166	.486
No. of adult male with only primary	.133	.359	.065	.273
No. of adult female with only primary	.118	.343	.077	.283
No. of adult male not completed primary	.706	.722	.887	.717
No. of adult female not completed primary	1.029	.830	1.040	.748
	Mean	Std Dev.	Mean	Std Dev.
Geographical Location				
Urban dummy	.140	.347	.148	.356
Rounded multiplier	463.391	235.059	417.386	301.833
Central region	.309	.462	.309	.462
Eastern region	.231	.422	.231	.422
Northern region	.154	.361	.154	.361
Western region	.307	.461	.307	.461
Measure of Welfare				
Log real monthly expenditure on food	10.713	.740	11.024	.746
Real expenditure share of food	.352	.243	.551	.150
No. of adult equiv for food requirement	4.22	2.45	4.53	2.56
No. of "effective adult equivalents"	2.73	1.12	2.88	1.18
Food Poverty Status				
	.690	.463	.303	.459
Observations	1313		1313	

(1) Source: Uganda Bureau of Statistics; Integrated household survey (UIHS 1992/93) and National Household Survey (UNHS 1999/00); (2) Children aged between 5 & 7 years were born after 1992 but before 1996 when universal primary education was announced; (3) effective adult equivalents are derived based on the results from table 4.10, in Appendix.

This Table shows a substantial increase in fertility, female labour supply in all age-groups and in male child labour supply, as well as in the measures of household welfare. The average number of head's own children between surveys increased by approximately 37%. The proportion of households with urban residency is 14% in 1992/93 and slightly increases to 14.8% in 1999/00. This means that, over 85% of households in the sample are rural dwellers. The real expenditure share of food is 35% in 1992/93 and this increases to 55% in 1999/00.

There are substantial declines in adult educational attainment (those above 17 years of age), with the exception of women, where there is an observed increase in post-primary education. Whereas there was a substantial increase in number of men who never completed primary education (by approximately 26 percentage points), the number of women who never completed primary education slightly increased (by nearly 1 percentage point) over the survey period.

Some descriptive statistics of the empirical distributions are reported in Table 4.2. It presents the subsample panel households grouped by a binary variable F_i equal to 1 if household i experienced a childbearing event in 1992/93 and 1999/00, and 0 if it did not. Columns 1 – 6 report the means for households in both groups, while columns 7 and 8 give the groups' relative mean difference between the two surveys. The relative mean is a simple average, in percentage terms, benchmarked from the first survey; that is UIHS92.

Table 4.2: Means in 1992/93 and 1999/00, and relative differences (%) between surveys by childbearing status for the Food expenditure and other selected socio-economic and demographic variables

status for the food expenditure and other selected socio-economic and demographic variables								
Variable	MEANS						Relative differences (%)	
	UIHS 1992/93		UNHS 1999/00					
	Childbearing Status						Childbearing Status	
	Yes	No		Yes	No		Yes	No
		t-ratios		t-ratios				
Welfare measures								
Log real monthly food consumption expenditure	10.834 (.656)	10.656 (.770)	4.08	11.187 (.645)	10.874 (.801)	7.74	3.26	2.05
Food poverty status	.662 (.474)	.703 (.457)	-1.50	.310 (.463)	.295 (.457)	0.59	-53.17	-58.04
Head's demographics								
Age	34.206 (10.828)	47.247 (15.619)	-15.41	40.614 (10.530)	58.425 (14.244)	-25.55	18.73	23.66
Female	.101 (.301)	.300 (.459)	-7.89	.137 (.344)	.417 (.493)	-11.82	35.64	39.00
Single	.019 (.137)	.075 (.263)	-4.10	.010 (.097)	.070 (.256)	-5.52	-47.37	-6.67
Married	.938 (.242)	.653 (.476)	11.55	.873 (.333)	.461 (.499)	17.42	-6.93	-29.40
Cohabiting	.014 (.119)	.009 (.094)	0.82	.037 (.188)	.029 (.169)	0.81	164.29	222.22
Divorced/separated	.019 (.137)	.106 (.308)	-5.52	.022 (.148)	.113 (.316)	-6.58	15.79	6.60
Widowed	.010 (.098)	.157 (.364)	-8.11	.059 (.236)	.113 (.316)	-3.48	490.0	-28.03
No. of own children	3.861 (2.603)	2.246 (2.383)	11.10	4.860 (2.353)	1.405 (1.950)	28.99	25.87	-37.44
No. of own sons	1.993 (1.771)	1.186 (1.442)	8.76	2.428 (1.605)	.749 (1.257)	21.15	21.83	-36.85
No. of own daughters	1.868 (1.542)	1.059 (1.397)	9.45	2.432 (1.610)	.656 (1.081)	23.58	30.19	-38.06
Household demographics								

Variable	MEANS						Relative differences (%)	
	UIHS 1992/93			UNHS 1999/00				
	Childbearing Status						Childbearing Status	
	Yes	No	t-ratios	Yes	No	t-ratios		
Household size	6.523 (3.155)	5.189 (3.280)	6.94	7.234 (2.704)	4.757 (3.496)	14.25	10.90	-8.33
No. of adults	2.528 (1.366)	2.681 (1.622)	-1.67	2.574 (1.176)	2.747 (1.868)	-1.99	1.82	2.46
Children under 5 years	1.974 (.913)	.674 (.955)	23.28	1.404 (1.019)	.379 (.825)	20.06	-28.88	-43.77
Between age of 5 & 15 years	2.022 (1.869)	1.834 (1.791)	1.75	3.256 (1.823)	1.632 (1.807)	16.17	61.03	-11.01
Head's main sector								
Crop farming	.669 (.471)	.666 (.472)	0.11	.685 (.465)	.651 (.477)	1.30	2.39	-2.25
Non-crop farming	.029 (.167)	.026 (.158)	0.31	.024 (.153)	.029 (.169)	-0.56	-17.24	11.54
Mining	.000 (.000)	.001 (.033)	-0.62	.000 (.000)	.002 (.038)	-1.32	0.00	100
Manufacturing & construction	.067 (.251)	.056 (.230)	0.78	.065 (.247)	.054 (.226)	0.84	-2.99	-3.57
Trade	.074 (.263)	.054 (.225)	1.42	.078 (.268)	.044 (.205)	2.59	5.41	-18.52
Transport & communication	.034 (.180)	.010 (.100)	3.09	.025 (.158)	.010 (.101)	2.06	-26.47	0.00
Government services	.086 (.281)	.092 (.289)	-0.35	.089 (.285)	.091 (.287)	-0.13	3.49	-1.09
Head's main sector:	.024	.021	0.34	.019	.025	-0.74	-20.83	31.58
Other services	(.153)	(.144)		(.137)	(.156)			
Head's education attainment								
With less than primary	.820 (.385)	.888 (.315)	-3.90	.830 (.376)	.870 (.337)	-2.03	1.22	-2.03
Completed primary	.067 (.251)	.019 (.137)	4.47	.051 (.220)	.028 (.165)	2.15	-23.88	47.37
Some secondary	.132 (.339)	.066 (.248)	3.98	.115 (.319)	.076 (.265)	2.41	-12.88	15.15
Completed secondary	.026 (.161)	.019 (.137)	0.81	.011 (.105)	.009 (.093)	0.36	-57.69	-52.63
Post secondary	.022 (.146)	.027 (.162)	-0.54	.043 (.203)	.039 (.195)	0.36	95.45	44.44
Members education Attainment								
No. of males with less than primary	.650 (.599)	.732 (.772)	-1.92	.940 (.618)	.838 (.794)	2.58	44.62	14.48
No. of females with less than primary	.990 (.826)	1.047 (.832)	-1.16	1.030 (.573)	1.048 (.879)	6.81	4.04	0.09
No. of males completed primary	.182 (.393)	.111 (.341)	3.34	.057 (.232)	.072 (.305)	-0.99	-68.68	-35.14
No. of female completed primary	.163 (.376)	.097 (.325)	3.26	.078 (.274)	.076 (.292)	0.13	-52.15	-21.65
No. of males with post-primary	.264 (.526)	.294 (.638)	-0.84	.119 (.370)	.218 (.586)	-3.62	-54.92	-25.85
No. of females with post-primary	.106 (.323)	.142 (.457)	-1.45	.122 (.398)	.206 (.552)	-3.13	15.09	45.07
Workers in household								
No. of Adult male working	.990 (.427)	.925 (.717)	1.72	1.000 (.514)	.893 (.855)	2.58	1.01	-3.46
No. of adult female	1.192 (.688)	1.135 (.722)	1.35	1.154 (.498)	1.200 (.877)	-1.15	-3.19	5.73

Variable	MEANS						Relative differences (%)	
	UIHS 1992/93		UNHS 1999/00				Childbearing Status	No
	Childbearing Status							
	Yes	No	Yes	No	Yes	No		
			t-ratios			t-ratios		
working								
No. of male children	.180	.230	-1.48	.407	.282	2.86	126.11	22.61
working	(.518)	(.591)		(.858)	(.721)			
No. of female children	.249	.240	0.28	.437	.292	3.09	75.50	21.67
working	(.519)	(.575)		(.928)	(.767)			
Residence status								
Urban dummy	.101	.158	-2.78	.115	.179	-3.26	13.86	13.29
	(.301)	(.365)		(.319)	(.384)			
Geographical location								
Central	.293	.316	-0.84	.262	.351	-3.49	-10.58	11.08
	(.456)	(.465)		(.440)	(.478)			
Eastern	.242	.225	0.68	.246	.216	1.29	1.65	-4.00
	(.429)	(.418)		(.431)	(.412)			
Northern	.151	.155	-0.19	.162	.146	0.80	7.29	-5.81
	(.359)	(.362)		(.369)	(.354)			
Western	.314	.304	0.37	.329	.287	1.65	4.78	-5.59
	(.465)	(.460)		(.470)	(.452)			
Observations	417	896		628	680			

Source: Uganda Bureau of Statistics, National Household Surveys, 1992/93 and 1999/00

(1) Post-secondary attainment includes those who completed post-primary specialised training or diploma, completed general degree, specialised or technical degree and above; (2) Figures in parenthesis are the standard deviations; (3) t-ratios are for two-sample t test of equal means, with equal variances; (4) the relative mean difference is defined as a percentage of the average mean in IHS1992/93.

Table 4.2 suggests some stylized facts that are worthy of note: (a) Average welfare increased, and hence there was substantial reduction in nutritional poverty between the surveys in both household groups. However, the reduction in food poverty was much lower in households that experienced childbearing, approximately five percent, than those that did not experience a new birth. (b) In both surveys, households that experienced a birth had a higher number of adult male and female children workers compared with those that did not. This disparity became much bigger in 1999/00 survey, during which time, male children workers in childbearing households outstripped those in households that did not experience a childbearing event. Thus, the large number of children workers in 1999/00 appears to have responded to the reduction in adult female labour supply for households that experienced a birth (c) The reduction in adult female labour supply for households that experienced a new birth is nearly 9% greater than the reduction observed in the other household group over time. This reduction of female labour supply (presumably of mothers) could have a negative impact on household's food expenditure, notwithstanding the increase in labour supply of male children. Why? Because productivity of these children

should be lower than would be for the mothers who move out of the labour market following a birth shock. This transmission mechanism is investigated in this section.

Concerning the trend in education, Table 4.2 shows a decrease in the number of females and males who completed their primary education in both groups. But the decline was much greater for households that experienced a childbearing event, compared with those that did not. However, the table also shows an increase in females attaining post-primary education in both groups in time; with the households that did not experience new birth outstripping those that did. There was a decline in post-primary educational attainment for males in both household groups, but again, childbearing households registered a bigger decline compared with those that did not experience childbearing. This may be due to the fact that adult males took to working, in order to compensate for the shortage in labour supply arising from childbearing mothers.

These empirical distributions serve to confirm the theoretical regularity that households that experience new birth respond by reorganizing their labour supply, and in particular, that children are seen as a critical source of labour force in poor households. Thus, as earlier noted, sex-sibling might not be a valid instrument for fertility. Recall that truly exogenous variables such as twin birth, unintended death of an infant, or a child born disabled are not captured in the household surveys, whose data this paper uses. Recall also that the 1992/93 UIHS childbearing event is used as the indicator of childbearing and total household food expenditure used is from the 1999/00 UNHS data. Table 4.3 gives some summary statistics for covariates of the two groups. In addition to the multivariate regression framework, these will be linchpins in the paper's bias-corrected matching model. The first two columns report the means and standard deviations for the treatment units. The second pair presents for the controls – that is, for households that did not experience childbearing during 1992/93 survey period. In column 5, the standardized difference defined as the mean difference between the two groups expressed in percentage terms of the standard deviation are presented. This is computed using the formula

$$\frac{\bar{y}(F=1) - \bar{y}(\bar{F}=0)}{\sqrt{(s^2(F=1) + s^2(\bar{F}=0))/2}} \cdot 100, \quad \text{where for each covariate}$$

$\bar{y}(F=1)$ and $\bar{y}(F=0)$ are sample means in the childbearing and non-childbearing households, and $s^2(F=1)$ and $s^2(F=0)$ are corresponding sample variance. The last column reports t-statistics for the hypothesis that the population averages for the childbearing households and the controls are zero.

Table 4.3: Means and Standardized Differences (%) for Covariates in both Treatment groups (childbearing and non-childbearing) before Matching: the Outcome measure is Total household food expenditure

	Childbearing Status in 1992/93				Standardised Difference (%)	t-ratios
Covariates	Yes (N= 417)		No (N= 896)			
	Mean	Std. Dev	Mean	Std. Dev		
Welfare measures						
Log real monthly food consumption expenditure	11.186	.657	10.863	.810	43.77	7.11
Log real monthly food consumption expenditure in 1992/93	10.834	.656	10.656	.770	24.89	7.91
Food poverty status	.307	.462	.300	.459	1.52	0.26
Head's characteristics						
Age	41.724	10.785	53.694	15.785	-88.55	-14.03
Female	.127	.334	.355	.479	-55.21	-8.78
Single	.017	.129	.052	.223	-19.21	-2.98
Married	.859	.349	.565	.496	68.56	10.91
Cohabiting	.034	.180	.032	.177	1.12	0.19
Divorced/separated	.022	.145	.091	.289	-30.17	-4.61
Widowed	.069	.255	.259	.438	-53.03	-8.23
No. of own children	4.837	2.550	2.233	2.445	104.24	17.72
No. of own sons	2.417	1.593	1.151	1.535	80.93	13.75
No. of own daughters	2.420	1.736	1.083	1.377	85.33	15.03
Household demographics						
Log household size	1.917	0.439	1.439	0.720	80.16	12.52
No. of adults	2.686	1.310	2.654	1.687	2.12	0.34
No. of children under 5 years	1.345	1.103	.648	.955	67.56	11.71
No. of children between 5 to 7 years	.981	.817	.281	.568	99.49	17.96
Proportion of children	.628	.183	.337	.298	117.67	18.39
No. of adults in 1992/93	2.528	1.366	2.681	1.622	-10.20	-1.67
No. of children under 5 years in 1992/93	1.974	.913	2.680	1.622	-53.64	-8.30
Head's main economic sector						
Crop farming	.669	.471	.666	.472	0.64	0.11
Non-crop farming	.029	.167	.026	.158	1.85	0.31
Mining	.000	.000	.001	.033	-4.29	-0.62
Manufacturing/construction	.067	.251	.059	.229	3.33	0.57
Trade	.074	.263	.054	.226	8.16	1.42
Transport & communication	.034	.180	.010	.099	16.52	3.11
Head's main economic sector						
Government services	.086	.281	.092	.289	-2.11	-0.35
Other services	.024	.153	.021	.144	2.02	0.34
Head's grade level (as a continuous covariate)	8.60	12.30	7.37	13.50	9.54	1.58
Head's education attainment						
Some primary	.823	.383	.864	.343	-11.26	-1.94
Completed primary	.046	.209	.036	.186	5.06	0.87

	Childbearing Status in 1992/93				Standardised Difference (%)	t-ratios
Covariates	Yes (N= 417)		No (N= 896)			
	Mean	Std. Dev	Mean	Std. Dev		
Some secondary	.125	.331	.080	.272	14.85	2.60
Completed secondary	.012	.109	.009	.094	2.95	0.51
Post secondary	.041	.198	.041	.199	0.00	0.00
Members education Attainment						
No. of males with no primary	.981	.635	.843	.748	13.09	2.76
No. of females with no primary	1.041	.676	1.039	.779	0.27	0.05
No. of males completed primary	.059	.223	.067	.288	-3.11	-0.50
No. of female completed primary	.088	.301	.071	.274	5.91	1.01
No. of males with post-primary	.108	.361	.199	.546	-19.66	-3.10
No. of females with post-primary	.153	.444	.172	.504	-4.00	-0.66
Workers in household						
No. of Adult male working	1.022	.565	.908	.771	16.87	2.71
No. of adult female working	1.201	.626	1.167	.761	4.88	0.80
No. of male children working	.393	.828	.318	.773	9.36	1.60
No. of female children working	.415	.955	.337	.797	8.87	1.55
Residence status						
Rural dummy	.892	.311	.828	.378	18.49	3.02
Geographical location						
Central	.293	.456	.316	.465	-4.99	-0.84
Eastern	.242	.429	.225	.418	4.01	0.68
Northern	.151	.360	.155	.362	-1.11	-0.19
Western	.314	.465	.304	.460	2.16	0.37

(1) Reference period for the treatment is UIHS1992/93, while covariates are for UNHS 1999/00, unless stated otherwise; (2) Figures in column 6 are t-ratios of the mean differences derived from the paired t tests with respect to 1992/93 childbearing status; (3) the standardized difference is the mean difference between groups as a percentage of the average standard deviation

From Table 4.3, it is clear that there are considerable differences between the two groups for many covariates; the null hypothesis of equal variance from the two-sample t test is rejected.

Apart from head's background characteristics and some few variables, the rest have large differences between the childbearing households and the controls. It is this difference that broadly makes drawing causal inferences from comparisons between the two groups of households an unconvincing endeavour. This issue is what the matching method will attempt to address in subsection 4.4.3. However, from the first two rows, one can obtain an unbiased and consistent estimate of the effect of childbearing on log food consumption expenditure in 1999/00, by running a flexible regression model for the two groups. This is due to the fact that the null hypothesis of no difference cannot be rejected, 0.323 (std. error 0.0454).

Therefore, subsection 4.4.2 begins with the estimation of household model structure using a multivariate regression model. In subsection 4.4.3, the Average Treatment effect for the Treated, an estimate of causal effect of childbearing on observed welfare measure based on the bias-corrected matching estimator will be presented.

4.4.2 Household model Structure: a Flexible Multivariate Regression Model

This subsection first estimates the causal effect of childbearing using a flexible multivariate regression framework of the form $W|X, F \sim N(\alpha + \beta F + X\gamma)$, where F is the treatment variable of interest, and X represents the matrix of control variables namely, household demographic and socio-economic, and geographical characteristics. A standard household model provides a starting point. Exploiting the well-known properties in a household maximization model with well behaved preferences and reproduction technology, one can argue that the first order impact of a childbearing event is equal to the benefit (could be gain or loss) in average household's (individual) welfare. However, under imperfect market conditions, the first order effect may not be a clear-cut one, since reproduction responses may also occur to cushion for the market failures. Indeed, one of the main reasons for high fertility in the less developed world is to ensure that parents have security and insurance in old age. Thus, there are also second order effects that are very important. Under imperfect or costly markets, the first and second order effects make the overall impact less predictable without further structure and information (Dercon 2005). In addition, the endogenous process between fertility and welfare makes it difficult for one to unpack and pinpoint the exact causal relationship. To cast this in a familiar econometric notation, consider the following two equations:

$$W_{it} = \alpha X_{it} + \beta F_{it} + \varepsilon_{it} \quad (4.10)$$

$$F_{it} = \delta X_{it} + v_{it} \quad (4.11)$$

where the outcome of interest denoted by W_{it} in equation (4.10) is welfare measure of household i at time t , F_{it} is the fertility variable that indicates whether household i experiences a new birth at time t , and X_{it} is a vector set of characteristics for household i at time t which affects the household welfare. The error term ε_{it} captures unobserved characteristics in the welfare measure at time t . Equation (4.11) models

the couple's choice for giving birth to a new child that depends on some observed characteristics X_{it} and some unobserved factors v_{it} . If fertility was exogenous to household welfare, then OLS regression (4.10) would yield an unbiased and consistent estimates of the treatment effect β . But as noted earlier, fertility is endogenous to household welfare, in which case there is dependence between F_{it} and the error term ε_{it} . Thus, the estimation of β in equation (4.10) is biased by the correlation between ε_{it} and F_{it} , which is a selection bias

$$E(\varepsilon_{it} | F_{it}, X_{it}) \neq 0 \quad (4.12)$$

In this case, the problem can be solved by using the fertility measure for the previous period while at the same time controlling for the observed variables X_{it} in the fertility equation. This is exactly what this empirical part does. Thus, this part uses a flexible, multivariate framework, linking the childbearing status of household for the previous survey period ($F_{i(t-1)}$) to the log of food consumption outcome (W_{it}), controlling for observed household characteristics including geographical location, allowing for an error term:

$$W_{it} = \alpha + \beta F_{i(t-1)} + \gamma X_{it} + \phi x_{i(t-1)} + \varepsilon_{it} \quad (4.13)$$

where W_{it} is household real monthly food consumption expenditure in current period (1999/00), $F_{i(t-1)}$ denotes household's childbearing status in previous survey (1992/93), X_{it} is a vector of control variables measuring demographic and socio-economic household characteristics, as well as geographical location in current period, $x_{i(t-1)}$ is a vector of some control variables for the previous period, while β, γ, ϕ are respective vectors of coefficients. In this specification, fixed effects as well as time-varying household demographic and socio-economic characteristics control for some heterogeneity, such as preferences, and $E(\varepsilon_{it} | F_{i(t-1)}, X_{it} \text{ and } x_{i(t-1)}) = 0$. The fixed effects include factors that may influence reproduction technology for which markets are incomplete or costly and community-level characteristics conditioning for the response to market failures. Thus, the model's interpretation need not be restricted to a perfect market case.

Thus, model (4.13) allows one to distinguish the effects of childbearing from those of other demographic and socio-economic characteristics, and geographical location of the household. Geography matters particularly for local labour markets and wages, and hence welfare (Heckman, Ichimura et al. 1997). It is also important for reproduction technology. For example, the results of empirical distribution reported in table 4.2 show that there was an increase in childbearing households in all regions, with the exception of Central where there is an observed reduction, between the surveys. Northern region registered the biggest increase.

The picture becomes much clearer when one considers household that did not experience a childbearing event. In particular, there was a reduction in this household group in the three regions between the surveys; the relative difference is -4% , -5.6% and -5.8% for Eastern, Western and Northern, respectively, compared to an increase of 11% in Central. It is therefore important that when controlling for geography in the multiple regression, the Central region is taken as a reference point.

4.4.2.1 Results of OLS Estimation of equation (4.13)

This empirical part of paper estimates a number of specifications for a random dynamic panel. The first set estimates the effect of the exogenous treatment indicator on average household welfare in 1999/00. This is done by using lagged childbearing events in the log real monthly food consumption expenditure of the household regressions. Two regression equations are estimated: first using the childbearing experience of the household in 1992/93 and, second using the treatment indicator over a three-year period of 1992/93-1995. Using a lagged childbearing experience in the household food expenditure regressions ensures that there is no endogeneity bias in the models. To test the strength of this indicator, the paper examines the partial correlation between the two indicator variables; a childbearing event in 1999/00 and the lagged childbearing event in 1992/93 using the proxy variable framework. For application, see Wooldridge (1960), Chapter 5 on solutions using indicators of unobservables. The correlation between the two is positive, 0.496, and their partial correlation when conditioned on head's education level, head's sector of employment, head's gender and place of residence is 0.514. Thus, since the two variable indicators are correlated, the past childbearing event is a sufficiently strong proxy indicator for

current (year *t*) childbearing indicator. The presumption here is that the indicator of the past childbearing event is generated by an independent measurement process in terms of timing, even though it could also itself be prone to measurement error.

The next set of estimations will consider the case of "endogenous models" whereby the childbearing events in a household are traced up to the current period, i.e., 1999/00, when the outcome variable of interest is observed.

Table 4.4 reports the regression estimates for the two models of the first set - the log monthly food consumption expenditure on an exogenous childbearing event with a number of controls. In Model 1 (column 1), the fertility indicator is for the households that experienced a childbearing event in 1992/93 and in Model 2 (column 2), it is for those households that experienced a childbearing event during the 1992/93 to 1995 period. The dependent variable in both cases is the real food consumption expenditure of the household in 1999/00.

Table 4.4: Regression results of log Household Monthly Food Consumption Expenditure in 1999/00 (at constant 1997/98 Ushs prices)

Variables	Model 1		Model 2	
	Coef.		Coef.	
Childbearing status (<i>rf: no childbearing</i>)	-0.105**	(0.0392)	-0.133*	(0.0684)
Demographic Variables				
Head's Age	-0.002	(0.0015)	-0.002	(0.0014)
Head is female	-0.069	(0.0701)	-0.066	(0.0700)
Head was female in 1992/93	-0.023	(0.0682)	-0.010	(0.0682)
Log household size	0.183	(0.1683)	0.250	(0.1726)
Log no. of adults	0.196*	(0.0948)	0.169*	(0.0968)
Log no. of children between 8 and 15 years	0.191**	(0.0693)	0.158*	(0.0707)
No. of children between 5 and 7 years	0.069	(0.0379)	0.112*	(0.0479)
No. of children under 5 years	0.040	(0.0304)	0.030	(0.0305)
No. of females	-0.002	(0.0146)	-0.003	(0.0145)
Head's marital status (<i>rf: not married</i>)				
Married	-0.175	(0.1311)	-0.169	(0.1332)
Cohabiting	-0.390**	(0.1507)	-0.392**	(0.1529)
Divorced/separated	-0.307*	(0.1446)	-0.294*	(0.1459)
Widowed	-0.189	(0.1353)	-0.183	(0.1376)
Head's education (<i>rf: no formal education</i>)				
Some primary	0.252	(0.1486)	0.209	(0.1498)
Completed primary	-0.122	(0.1003)	-0.096	(0.1013)
Some secondary	0.308*	(0.1568)	0.259	(0.1578)
Completed secondary	0.525**	(0.1850)	0.473**	(0.1821)
Post secondary	0.406**	(0.1595)	0.365*	(0.1603)
Head's employment sector (<i>rf: not working and mining</i>)				
Crop farming	0.015	(0.0786)	0.014	(0.0786)
Non-crop farming	0.065	(0.1239)	0.059	(0.1265)
Manufacturing/construction	0.019	(0.1024)	0.014	(0.1015)
Head's employment sector Cont'd				
Trade	0.222*	(0.0995)	0.224*	(0.1002)

Variables	Model 1		Model 2	
	Coef.		Coef.	
Transport & communication	0.331*	(0.1287)	0.323*	(0.1308)
Government services	0.116	(0.0919)	0.123	(0.0921)
Other services	0.080	(0.1385)	0.080	(0.1404)
Members education Attainment (rf: less than primary)				
No. of males who completed primary only	0.076	(0.0605)	0.070	(0.0605)
No. of female who completed primary only	-0.042	(0.0511)	-0.045	(0.0514)
No. of males with post-primary	0.030	(0.0374)	0.032	(0.0372)
No. of females with post-primary	0.080*	(0.0383)	0.074*	(0.0387)
Economic Activity (rf: not working)				
No. of adult male working	0.019	(0.0361)	0.016	(0.0362)
No. of adult female working	0.041	(0.0307)	0.038	(0.0307)
No. of male children working	0.007	(0.0227)	0.011	(0.0231)
No. of female children working	-0.011	(0.0213)	-0.009	(0.0219)
No. of adult male who worked in 1992/93	-0.030	(0.0382)	-0.023	(0.0381)
No. of adult female who worked in 1992/93	-0.024	(0.0245)	-0.027	(0.0244)
No. of male children who worked in 1992/93	0.014	(0.0321)	0.014	(0.0326)
No. of female children who worked in 1992/93	-0.022	(0.0312)	-0.024	(0.0311)
Geographical Location (rf: Central region)				
East	-0.206***	(0.0443)	-0.206***	(0.0446)
North	-0.687***	(0.0554)	-0.680***	(0.0555)
West	-0.114*	(0.0424)	-0.079*	(0.0386)
Rural	-0.106*	(0.0539)	-0.109*	(0.0422)
Previous measure of welfare				
Log food consumption expenditure in 1992/93	0.133***	(0.0253)	0.131***	(0.0254)
Intercept	9.290***	(0.3722)	9.280***	(0.3762)
R-squared	0.4640		0.4621	
F (43, 931)	20.73		20.57	
Childbearing (Treated) households	417		502	
Number of Observations	975		975	

- (i) Robust standard errors are in parentheses: *** significance at 1%, ** significance at 5%, * significance at 10%; (ii) independent variables are for UNHS 1999/00, unless stated otherwise; (iii) rf: denotes the base line group; (iv) Mean VIF for Model 1 and 2 is 4.80 and 4.11, respectively; and (v) specification tests fail to reject the RESET's null hypothesis of no omitted variables for the models, i.e.;

Ramsey RESET test using powers of the fitted values of logfoodexp99

H₀: model has no omitted variables

F (3, 929) = 1.04; Prob > F = 0.3732 &

F (3, 928) = 1.13; Prob > F = 0.3379, respectively.

These regression estimates are unbiased, robust and more crucially precise as the treatment indicator used in both models is strictly exogenous in addition to the models passing diagnostic tests. The results show that childbearing matters for the level of household's wellbeing. There is a shift in the regression equation for the households that experienced a childbearing event in 1992/93 and over the period 1992/93 to 1995 relative to those that did not. Both coefficients of childbearing are negative and statistically significant at the 5% level. Compared to no-childbearing situation, the households experiencing a childbearing event have real monthly food consumption that is 10.5 and 13.3 percent lower for the respective periods, all else being equal. It is noted that in addition to the lagged birth shock, the two regressions also control for the number of different categories of children. This means that the child/children

born in 1992/93 is/are captured in the “number of children between 5 and 7 years” regressor in Model 1. The same applies to the regressor “number of children under 5” for the child/children born in 1995 in Model 2. It would thus appear that both regressors, a birth shock and number of children, are measuring the same effect, in which case the marginal effect becomes the combination of the two coefficients. Notice that the childbearing indicator goes back from 1 to zero in the following period after the birth shock, while the number of children in a given category remains the same (assuming no death of a child in between). If the childbearing indicator variable is negative and significant but the number of children variable for respective categories is not, as it is the case in Models 1 and 2, this would suggest that food consumption falls in the year following birth but recovers slowly afterwards. It is only after around 8 years and later when the combined effect would be positive and significant. This fact is reflected in the regressor “number of children between 8 and 15 years” in both regressions. Thus, the results show that child birth lowers food consumption expenditure in the immediate post-birth shock, and the consumption would take a while to recover fully. This issue will be revisited shortly.

There are some other control variables in the models whose coefficients are statistically significant that might provide a useful basis for policy analysis and, therefore, are worth noting.

- *Head's marital status:* Whether a household's head is cohabiting or divorced matters for wellbeing. Compared to unmarried head, the households with cohabiting couples have real food consumption that is 39 percent lower in both models. Although the proportion of the cohabiting heads is small – observed to be at 1.1 percent in 1992/93 but importantly grew steadily to 3.3 percent by 1999/00, the size of the impact is large. The results also show that the households whose heads are divorced have food consumption that is approximately 30 percent lower compared to the household headed by unmarried. It is important to note that the proportion of households in this category dropped from 7.8 percent in 1992/93 to 6.9 percent, but nevertheless the size of the impact is again large in the panel sample.
- *Head's education:* All else being equal, households whose head attended some secondary school by 1999/00 have food consumption that is 31 percent higher

than those whose head never went to school. Note, however, that the coefficient of this variable in Model 2 is not statistically significant. For those who are secondary graduates and higher, the differential is even higher than those with some secondary schooling in models. These results were expected and reinforce the fact that education beyond secondary school clearly has significant payoff in terms of reduced extreme poverty in this panel sample.

- *Head's sector of employment:* Other things being equal, having a household head engaged in Transport and Communication and in Trade increases household food consumption by around 33 percent and 22 percent, respectively. Other sectors of employment do not have statistically significant different levels of food consumption expenditure from those not working.
- *Household members' education attainment:* The households with females who are post-primary graduates have food consumption that is on average 8 percent higher than those without, all else equal. Other education attainments that are lower than this for both sexes are not statistically significant. Interestingly, the same applies to males who completed post-primary education. Educating girl child up to this level clearly has a substantial payoff in terms of economic wellbeing.
- *Place of residence:* Where a household lives matters also, all else equal.

Rural-Urban Dichotomy: Compared to the urban areas, the rural areas have food consumption that is nearly 11 percent lower. While this result might be expected, the size of the impact is a matter of concern for the reduction of absolute poverty especially given that more than 95 percent of the population lives in rural areas.

Regional Location: Compared to the Central region, households from Northern region have food consumption that is over 60 percent lower.

Those in the Eastern region have food consumption that is nearly 21 percent lower. These two regions are highly significant at 1% level. The Western region households have their food consumption that is 11 percent and around 8 percent lower compared to those in the Central region, for respective models. The coefficient of this region is slightly significant at 10% level.

The next issue to consider is whether there might be some interesting welfare conclusions if there are many young children in the household. This can be addressed by considering different scenarios with the households experiencing a childbearing event relative to the counterfactual situation at different periods, coinciding with that when the household's food consumption expenditure is observed. Thus at this stage there less emphasis on producing precise unbiased estimates – this has already been addressed by using a lagged childbearing experience in earlier estimations (see, Model 1 and 2 above) – but to help in understanding the relationship of the childbearing itself on household's food consumption outcome. In order to have the comparable results, a similar functional form specification like that in Models 1 and 2 is estimated for different childbearing periods.

Table 4.5 presents the regression results for a range of the childbearing experiences in the household. Column 1 (Model 3) fits a regression for the households experiencing a childbearing event in 1999/00; column 2 (Model 4) is for households that had newborn children since 1996 to 1999/00; and column 3 (Model 5) fits a regression for those that experienced a childbearing event over the survey periods, 1992/93 to 1999/00. All control variables remain the same as in the regressions above.

Table 4.5: Regression results of log household monthly food consumption expenditure in 1999/00 (at constant 1997/98 Uganda shilling prices)

Variables	Model 3 (CB in 1999/00)		Model 4 (CB in 1996-1999/00)		Model 5 (CB in 1992/93-99/00)	
	Coef.		Coef.		Coef.	
Childbearing status (<i>rf: no childbearing</i>)	-0.070	(0.0578)	-0.131*	(0.0564)	-0.142*	(0.0557)
Demographic Variables						
Head's Age	-0.002	(0.0015)	-0.002	(0.0015)	-0.002	(0.0015)
Head is female	-0.065	(0.0708)	-0.057	(0.0703)	-0.061	(0.0700)
Head was female in 1992/93	-0.014	(0.0682)	-0.013	(0.0679)	-0.013	(0.0680)
Log household size	0.223	(0.1740)	0.314	(0.1830)	0.335	(0.1823)
Log no. of adults	0.178	(0.0980)	0.150	(0.0997)	0.141	(0.0989)
Log no. of children between 8 and 15 years	0.168*	(0.0711)	0.133	(0.0753)	0.127	(0.0743)
No. of children between 5 and 7 years	0.069	(0.0394)	0.042	(0.0375)	0.064	(0.0375)
No. of children under 5 years	0.035	(0.0305)	0.062*	(0.0322)	0.045	(0.0303)
No. of females	-0.001	(0.0148)	-0.005	(0.0144)	-0.006	(0.0144)
Head's marital status (<i>rf: not married</i>)						
Married	-0.166	(0.1312)	-0.150	(0.1309)	-0.165	(0.1314)
Cohabiting	-0.396*	(0.1514)	-0.384*	(0.1511)	-0.402**	(0.1515)
Divorced/separated	-0.295*	(0.1449)	-0.281*	(0.1445)	-0.287*	(0.1451)
Widowed	-0.184	(0.1358)	-0.168	(0.1359)	-0.174	(0.1371)
Head's education (<i>rf: no formal education</i>)						
Some primary	0.225	(0.1519)	0.264	(0.1729)	0.259	(0.1619)
Completed primary	-0.105	(0.1018)	-0.098	(0.1005)	-0.102	(0.0996)
Some secondary	0.273	(0.1598)	0.311	(0.1805)	0.303	(0.1695)

Variables	Model 3 (CB in 1999/00)		Model 4 (CB in 1996-1999/00)		Model 5 (CB in 1992/93-99/00)	
	Coef.		Coef.		Coef.	
Completed secondary	0.485**	(0.1855)	0.530**	(0.2013)	0.506**	(0.1930)
Post secondary	0.380*	(0.1623)	0.424*	(0.1827)	0.408*	(0.1716)
Head's employment sector (rf: not working and mining)						
Crop farming	0.015	(0.0785)	0.014	(0.0777)	0.022	(0.0773)
Non-crop farming	0.054	(0.1269)	0.057	(0.1279)	0.055	(0.1263)
Manufacturing/construction	0.018	(0.1012)	0.020	(0.1005)	0.026	(0.0996)
Trade	0.221*	(0.1004)	0.226*	(0.1001)	0.241*	(0.0995)
Transport & communication	0.321*	(0.1291)	0.314*	(0.1265)	0.329**	(0.1265)
Government services	0.119	(0.0918)	0.127	(0.0910)	0.138*	(0.0909)
Other services	0.074	(0.1396)	0.072	(0.1400)	0.087	(0.1392)
Members education Attainment (rf: less than primary)						
No. of males who completed primary only	0.071	(0.0604)	0.064	(0.0598)	0.065	(0.0593)
No. of female who completed primary only	-0.045	(0.0514)	-0.055	(0.0514)	-0.048	(0.0519)
No. of males with post-primary	0.035	(0.0371)	0.029	(0.0372)	0.028	(0.0369)
No. of females with post-primary	0.075*	(0.0384)	0.072*	(0.0383)	0.070*	(0.0379)
Economic Activity (rf: not working)						
No. of adult male working	0.017	(0.0362)	0.014	(0.0361)	0.013	(0.0362)
No. of adult female working	0.038	(0.0308)	0.042	(0.0306)	0.045	(0.0305)
No. of male children working	0.009	(0.0229)	0.010	(0.0230)	0.008	(0.0229)
No. of female children working	-0.008	(0.0216)	-0.009	(0.0216)	0.003	(0.0213)
No. of adult male who worked in 1992/93	-0.025	(0.0380)	-0.023	(0.0376)	-0.019	(0.0218)
No. of adult female who worked in 1992/93	-0.025	(0.0248)	-0.028	(0.0251)	-0.031	(0.0247)
No. of male children who worked in 1992/93	0.016	(0.0325)	0.011	(0.0325)	0.016	(0.0322)
No. of female children worked in 1992/93	-0.024	(0.0314)	-0.025	(0.0308)	-0.023	(0.0308)
Geographical Location (rf: Central region)						
East	-0.203***	(0.0446)	-0.205***	(0.0443)	-0.205***	(0.0442)
North	-0.680***	(0.0555)	-0.682***	(0.0555)	-0.679***	(0.0552)
Geographical Location (rf: Central region)						
West	-0.108*	(0.0424)	-0.109*	(0.0422)	-0.111*	(0.0423)
Rural	-0.111*	(0.0541)	-0.108*	(0.0538)	-0.113*	(0.0537)
Previous measure of welfare						
Log food consumption expenditure 1992/93	0.131***	(0.0255)	0.135***	(0.0255)	0.138***	(0.0257)
Intercept	9.287***	(0.3762)	9.093***	(0.3988)	9.088***	(0.3944)
R-squared	0.4606		0.4631		0.4638	
F (43, 931)	20.67		20.50		20.78	
Treated households	628		685		803	
Number of Observations	975		975		975	

(i) rf: represents the base line group; (ii) CB refers to the indicator of experiencing a childbearing event in respective periods; (iii) Robust standard errors are in parentheses: *** significance at 1%, ** significance at 5%, * significance at 10%; (iv) independent variables are for UNHS 1999/00, unless stated otherwise; and (v) Ramsey RESET tests: cannot reject the null of no omitted variables.

All the coefficients of childbearing indicator are negative. They are statistically significant for the treatment period in 1996 to 1999/00 and in 1992/93 to 1999/00 at 5% level, whereas the coefficient for the treatment period in 1999/00 is not. It can thus be concluded that a birth shock lowers the real monthly food consumption

expenditure by 7 to 14 % percent in the households experiencing birth over the survey period compared to those that did not. As in Models 1 and 2, the coefficients of the regressors “number of children between 5 and 7 years” and “number of children under 5” are not statistically significant but positive. Therefore, the same interpretation can be given to these results also – food consumption falls after a birth shock but recovers afterwards. Notice that when a birth shock is in use from a given period until year t (1999/00), as in Models 4 and 5, the number of children between 8 and 15 years variable is not significant. This implies that food consumption will take a longer period to recover fully if a household continues having new births than it would take had that household stopped having children 4 years earlier (as in Model 2, for example).

The fact that the coefficient is not statistically significant when the year t is in use, serves to explain why there is a concern using this indicator variable. It could be due to observational problems, particularly if much of the household's food expenditure was before the birth shock. This can, indeed, raise the issue of possible endogeneity bias. A couple may choose to have a child when they realise that their consumption in the first two month of the year is very high, perhaps due to their increased earnings. By the time a new child arrives in the survey time, after 9 months, their food expenditure would still be high. This case illustrates a classic observational and endogeneity problem of using the same period for child birth event and food consumption outcome.

Of course the other results (in Models 4 to 5) might also be affected by a potential endogeneity bias. But as pointed out earlier, this was ameliorated by using appropriate lags in Models 1 and 2. The point here is to examine the impact of childbearing on food consumption expenditure; i.e., the effect of childbearing on household's wellbeing, and also of having children of different ages on welfare. Table 4.6 demonstrates the effects based on different treatment periods. Note that the estimated effects, percentage reduction in food consumption expenditure, are extracted from Models 1 to 5. Column 1 reports reductions in real monthly food consumption expenditure of households experiencing a childbearing event in a given period relative to that that did not. The first two rows are for the households with babies born in 1999/00 (aged 1 and below) and those with children born since 1996 to

1999/00 (under 5), respectively. The third one is for the households with children born since 1992/93 to 1999/00 (under 9). The fourth excludes all children under 4, i.e. captures the households with children born between 1992/93 and 1995 (aged 5-8). The last row is for household with children born in 1992/93 (aged 7-8).

Table 4.6: Marginal Effect of Childbearing in a given period: Dependent variable is log household monthly food consumption expenditure, 1999/00 (in constant 1997/98 prices)

Period	Elasticity (percentage reduction)	Comment on treatment indicator
1999/00 (1 and below)	7.0	Endogenous
1996-1999/00 (under 5)	13.1	Endogenous (due to 1999/00 births)
1992/93-1999/00 (under 9)	14.2	Endogenous (due to 1999/00 births)
1992/93-1995 (aged 5 to 8)	13.3	Strictly exogenous
1992/93 (aged 7 & 8)*	10.5	Strictly exogenous

Note: marginal effects are calculated at reference of no childbearing households; * denote the treatment period of interest.

From this Table it is clear that the reduction in welfare is higher in households having younger children (under 5) compared to those having older children aged 7 and 8. However, the reduction in welfare is lower for households with children aged 1 and below (is only 7%) compared to those with older children (is nearly 11% for those having children aged 7 & 8, for example). This confirms that food consumption expenditure falls in the year following a birth shock, and recovers slowly in the subsequent years. If there are no new births, recovery would be complete after 8 years and the benefit of the child would be realised 15 years later, *ceteris paribus*. This will not be the case if the household continues having new children; food consumption will keep falling and food poverty will persist as shown in Model 5 (1992-1999/00 treatment period).

Thus by acquiring children, the share of household resources that is available for each member would decrease, and hence food consumption will be lower on average. The projection is that this could continue until when children start contributing to the household's production and resource envelope 15 years later (when they are now adults). This coupled with the economies of scale in consumption could then lead to an increase in household's food consumption expenditure per capita.

The presence of children and household size brings to light the raging debate on the issue of intra-household resource allocation and economies of scale in consumption. There is a view in the related literature suggesting that the adjustments for

demographic composition and size should provide a clearer picture on such welfare conclusions. The next set of estimations is simply meant to check what happens to the coefficients when the household size and composition are adjusted for. These particularly estimate the welfare effect of a childbearing event on the real food consumption per "effective" adult equivalent. The adjustment is explained fully in Appendix 2A (see also, Table 6.2). To mitigate the problem of possible endogeneity bias and also for consistency, the childbearing indicator and all the control variables are exactly the same as those specified in Models 1 and 2. Note that in these specifications, household size is excluded because it was already controlled for in the Engel curve estimation (Appendix 2A). Including it would result in over-specification of the model (specification tests showed so). In any case, this is captured by decomposing the household composition into adults, older and younger children.

Table 4.7 reports the regression results. Column 1 (Model 6) treatment is households that experienced a childbearing event in 1992/93 while in Model 7 it is for those that experienced a childbearing event over 1992/93-1995. The coefficients of a childbearing event are both negative even in these models that adjusted for the household composition and size. It is statistically significant at the 5% level for households that experienced a childbearing shock in 1992, whereas it is not in the period over 1992/93 to 1995. These results are robust (White 1980; Deaton 1997).

Table 4.7: Regression results of log real monthly Food Consumption Expenditure per effective adult equivalent, 1999/00 (at constant 1997/98 prices and adjusted for economies of scale in consumption; $\theta = 0.72$)

Variables	Model 6		Model 7	
	Coef.		Coef.	
Childbearing status (rf: no childbearing)	-0.112*	(0.0445)	-0.099	(0.0696)
Demographic Variables				
Head's Age	-0.002	(0.0017)	-0.002	(0.0017)
Head is female	-0.015	(0.0771)	-0.007	(0.0769)
Head was female in 1992/93	-0.048	(0.0765)	-0.037	(0.0770)
Log no. of adults	0.306***	(0.0643)	0.308***	(0.0647)
Log no. of children between 8 and 15 years	0.259***	(0.0343)	0.249***	(0.0342)
No. of children between 5 and 7 years	0.110**	(0.0308)	0.143*	(0.0451)
Children under 5 years	0.065*	(0.0215)	0.062*	(0.0220)
No. of females	-0.002	(0.0157)	-0.004	(0.0159)
Head's marital status (rf: not married)				
Married	-0.167	(0.1340)	-0.159	(0.1359)
Cohabiting	-0.362*	(0.1526)	-0.362*	(0.1544)
Divorced/separated	-0.308*	(0.1475)	-0.295*	(0.1486)
Head's marital status Cont'd				
Widowed	-0.169	(0.1382)	-0.164	(0.1401)

Variables	Model 6		Model 7	
	Coef.		Coef.	
Head's education (<i>rf: no formal education</i>)				
Some primary	0.247	(0.1692)	0.213	(0.1735)
Completed primary	-0.081	(0.1014)	-0.060	(0.1018)
Some secondary	0.286	(0.1764)	0.244	(0.1805)
Completed secondary	0.490*	(0.2008)	0.448*	(0.2039)
Post secondary	0.401*	(0.1765)	0.370*	(0.1804)
Head's employment sector (<i>rf: not working and mining</i>)				
Crop farming	0.038	(0.0793)	0.036	(0.0796)
Non-crop farming	0.008	(0.1605)	0.001	(0.1650)
Manufacturing/construction	0.041	(0.1033)	0.036	(0.1022)
Trade	0.227*	(0.1010)	0.227*	(0.1019)
Transport & communication	0.354*	(0.1314)	0.342*	(0.1350)
Government services	0.112	(0.0931)	0.118	(0.0935)
Other services	0.107	(0.1348)	0.104	(0.1363)
Members education Attainment (<i>rf: less than primary</i>)				
No. of males who completed primary only	0.069	(0.0630)	0.071	(0.0633)
No. of female who completed primary only	-0.039	(0.0511)	-0.042	(0.0514)
No. of males with post-primary	0.020	(0.0407)	0.026	(0.0403)
No. of females with post-primary	0.068	(0.0420)	0.064	(0.0423)
Economic Activity (<i>rf: not working</i>)				
No. of adult male who work	0.027	(0.0376)	0.025	(0.0375)
No. of adult female who work	0.036	(0.0329)	0.034	(0.0330)
No. of male children who work	-0.002	(0.0243)	0.000	(0.0248)
No. of female children who work	-0.010	(0.0223)	-0.008	(0.0228)
No. of adult male who work in 1992/93	-0.026	(0.0397)	-0.018	(0.0397)
No. of adult female who work in 1992/93	-0.020	(0.0253)	-0.023	(0.0253)
No. of male children who work in 1992/93	-0.002	(0.0366)	-0.001	(0.0372)
No. of female children who work in 1992/93	-0.014	(0.0326)	-0.016	(0.0326)
Geographical Location (<i>rf: Central region</i>)				
East	-0.248**	(0.0460)	-0.248**	(0.0461)
North	-0.766***	(0.0644)	-0.760***	(0.0646)
West	-0.111*	(0.0435)	-0.106*	(0.0433)
Rural	0.105*	(0.0548)	0.114*	(0.0547)
Previous measure of welfare				
Log food consumption expenditure in 1992/93	0.157**	(0.0270)	0.155**	(0.0269)
Intercept	9.087***	(0.3716)	9.114***	(0.3765)
R-squared	0.4613		0.4582	
F (42, 932)	19.72		19.43	
Treated households	417		502	
Number of Observations	975		975	

(i) Robust standard errors are in parentheses: *** significance at 1%, ** significance at 5%, * significance at 10%;
(ii) independent variables are for UNHS 1999/00, unless stated otherwise; (iii) *rf*: represents the base line group;
and (iv) specification tests cannot reject the RESET's null hypothesis of no omitted variable for this model, i.e.;
Ramsey RESET test using powers of the fitted values of log real mean food consumption expenditure (per
effective adult equivalent) 1999/00

Ho: model has no omitted variables

F (3, 929) = 1.20; Prob > F = 0.3100 &

F (3, 929) = 1.19; Prob > F = 0.3135, respectively.

In these regressions, a household that experienced a childbearing event in 1992/93 has real monthly food consumption per effective adult equivalent that is 11.2 percent lower compared to those that did not. This result is comparable to that from Model 1 (Table 4.4): the real monthly food consumption for the average household is 10.5 percent lower. For the period 1992/93 to 1995 it is 9.9 percent lower compared to no-

childbearing household, though not much can be inferred since the coefficient is not statistically significant.

There are few aspects that are worth noting from the two sets of models. First, the coefficients of younger children - aged 5 to 7 and below 5 - are fairly statistically significant in the adjusted regressions, whereas they are not in the unadjusted ones. This is due to the adjustments for the economies of scale in consumption and household composition, based on the adult equivalent scales. Thus, all else equal, an individual in a household with children in these age groups should have a higher food consumption level. Note, however, this adjustment is problematic since a newborn adds to the denominator, counted in number of household members, without adding to the numerator, food expenditure. A baby does not contribute to household resources. Therefore, since it is clear that a child birth mechanically reduces food consumption expenditure, the coefficient of a birth shock and number of children is uninformative, making the adjusted results uninteresting.

It is important to bear in mind that the validity of the inference drawn from the multivariate regression models (Models 1 to 5) might be questionable. In fact, Francavilla and Mattei (2006) have argued that the regression results could be driven by the specific way of extrapolating outcome values from regression models. For related literature, see also (Rubin 1997; Dehejia and Wahba 1999; Van de Walle and Mu 2007), for example. These authors have argued that the result relies on the correct specification of the functional form in particular the linearity relationship between the welfare outcome and the covariates. They also argue that the assumptions in such models are very strong. Therefore, in spite of the fact that the empirical functional form specifications particularly in Models 1 and 2 do not suffer from endogeneity bias, it is important that another approach usually used for counterfactual inferences is explored.

As already discussed in the previous section of analytical framework, the bias-corrected matching method is one of the approaches that depend on relaxed model assumptions. In particular, the bias-corrected matching method yields a nearest-neighbour matching estimator called the Sample Average Treatment effect for the

Treated households. That is what the next part will try to implement, this time using strictly exogenous treatments (1992/93 and 1992/93-1995) only.

4.4.3 Sample Average Treatment effect for the Treated (SATT) with Bias Adjustment

From this approach, an assessment of the causal effect of childbearing on the household real monthly food consumption expenditure can be conducted provided that the unconfoundedness and balancing properties are met. Indeed, the strength of the bias-corrected matching estimator is that, it allows one to improve the balancing in the covariates after matching, and also to achieve efficiency and robustness requirements. As in the previous subsection, the 1992/93 and 1992/93-1995 indicators of a childbearing event are used as a treatment variable, respectively. The 1999/00 household's real food consumption expenditure per month is the welfare measure. The choice of the periods ensures that the assignment to treatment F is orthogonal to welfare outcomes $\{W(0), (W(1)|X)\}$, given the covariates in matched group. This additional condition is an important one; for it means that, the probability of assignment will be bounded away from zero and one. It may also be recalled that, the dimension of X will have a crucial role to play in the properties of the paper's matching estimator. Thus emphasis is placed on having sufficient observations for the control groups to be used as a match. Furthermore, the distribution of the smoothing parameter $K_M(i)$, is very important in analysis. Hence, with both the treated and control units matched, these units are to be used as matches more than once.

To achieve this, 20 covariates are used; of which 13 are continuous and seven discrete. Since the majority of covariates that are used have continuous distributions, their number does not affect the result from the analysis. By using more continuously distributed covariates; the possibility of having any tie is very remote. Besides, few discrete covariates are included. These are dealt with by bias-adjustment and exact matching procedures in line with Abadie and Imbens (2002); the bias-corrected matching estimator adjusts the difference within matches for the differences in their covariate values. Therefore, bias-adjustment is based on the estimate of the

regression function for the controls only: $\mu_0(x) = E\{W(f) | X = x\}$ for $f = 0$, equation (4.9) above. For emphasis, it is worth stating the estimator as:

$$\hat{\tau}_M^{bcm,t} = \frac{1}{N_T} \sum_{i:F_i=1} \{W_i - \tilde{W}_i(0)\}$$

This is implemented by using the *nnmatch* module, with number of times each unit is used as a match *m*(#) and bias-adjustment option *bias*(*bias*) at the end of the command. The paper estimates the SATT for the special case with homoskedastic residuals, for stated number of continuous and scalar covariates that have been matched. Table 4.8 below shows the average differences, and their standard deviations, within the matched pairs derived from the bias-corrected matching model for the 1992/93 treatment.

Table 4.8: Mean Covariate Differences (Diff) in Matched Groups (the treatment is for 1992/93)

Covariates	Match = 1		Matches = 2		Matches = 4		Matches = 16	
	Diff	(St. D)	Diff	(St. D)	Diff	(St. D)	Diff	(St. D)
Head's age	-22.31	(29.01)	-13.31	(18.63)	-16.13	(18.07)	-18.31	(21.97)
Head's education	2.34	(3.089)	1.09	(1.635)	1.23	(1.796)	1.98	(1.822)
Head is married*	7.94	(12.704)	0.01	(0.015)	0.04	(0.064)	2.04	(3.264)
Head is female*	-3.87	(6.193)	0.03	(0.048)	0.73	(1.168)	-4.29	(6.864)
Head's sector is crop farming*	0.29	(0.321)	0.05	(0.083)	0.18	(0.193)	0.21	(0.265)
No. of males who completed primary	-2.09	(2.436)	1.02	(1.734)	-1.62	(2.462)	-1.69	(1.504)
No. of female who completed primary	3.06	(3.810)	1.25	(1.875)	1.67	(2.004)	1.84	(1.778)
No. of males with post-primary	-8.79	(9.318)	-3.01	(3.913)	-5.04	(6.653)	-5.29	(4.602)
No. of females with post-primary	-2.36	(2.920)	-1.04	(1.695)	-1.59	(1.907)	-1.61	(1.481)
No. of adult male who work	9.67	(8.209)	4.62	(6.468)	6.76	(9.464)	6.95	(6.880)
No. of adult female who work	2.34	(2.511)	1.08	(1.404)	1.38	(1.932)	1.89	(1.985)
No. of male children who work	4.93	(5.478)	2.67	(3.041)	3.02	(3.624)	3.27	(3.917)
No. of female children who work	3.35	(3.922)	1.05	(1.543)	1.98	(2.218)	2.04	(2.448)
Log food consumption expenditure in 1992/93	19.91	(20.874)	10.03	(12.036)	12.18	(17.052)	12.23	(17.048)
Log household size	21.83	(21.258)	12.75	(13.050)	12.87	(12.931)	13.25	(13.663)
Proportion of children	16.09	(24.135)	15.47	(20.111)	15.86	(17.763)	16.23	(14.591)
Residence**								
Rural	-0.57	(0.912)	0.07	(0.098)	-0.19	(0.029)	-1.48	(2.220)
East	0.08	(0.120)	0.01	(0.015)	0.04	(0.064)	0.12	(0.180)
North	-0.01	(0.014)	0.01	(0.017)	0.03	(0.042)	0.01	(0.016)
West	0.02	(0.025)	0.01	(0.014)	0.01	(0.014)	-0.02	(0.024)

(i) ** denotes discrete covariates where exact matching has been specified in the model; (ii) * denotes discrete covariates, where bias adjustment is specified: every childbearing household head is matched to that one with the same marital status (married), female headed household and sector of employment with non-childbearing household head during 1992/93.

Table 4.8 is particularly helpful in explaining how well this approach performs in terms of balancing the covariates. For brevity, it reports the averages for Matches 1, 2, 4 and 16; from which an appropriate smoothing parameter, i.e., number of matches that produces an efficient estimator of SATT, is chosen. The respective pair of columns reports the within matched-pairs average differences and the standard deviation of this within-pair difference for given number of matches, or the smoothing parameter.

By comparing these with the standardized differences before matching, one can see that bias-corrected matching reduces the bias of covariates. In fact, before matching (see in earlier Table 4.3), the means for a majority of the variables are more than their standard deviation. Indeed, it is clear to see the important role that the smoothing parameter, number of matched, plays in terms of efficiency properties. By comparing units with similar values of the covariates and the bias reduction from the regression, this bias-adjustment estimator combines substantial bias reductions from the matching.

Turning to the estimates of the causal effect of childbearing, Table 4.9 reports results for the bias-adjusted regression estimator with different number of matches. All covariates are entered linearly. The number of matches considered are 1, 2, 4, 8, (Panel 1, for matched covariates reported in table 4.9 and are of multiple two), and 3, 9 and 27 (Panel 2). The result for M= 16, the square of four, is also reported at the end of Panel 2. Apart from M= 16, panel 2 gives the results for matches in multiples of three whose summary statistics for these are not reported here.

Table 4.9: Estimates of Average Treatment Effect for the Treated Subpopulation in 1992/93

Panel 1: No. of Matches (M)	M=1	M = 2	M = 4	M= 8
SATT (Coef.)	-0.127(0.0477)	-0.095 (0.0446)	-0.078 (0.0419)	-0.063 (0.0404)
z-statistic	-2.65	-2.12	-1.86	-1.57
Panel 2: Other matches	M= 3	M= 9	M= 27	M=16
SATT (Coef.)	-0.071 (0.0431)	-0.063 (0.0399)	-0.078 (0.0389)	-0.079 (0.0395)
z-statistic	-1.65	-1.57	-2.01	-2.00

Figures in parenthesis are bias-adjusted standard errors.

Table 4.9 indicates that the estimated SATT is negative for all the matches. The estimated SATT ranges from -0.063 (std error = 0.0399) to -0.095 (std error = 0.0446). The treatment therefore had a negative effect on its participants. This means that in terms of real food consumption for the two groups, there is a reduction for childbearing households compared with the estimated counterfactual for matched no-childbearing households. The statistical significance is different for different number of matches. Some of them are not statistically significant at 5% level. Although all the set of matches reported produce an unbiased and a consistent estimator, only one of the matches yields the estimator that is efficient. It is therefore important to identify correctly which specific number of matches can lead to this result. This is done by normalizing all the covariates to have zero mean and unit variance. The normalised covariates weighted by the identity matrix are given in Table 4.10.

Table 4.10: Mean Covariate Differences in Matched Groups: all the covariates are normalised

Covariates	Match = 1		Matches = 2		Matches = 4		Matches = 16	
	Diff	(St. D)	Diff	(St. D)	Diff	(St. D)	Diff	(St. D)
Head's age	-0.25	(0.325)	-0.15	(0.210)	-0.18	(0.202)	-0.21	(0.252)
Head's education	0.25	(0.330)	0.11	(0.165)	0.13	(0.190)	0.21	(0.193)
Head is married**	0.12	(0.192)	0.00	(0.000)	0.00	(0.000)	0.03	(0.048)
Head is female**	-0.07	(0.112)	0.00	(0.000)	0.01	(0.016)	-0.08	(0.128)
Head's sector is crop farming*	0.45	(0.498)	0.08	(0.133)	0.28	(0.300)	0.33	(0.416)
No. of males who completed primary	-0.67	(0.781)	0.33	(0.340)	-0.52	(0.486)	-0.54	(0.294)
No. of female who completed primary	0.52	(0.647)	0.21	(0.315)	0.28	(0.336)	0.31	(0.300)
No. of males with post-primary	-0.45	(0.477)	-0.15	(0.195)	-0.26	(0.343)	-0.27	(0.235)
No. of females with post-primary	-0.59	(0.730)	-0.26	(0.424)	-0.40	(0.480)	-0.40	(0.368)
No. of adult male who work	0.57	(0.484)	0.27	(0.378)	0.40	(0.560)	0.41	(0.406)
No. of adult female who work	0.48	(0.515)	0.22	(0.286)	0.28	(0.392)	0.39	(0.410)
No. of male children who work	0.53	(0.589)	0.29	(0.426)	0.32	(0.384)	0.35	(0.419)
No. of female children who work	0.38	(0.445)	0.12	(0.176)	0.22	(0.246)	0.23	(0.276)
Log food consumption expenditure in 1992/93	0.79	(0.828)	0.40	(0.480)	0.49	(0.686)	0.49	(0.683)
Log household size	0.27	(0.263)	0.16	(0.164)	0.16	(0.161)	0.17	(0.175)
Proportion of children	0.14	(0.175)	0.13	(0.169)	0.13	(0.146)	0.14	(0.126)
Residence**								
Rural	-0.03	(0.042)	0.00	(0.000)	-0.01	(0.017)	-0.08	(0.078)
East	0.02	(0.032)	0.00	(0.000)	0.01	(0.015)	0.03	(0.054)
North	-0.01	(0.009)	0.00	(0.000)	0.03	(0.024)	0.01	(0.028)
West	0.01	(0.018)	0.00	(0.000)	0.00	(0.000)	-0.01	(0.010)

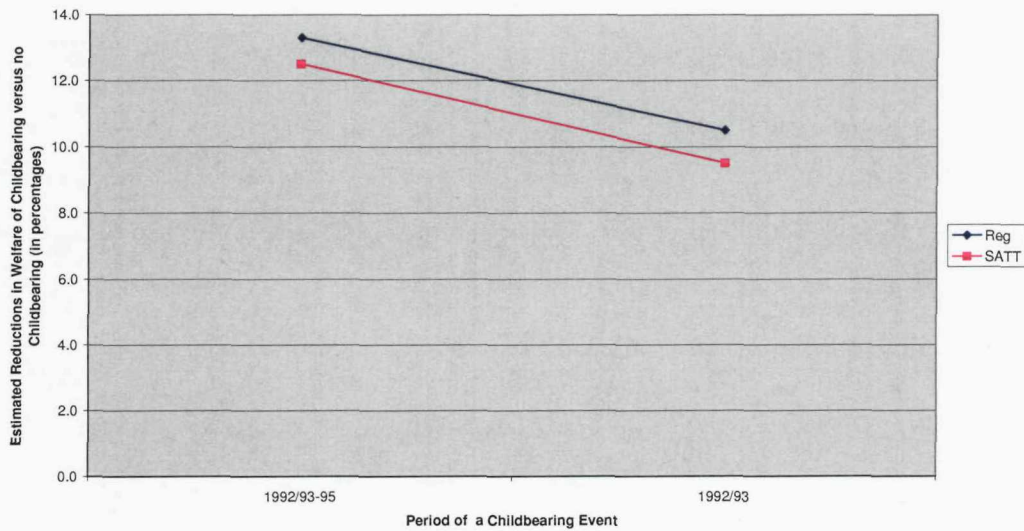
(i) ** denotes discrete covariates where exact matching has been obtained with two matches; (ii) * shows a discrete covariate namely; head is in crop farming; though not matched exactly, the quality is extremely good when one gets to two matches.

Notice that in Table 4.10, the form of the variance being analysed is the case with homoskedastic residuals and seven scalar covariates. This makes it possible to tell the appropriate number of matches that produce the efficient estimator. Most importantly, this Table demonstrates that the bias-corrected matching performs extremely well in balancing the covariates. In most cases, the average difference is much smaller than the standard deviation. The results from a single match are not exact, and there is less efficiency gain from using it compared with two or more matches (Abadie and Imbens 2002). In fact, according to Abadie and Imbens (2002), the variance of $K_M(i)/M$, converges to zero and the estimator becomes efficient as the number of matches increases up to some point. When the number of matches gets to 2, exact matching is obtained for all of the indicator variables, with the exception of only one, namely head in crop farming. Even then, the quality of the match for this indicator appears very high. In addition, though not exactly matched those of the continuous variables are of a very high quality at $M = 2$. However, the quality declines as the number of matches increases beyond two for the continuously distributed covariates. In fact, the same can be said of discrete variables: matching is no longer exact after two as was at $M = 1$. Therefore, it can be concluded that the sufficient smoothness is achieved from two matches. This is where the estimator is efficient. Hence, the number of matches used in deriving the bias-corrected matching estimator for this treatment period is two.

Therefore, the size of the estimated Sample Average Treatment effect of the Treated (SATT) for 1992/93 is equal to -0.095 (std error = 0.0446). This is slightly lower than the size of the coefficient estimated from the multivariate regression Model 1, -0.105 (std error = 0.0392), in Table 4.4 above. The estimated SATT is also lower than the regression coefficient in the other model for the treatment period of 1992/93-1995. The coefficient from the regression coefficient is equal to -0.133 (std error = 0.0684) and of the SATT is -0.125 (std error = 0.0483), achieved after three matches ($M = 3$). In both cases, the coefficients for the estimated SATT are also statistically significant at 5% level.

Figure 1 presents a comparison of the results from the two: the multivariate regression versus the bias-corrected matching approaches.

Fig 4.1: Multiple Regression Vs Bias-corrected Matching methods: Reference is no-childbearing Households



It is worthy to note from this figure that the two sets of points are close and the SATT is always lower than the multivariate regression estimates. The lines are parallel to each other. This implies that for treatment periods of 1992/93 to 1995 and 1992/93, the estimates are precise. The households with children below the age of nine have food consumption outcomes that range from approximately 10 to 13 percent lower than the counterfactual situation of no-childbearing households. As discussed earlier, however, the limitation of the paper's bias-adjustment estimator is that the key assumption of strong ignorability has not been satisfied. A nonparametric series estimator for the two regression functions in expression (4.8) with $K(N)$ terms in the series, where $K(N)$ increases with N would be yield more consistent estimates. The advantage of a nonparametric estimation is that it does not rely on the correct specification of functional form and the ignorability assumption. Further research will consider implementing a nonparametric estimation to help explain the causal relationship between childbearing and welfare.

4.5 Conclusion

This chapter provides evidence on the causal effect of fertility on average welfare in a panel of 1296 households from Uganda household surveys conducted in 1992/93 and 1999/00. The paper used the event of a household experiencing childbearing in 1992/93 as the treatment of interest, and real food consumption expenditure for

1999/00 as welfare outcome, from panel household data for Uganda. This was in a bid to address possible endogeneity bias due to joint determination and unobservable aspects inherent in earlier studies.

In addition to the multivariate regression framework of the household model structure that is not restricted to a perfect market case, the bias-corrected matching estimator was also estimated using the same data. The results largely confirm the theory from the average treatment effects literature, that a bias-adjustment removes the asymptotic bias that might have remained in the regression model. However, there is much similarity between the results from the two approaches. The estimated sample average treatment effect of the treated (SATT) is equal to -0.095 for the 1992/93 treatment periods, while the size of the coefficient estimated from the multivariate regression model for average household is -0.105 for the 1992/93 treatment period. During the treatment period of 1992/93 to 1995 they are -0.125 and -0.133, respectively.

Clearly, the use of panel data from household surveys has its drawbacks: available panel data for less developed countries are not only few but less comprehensive than those based on Demographic and Health Surveys, or indeed than other similar panels available for developed countries. Demographic and Health Surveys normally contain good information on marriage, fertility histories, death of infants and contraceptive use but have little information to assess poverty. Even if poverty-related data were available, the dynamic aspects of wellbeing and fertility cannot be derived from these Demographic and Health Surveys, as they are available only in cross-sectional form. One other point to note that is common while working with panel household surveys is the issue of attrition. This comes from the fact that most panels are not randomly selected. As earlier discussed, the panel used in this paper is generated from cross-sectional surveys which were randomly selected, leaving very little possibility of losing any household. Having said that, however, in spite of their drawbacks, the use of panel data from Uganda household surveys fills an important gap in this literature, and this study should be seen as a first step until more, comprehensive and longer panels for these countries become available.

In general, it may be concluded that childbearing lowers a household's wellbeing. In fact, the reduction is greater for a household having many younger children, as is shown for the 1996-1999/00 and 1992/93-1999/00 periods when there are many under fives. In a country like Uganda where the share of children below 15 is over 52% of the total population, the prospects are really bleak. Therefore, the finding in this paper implies that demographic developments can lead to changes in economic wellbeing. In particular, a higher fertility rate is associated with lower household wellbeing, and hence, in part, is responsible for the persistence of extreme poverty in LDCs, and Uganda in particular.

The results of this study differ from the findings in studies such as Francavilla and Mattei (2006). Whereas this paper found that childbearing leads to a negative effect on economic wellbeing, that study reported that there is a positive effect - though both papers find the effect not very significant. It may be that the direction of effect in the Albanian study is most likely driven by the endogenous process between their welfare measure and childbearing, an aspect that the present paper has ably addressed.

Chapter 5

5 Summary of Thesis, Discussion and Policy Recommendations

5.1 Summary

This thesis presents three essays on aspects of economic wellbeing for a typical less developed country over the last one and a half decades. The first essay evaluated the contribution of growth to the changes in absolute poverty in Uganda. It makes use of changes in survey monthly real mean consumption (per adult equivalent) as a measure of growth using data drawn from four cross-sectional micro-level data namely, the 1992/93 Uganda Integrated Household Survey (1992/93UIHS), the 1997 Monitoring Survey (1997 MS-4), and the Uganda National Household Surveys for 1999/00 and 2002/03 (UNHS1 and UNHS2, respectively). The main approach employed is that of the decomposition of poverty changes into the growth and the redistribution components following Datt and Ravallion (1992) and Datt (1998).

Focussing on the main sources of changes in absolute poverty, it was found that: (a) a high growth of mean consumption, (b) a consistent poverty-reducing pattern of growth in relative consumption (consumption inequality), and (c) other aspects that can directly reduce poverty captured in the residual term are all important. This was also confirmed from the OLS regression analysis that was conducted on the small areas (county-level) estimates.

These findings are largely consistent with the theoretical contributions in Bruno, Ravallion and Squire (1998), Agenor (2002), to mention just a few. These studies argued that although growth is important for absolute poverty reduction it cannot alone be sufficient. There are other important sources of changes in absolute poverty that complement growth. The implication, therefore, is that even when there are growth-enhancing policies in place, there is a possibility that worsening consumption inequality and other negative shocks peculiar to each country that leave the majority out could increase extreme poverty. Since there is no guarantee, therefore, that only positive changes in the survey mean consumption will be accompanied by a reduction in extreme poverty, the pro-poor policies, investments and enduring institutions must

be incorporated in a holistic way, constantly keeping a close eye on all of them. According to Sachs (2005), public policies and programmes have to ensure: higher physical and human capital stock, greater division of labour and specialisation, more advanced technology and technology diffusion, and lower fertility.

The second essay analysed the effect of decentralisation on individual wellbeing in a typical less developed country characterised by mobility constraints, incomplete political markets and information asymmetry. This issue has been brought to the frontier of research in recent times by developments in the decentralised service delivery mechanism of community targeting literature. Although several influential theoretical papers have come up with contradicting opinions on the issue, the empirical literature remains scanty, particularly in a typical less developed country context.

In a recent seminal work by Bardhan and Mookherjee (2000), it is demonstrated that the case for decentralisation will depend on the resulting trade-off between the advantage of decentralised delivery mechanisms to local governments with access to superior information and greater capture of the programmes by the local elites. This argument is in a stark contrast to the standard efficiency advantages theory of decentralisation by Tiebout (1956) and later by Breton (1996). Therefore, there remains a controversy since it appears that the result depends on the particularities of each country. It is, indeed, an empirical issue as to whether decentralisation is a useful institutional reform to reduce absolute poverty especially in the less developed countries.

This essay, therefore, examined the evidence for Uganda. The essay made use of a household model structure with incomplete markets; incorporating the hypothesis of political struggles predicted to stem from ethnic fractionalisation. In particular, it considered the degree of local capture using important indicator variables of access to information, political connection, ethnicity and district fragmentation in the specified periods. Tests were based on cross-sectional household surveys data covering the pre-decentralisation period (1992) and the post-decentralisation periods (1999/00 and 2002/03). The results from econometric analyses showed that, holding other factors constant, an individual who accesses public information from the local leaders is most

likely to have lower real food consumption compared to the one who does not. The disparity becomes worse in the post-decentralisation period. It also found compelling evidence that individual's real food consumption is positively related to ethnic diversity. A person residing in a more ethnically diverse jurisdiction has a higher real food consumption outcome compared to the one in a more or complete homogeneous jurisdiction, *ceteris paribus*.

These findings are consistent with the theoretical contribution in Bardhan and Mookherjee (2000) and indeed, with the theory of elite capture and interest group cohesiveness. The decentralised delivery mechanism was compromised by greater local capture, thereby exacerbating absolute poverty in the immediate post-decentralisation period in Uganda. And, therefore, there is no strong efficiency argument for decentralisation in a country where there are persistent incomplete political markets exacerbated by information capture by local elites. Hence, the implication is that a decentralised delivery mechanism must be accompanied by voter empowerment through informational enlightenment (Besley and Prat 2005). The other implication is that rather than fragmenting districts into smaller new ones because of ethnic reasons, the decentralisation models must incorporate the possibility of ethnic diversity as a way to facilitate checks and balances for greater accountability and value for money. The practice of fragmenting districts on ethnic groups, therefore, defeats the purpose of decentralisation.

As described in the Appendix 3A, it would appear that the appeal for a multiparty political system became particularly an important factor behind the decentralisation reform. And once district fragmentation was legitimised within the framework of decentralisation by President Y. K. Museveni, the NRA/M government found it easier to make use of it as a campaign strategy. The local politicians and elites, not surprisingly, embraced it while the largely uninformed and poorly resourced voters were caught in a grip of irrational exuberance. In every election campaign, demands for districts based on tribal lines have become a routine in the pretext of bringing services nearer to the masses. This has been followed by the creation of smaller sub-optimal districts in the face of poor service delivery owing to the districts running broke. It not surprising that of the 80 districts only 5 (Kampala, Wakiso, Masaka,

Mukono and Bushenyi) have not sought more financial assistance from the central government (The Daily Monitor of May 18, 2008).

The third essay evaluated the causal effect of fertility on household welfare in a panel of 1296 households drawn from the Uganda household survey data for 1992/93 and 1999/00, exploring the Malthusian theory in a dynamic context. In addition to the flexible multivariate regression framework, the paper made use of the Bias-corrected Matching Estimator (Abadie and Imbens 2002) to estimate the Sample Average Treatment effect for Treated (childbearing) households; correcting for selection and potential endogeneity biases that was hitherto not addressed in the empirical literature. The estimates largely confirm the theory from the average treatment effects literature, that a bias-adjustment removes the asymptotic bias that might have remained in the regression model.

In particular, the results from the Bias-corrected Matching method showed that the treatment had a negative effect on its participants: Households that experienced a childbearing event were found to have a lower real food consumption compared to the households that did not. The multivariate regressions produce similar results, and in fact the magnitudes are close. These findings are largely consistent with the Malthusian and neo-classical growth theory. Thus, demographic developments and particularly high fertility rates can lower economic wellbeing, and are therefore partly responsible for the persistence of extreme poverty in Uganda and other LDCs with similar fertility trends.

The main conclusion from the three essays is that a substantial reduction in extreme poverty in Uganda, and indeed in the Sub-Saharan Africa, does not only depend on growth (through stabilization policies) but also on other important factors. These are good enduring institutions that ensure stronger accountability, voter enlightenment resulting from both civic and formal mass education, and a fall in the fertility rates as well as other variables that can ensure sustained higher long run growth. Such variables would include pro-poor policies like redistribution, supportive physical and social infrastructure, among others.

5.2 Discussion and Policy Recommendations

Notwithstanding the vast literature that has already accumulated, explaining aspects of economic wellbeing in Sub-Saharan Africa continues to attract empirical interest. It is, indeed, a crucial matter for a Sub-Region in which many people continue living in extreme poverty compared to other regions in the developing world.

In this subsection, an attempt is made to provide a discussion on which measures could help to bring about substantial reduction in extreme poverty across the Sub-Region. The analysis shows that a strong growth backed by sound redistributive policies remains a key factor for absolute poverty reduction. For these countries to achieve strong economic growth, it is important that the crucial variables that push the economy from one steady state to another ranging from higher savings and investment, technological change (or any other stimuli to growth) and industrialisation to falling fertility rates are brought to bear. The latter argument, of a fall in fertility rates, is supported by evidence from the third essay.

Therefore, in addition to ensuring sustained macroeconomic stability and growth (an aspect that appears to have made a considerable dent on absolute poverty in Uganda over the period 1990-1997), these countries would have to redirect their efforts towards reducing economic inequality through redistributive policies. These would include reforming the current land tenure systems and cooperatives as well as establishing commodity exchange. In the long-run, these initiatives would create a big number of modern farmers who participate more into the determination of the prices of their produces. Fostering and promoting adequate institutional growth to redistribute income through improved social welfare payments to the workers, and better provision of public goods and services to the population could reduce inequality also.

In terms of other policy frameworks and institutional reforms, the existing initiatives have the potential to make a substantial dent on absolute poverty, provided their implementation is properly financed and managed well. These include; the Poverty Reduction Strategy Papers (PRSPs), the Millennium Development Goals (MDGs), the New Partnership for Africa's Development (NEPAD), the Economic Partnership

Agreements (EPAs) with European Union, the African Growth and Opportunity Act (AGOA) and subsequently, the AGOA Acceleration Action 2004, and several regional integration arrangements, among others.

For Uganda's case, the decentralised service delivery mechanism of community targeting within the overall Poverty Eradication Action Plan (PEAP) framework has all it takes to help fight extreme poverty. But as the analysis from the second essay showed, this objective was largely compromised by greater local capture of public information, and hence of the antipoverty programmes. The matter is made worse by the current fragmentation of districts into smaller units that have to run established administrative and political structures but with no revenue base to finance the activities. This fragmentation that is exacerbated by interest groups' pressures especially since the late 1990s wiped out the growth gains.

One explanation of this is that the effect of decentralisation on individual wellbeing is amplified by its consequence on local capture and the diluting effect local capture has on service delivery. Indeed, in the extreme greater local capture results in lower individual wellbeing. With many individuals (voters) having no access to public information owing to informational capture by local elites, in fear of being monitored and consequently being held accountable, decentralisation would exacerbate extreme poverty. This being the case, therefore, it calls for informational enlightenment to empower those for whom the programmes are meant. This area needs to be looked at very carefully as it is an important ingredient for fighting both political and economic corruption. Concerning the creation of new districts, it is now-known that decentralisation should be preferred when tastes are heterogeneous. The fragmentation based on ethnicity means that there will be ethnic homogeneity, which would in turn deprive the affected areas of the advantages associated with costs of interest group cohesiveness. To the extent that ethnic homogeneity is associated with a number of constraints to technical progress, and to the extent that it is also associated with the political agency problems fostering greater capture of the antipoverty programmes by local elites, demarcating districts along tribal lines could exacerbate absolute poverty.

In addition, while there may be differences in preferences within sub-national governments in Uganda stemming from differences in tribal languages and culture, the lack of mobility prevents Ugandans from sorting themselves along the level and composition of public goods and services. Because of this, the median-voter preferences for public goods across sub-national governments are similar. Thus, this aspect also invalidates the efficiency advantages argument for decentralisation. Instead, decentralisation might occur because of political demands related to differences in ethnic identity as well as local capture incentives. It is reasonable to propose that this happened partly due to the fact that the political competition in Uganda is not grounded on policy platforms for competing candidates, and also the high level of voter ignorance. This is also true in the other countries in the Sub-Region where there are incomplete political markets and information asymmetry.

These agency problems and other market failures, coupled with low investment in their education, drive the poor households to choose high fertility rates with low investment in their offspring's education and, therefore, low real food consumption would persist in the future generations. This is consistent with the now well-known theory of fertility described in chapter 4. The non-convexities in reproduction technology prevent investment by the poor households, leading to decreased education and increased fertility rates and reduced food consumption generating the persistence of absolute poverty in these households. There is evidence that public education (schooling) would shift the poor dynasties to a path of prosperity, provided the diluting effect of stronger local capture is eliminated.

Moreover, it is well-known that the economic power driving the fertility gap between the rich and the poor is the lower quantity cost faced by the poor (Moav, 2005). There are indirect (opportunity) costs that are measured by the amount of income forgone in the process of bringing up the child: time spent at home with the child means time not spent earning income. But in the Sub-region most women do not work in paid employment and thus this opportunity cost is low, and fertility rates tend to be high.

In light of the analysis in this thesis and the foregoing discussion, it is reasonable to give the following policy and institutional recommendations:

- (a) Reducing consumption inequality is important for reduction of extreme poverty. Majority of the poor population in Uganda are found in subsistence agriculture, most of whom lack security of tenure. Boosting agricultural production and access to markets for their produce is crucial. The major stimuli to agricultural development are secure land tenure systems, vibrant agricultural extension services and micro-credit facilities targeting the rural subsistence farmers. Since the mid-1990s, the Government of Uganda has tried to dispense these key aspects, the last two on an individual basis. First, there is the need to put in place more flexible agricultural extension services that can respond to current technologies, by a selective state policy that combines incentives and stringent sanctions. Second, in the current form, the micro-credit facility appears to have failed partly because: (1) peasants lack security of tenure, and thus lack incentives to invest on land; (2) of absence of key social institutions such as robust farmers cooperative societies, which existed before but were subdued due to lack of internal democracy and accountability problems in the late 1980, among others. Therefore, as discussed above, the need for a wide-ranging land reform is as important as re-engineering of archaic structures that are blocking the development of peasant productivity. In this regard, cooperative unions must be revived in a manner that is responsive to current conditions, based on the history of economic development in South Korea.
- (b) The findings about the effect of decentralisation imply that community targeting mechanisms could have a significant effect, the extent depending on the degree of capture of the antipoverty programmes by local elites. The need for central government actions to ensure greater accountability, without sacrificing the real principles of decentralisation is paramount. In designing and implementing decentralisation programmes, therefore, every effort must be made by the central government to intensify its supervisory role, strengthen the anti-corruption agencies, and also to appoint bureaucrats on contract terms to the respective sub-national jurisdictions – based on the French model of “prefectures” - rather than depending on elected leaders only.

- (c) The present model of publishing central government transfers in the media has a great potential to deter capture, corruption and exploitation of local governance in Uganda and indeed, in the Sub-Region. Under the current arrangement, however, the non-elite uninformed (poor) cannot access that vital information and the impact is far too little. There is a need for stronger involvement by the civil society organisations and other private actors in partnership with the central government, private-public partnerships, to help increase poor individuals' awareness about the antipoverty programmes. In particular, the partnership should ensure coherent strategic planning, capacity development and also develop a monitoring and evaluation (M&E) system, setting comprehensive processes and performances indicators built around the decentralisation model in Denmark. In so doing, the poor individuals would have sufficient knowledge concerning public funding on antipoverty programmes to which they are entitled; the local governments would be better equipped for the challenges of decentralisation; and all the stakeholders, public and private officials would own to the service delivery mechanism, making them accountable. This could go along way in counteracting stronger local capture tendencies observed in Uganda.
- (d) The practice of creating small districts based on political expedience need to be revisited, not only on the grounds of economic efficiency but, most importantly, on the opportunity cost forgone in homogenising ethnicity also. The non-convexities in ethnic homogeneity and interest group cohesiveness and greater local capture, depriving society of inherent checks and balances that arise from inter-ethnic competition have been well explained in the literature. There are positive effects of ethnic cleavages on democratic outcomes and technological changes, and on hence wellbeing in general. The following policy actions need to be explored: first, as already discussed the poor households need be empowered through mass civic education; second, there should be wide-ranging democratic reforms ensuring regular free and fair elections at the local government levels so that voters are able to hold politicians accountable, rather than fragmenting districts along the boundaries of ethnic groups; and third, the National Planning Authority as an institution with a constitutional mandate to coordinate local governments among others

should vet the creation of new districts based on a set of criteria including viability. For the districts that are found not viable, they might have to be merged with their parent districts regardless of ethnic considerations.

(e) The findings about the effect of fertility suggest that high population pressure could have a negative impact, since it depresses savings and capital accumulation. The diluting effect of fertility on capital per worker amplifying the effect of quality choice on household wellbeing is captured in the theory reviewed in chapter 4 and in appendix 1A. Lowering fertility, therefore, should be a major objective for Uganda and the Sub-Region in general. Long term investments in public education and health, and other social infrastructure are critical in this. The present framework of universal primary and secondary education, as well as health sector reform holds a lot of promise for Uganda, and the entire Sub-Saharan Africa. Unfortunately, funds allocated to these initiatives are so far very little and hence inadequate. To make matters worse, much of this ends up being "captured" by local government officials. First, as in previous recommendations, the central governments together with civil society organisations in countries implementing decentralisation must intensify their efforts in combating local capture tendencies. Second, there needs to be increased funding for public schooling at primary, secondary and vocational levels as well as teacher training. This is an area where the World Bank and the African Development Bank could finance given the weak indirect-consumption tax base in Uganda. These initiatives would greatly enhance human capital development and promote economic progress in general.

(f) Employment creation that particularly promotes equal gender opportunities is crucial for lowering fertility rates. This will require a serious industrialisation drive based on vertical linkages with the agricultural sector, where the majority of women are usually found, and other sectors where the Sub-Region has comparative advantages. Creating jobs with higher labour earnings in this way would increase the quantity cost, decreasing the marginal cost difference faced by the poor women (households) consequently lowering the fertility rates. Here, the public-private sector partnership has a big role to play, again.

(g) There is also robust econometric evidence indicating that cohabiting is inversely correlated with household's real food consumption expenditure. This is consistent with the theory that emphasises the role of individualism and the distribution of power in decision making within households. That theory is based on the premise that observed behaviour reflects each individual's perception of costs and benefits as well as their power in asserting private preferences during the process of household-level negotiations. Public (family) policy aimed at strengthening this type of relationship, perhaps providing alimony rights and obligations to cohabiting couples in Uganda could be critical. These rights upon dissolution would improve women's outside option, strengthening their negotiating positions and deepening their influence over allocation of intra-household resources. Greater decision power of a woman would have a positive impact on hours worked by a female adult as well as investment in the education of girl child, which would in turn lower fertility rates.

5.3 Future Areas of Research

Chapter 3 considered useful broad issues on local capture but does not provide a treatment of sector-specific service delivery. Research on local government efficiency, focusing on the production of public goods and service delivery in crucial sectors like public education and health, water and sanitation and rural roads, would provide more insight into the performance of community targeting programmes. There is also need for a detailed analysis to help identify the exact impact of local capture on agricultural development. In addition, in light of large foreign capital inflows from donors and immigrant remittances, another crucial area for future study is the Dutch disease effect on Ugandan economy which is now likely to be amplified by the current oil and gas discoveries in the country. Lastly, an investigation that considers implementing a nonparametric estimation to augment the understanding of the causal relationship between childbearing and welfare will be undertaken. These aspects are important for extreme poverty reduction and are, therefore, part of my future research agenda.

6 Appendices

Appendix 1A Review of Existing Literature

To place the thesis in context, appendix 1A presents a review of theoretical and empirical literature. The appendix particularly reviews the literature on the issues of growth, decentralisation and local capture as well fertility and long run economic development. It is divided into three sections. Section 6.1 reviews the existing literature on the impact of economic growth on absolute poverty reduction. In section 6.2, the literature on the relationship between decentralisation, local capture and household welfare is presented. Section 6.3 reviews the literature on the effects of fertility on household welfare.

6.1 Economic Growth and Absolute Poverty Reduction

From the 1950s to the early 1970s, an issue in economics literature was about the likely tradeoffs between growth and distribution of income (or consumption). The debate gained much momentum in 1974 when the scholarly work started to focus on aspects of human wellbeing. This particularly sought to identify the re-distributive mechanisms for poverty reduction that would not necessarily hinder economic growth (Chenery, Ahluwalia et al. 1974). Unfortunately however, this was short lived and was reversed in the early 1980s. This followed the presumption that growth itself would be the engine for poverty reduction, via the “trickle-down” mechanisms. As Ravallion and Chen (2003) have argued, the problem with this assumption is that it could be wrong: these mechanisms were not clearly specified, and still remain a mystery particularly within the context of less developed countries (Ravallion and Chen 2003).

There are three strands in the economics literature concerning this issue. The first strand argues that there are large reductions in poverty coming from growth, suggesting that the problem of extreme poverty can be addressed through growth alone. This literature argues that growth raises the incomes of the poor by almost as

much as it raises the incomes of everybody (Chen and Ravallion 1997; Deininger and Squire 1998; Warr 2000; Dollar and Kraay 2002; Krongkaew and Kakwani 2003; Kraay 2005). In particular, Kraay (2005) argues that most of the variation in changes in poverty is due to growth in average incomes. Dollar and Kraay (2002) also earlier argued that growth in incomes of the poor roughly matches growth in average incomes, so much so that the reduction in absolute poverty can be achieved by the growth in average incomes alone.

However, the second strand of literature completely disagrees with this view. It argues that growth alone might not be sufficient for a reduction of extreme poverty (Chenery, Ahluwalia et al. 1974; Bhagwati 1988; Alesina and Perotti 1994; Khan 1997; Timmer 1997; Bruno, Ravallion et al. 1998; Aghion, Caroli et al. 1999; Agenor 2002; Dagdeviren, van de Hoeven et al. 2002; Besley and Burgess 2003; Sachs 2005), emphasising that redistribution and institutional changes are also as important. This literature argues that growth could be poverty-reducing only if the accompanying change in distribution itself reduces extreme poverty, an aspect the stabilisation and structural adjustment policies might have failed to address. The third strand, which is related to the latter, argues that regional differences in inequality and the inequality changes over time also matter (Ahluwalia 1976; Dagdeviren, van de Hoeven et al. 2002; Adam 2004). Thus, these differences could determine the extent of absolute poverty changes that might come from growth.

6.1.1 Growth-induced Poverty Reduction Literature

The growth-induced poverty reduction proponents argue that economic growth (however measured) reduces absolute poverty in the developing world (Warr 2000; Dollar and Kraay 2002; Kraay 2005). These authors regard economic growth in the sense of rising per capita income (per capita GNP) or per capita consumption. In a number of cross-country studies, they find that almost always absolute poverty falls with growth in average incomes and rises with a reduction. Despite the differences in their methodology, Dollar and Kraay (2002) and Kraay (2005) come to more or less similar conclusions. The study by Dollar and Kraay (2002) investigates the determinants of the relative poverty measure by testing the link between the income of the poor and overall income per capita for 80 countries over 40 years. Their

finding is that as overall incomes increase, average incomes of the poor proportionately increase. This implies that the growth in average incomes would translate into growth in incomes of the poor approximately one-for-one.

In a related study, Kraay (2005), using survey data from the same 80 countries, concludes that most of the changes in poverty is attributed to growth in average incomes. This result requires cautious interpretation, however. Although that study adjusts for cross-country differences in the purchasing power parity for the countries in the sample, the surveys use different measures: either household income or consumption. This difference could actually lead to biased and inconsistent estimates. In cases where income and consumption data are both available and used, as Deaton (2003) demonstrates, the growth estimates are generally not close.

6.1.2 Growth with Redistribution Literature

Other cross-country studies, however, find that changes in poverty cannot be attributed to growth alone (Birdsall and Londono 1997; Khan 1997; Bruno, Ravallion et al. 1998; Agenor 2002; Dagdeviren, van de Hoeven et al. 2002; Besley and Burgess 2003). These analysts argue that growth is not neutral, and is always accompanied by worsening income or consumption distribution. In their seminal work, Dagdeviren et al (2002) argue that since a high growth rate could have an opportunity cost in foregone consumption compared to the lower rates, it should be combined with mechanisms of redistribution to achieve substantial reduction in absolute poverty.

Ssewanyana, Okidi, et al. (2004) show that higher income groups in Uganda possessing more income generating assets (productive, human, or both) are in a better position to benefit from increased national income. And, according to the Government of Uganda Poverty Eradication Action Plan 2004/05-2007/08, there was unequal distribution of assets during the late 1990s and the early 2000s owing to the country's privatisation drive (Ministry of Finance 2004). Thus, in spite of strong growth, the worsening inequality could partly account for the drastic rise in absolute poverty in Uganda during that period.

For the Latin American countries, Birdsall and Londono (1997) find that asset inequality does matter for poverty reduction. Birdsall and Londono (1997) argue that unequal distribution of assets, both physical and human capital (education, in particular) has been costly. Therefore, economic growth can be expected to reduce absolute poverty by more if consumption inequality falls than if it does not (Khan 1997; Bruno, Ravallion et al. 1998). Worsening distribution dampens growth effects. Kraay (2005) also agrees when he observes that the distributional component of changes in poverty becomes larger in absolute value the more bottom-sensitive are the poverty measures. To the extent that the bottom-sensitive poverty measures and the squared poverty gap in particular, are very sensitive to distributional changes among the extreme poor, high growth with consumption inequality does not nudge the poorest of the poor from abject poverty.

Thus, tackling inequality through equal distribution of assets (human and physical) would contribute to substantial reduction in absolute poverty (Dagdeviren, van de Hoeven et al. 2002; Sachs 2005). According to Dagdeviren et al (2002), the redistribution either of current consumption or of the growth increment of consumption or both, rather than growth alone, is more effective in reducing absolute poverty for a majority of less developed countries.

In addition, the sectoral composition of growth matters also. An increase in demand arising from the sectoral shifts in favour of the poor would result in an increase in consumption (Lipton and Ravallion 1995; Appleton 2001; Dercon 2005). Thus, absolute poverty will fall if the poor people are employed in the sectors that are witnessing growth. Short of this, the chances of the poor benefiting from growth would be very small. The exception would be when there is the real "trickle-down effect". If there are compensatory changes due to high incomes in some sectors spreading through the entire economy, the demands for other goods and services produced by the poor would rise, as happened in India's agricultural sector (Ahluwalia 1978; Lipton and Ravallion 1995; Ravallion and Datt 1996; Datt and Ravallion 1998; Appleton 2001). These authors show that rapid agricultural growth benefited all classes of the poor in the rural India. This is, however, in stark contrast to Uganda's case. The country experienced substantial decline in agricultural production since the late 1990s (Kappel, Lay et al. 2005).

According to Kappel et al. (2005), the decline in agricultural production was due to inadequate agricultural extension and advisory services as well as the budgetary resource constraints in that critical sector. This implies that the overall growth process could have bypassed the poor peasants. It appears that the diminishing land productivity due to population pressures, coupled with adverse selection that resulted into incomplete markets worked against the poor in Uganda (Akerlof 1970).

A critical issue is to assess the contribution of each of the potential sources to changes in absolute poverty, and how these sources might be important for absolute poverty reduction. Applying this logic to cross-country data, Kraay (2005) finds that cross-country differences in the growth component of changes in poverty are overwhelmingly accounted for by cross-country differences in growth itself. He also shows that over the long-run, the redistribution component does not matter for the poverty changes. However, as Ravallion (2001) has argued, there are problems associated with cross-country analysis and cross-country correlations. These issues are briefly discussed in the following subsection, particularly outlining key methodological issues arising from empirical literature. The subsection highlights appropriate methods used in empirical analysis in Chapter 2.

6.1.3 Some Methodological Issues

As discussed in previous chapters, the problems associated with cross-country analysis and cross-country correlations are many. These include issues of parameter heterogeneity, unobserved heterogeneity and outliers as countries in the sample would have different characteristics. In addition, there are diverse impacts amongst the poor which are country-specific that can not be measured from cross-country analyses. This could be the reason why Kraay (2005) finds little changes in poverty due to differences in distribution. For example, Ravallion (2001) argues that cross-country correlations are clouded in data problems and always hide welfare impacts, and that they can be deceptive for development policy.

In addition, the question of using the survey mean consumption and average income or GDP per capita as a measure of growth has remained contentious in respect of accurate and sensitive estimates. Most empirical studies on poverty in less developed

countries have been based on the survey mean consumption as a monetary measure for growth (Datt and Ravallion 1998; Warr 2000; Appleton 2001; Dercon 2005). It is, however, well-known that an increase in current income is associated with an increase in consumption only to the extent that it reflects an increase in permanent income. This is from the permanent-income/life cycle hypothesis. When variation in current income is much greater than the variation in transitory income, almost all differences in current income reflect differences in permanent income; thus consumption rises nearly one-for-one with current income.

For the less developed countries, an appropriate measure is growth of survey mean consumption expenditure (Ravallion 2001). This is because these economies are largely subsistence in nature and also because of serious reporting problems on household income. In addition, household income is not necessarily market-translated. In any case, as Ravallion (2001) points out, if the problem is entirely due to under-reporting of consumption expenditure by the non-poor who are nevertheless correctly weighted in the survey design, then one will still get the poverty measure right. In addition, Ray (1998) argues that the poorer the country the better the consumption based approximation of the poverty line, since this would fulfil some absolute notion of the ability to function in a society.

Adams JR (2004) estimated the growth elasticity of poverty for 60 developing countries using changes in survey mean consumption on one hand and GDP per capita on the other as a measure of growth. Adams' study shows that the growth elasticity of poverty using the survey mean consumption is more significant than that measured by changes in GDP per capita for similar selection of countries. Earlier, Deaton (2003) had compared the survey estimates of consumption per capita with those of the national accounts for 127 countries. That study found significant differences between such sources, the exception being sub-Saharan Africa. Similarly, Ravallion (2001) makes a brief comparison between private consumption expenditure per capita from the national accounts and measures of household living standards based on household surveys. Ravallion particularly shows that the mean from the surveys is consistent with the data used to calculate poverty measures.

Kraay (2005) uses a combination of the survey consumption and income for different countries in his cross-country study. Based on this, the conclusion was that growth alone is sufficient for poverty reduction. Note, however, that the standard errors and confidence intervals, and point estimates are less accurate when different measures of wellbeing are simultaneously used. Thus, a uniform measure of either survey consumption or survey income would provide reliable and consistent estimates.

In particular, the consumption estimates from the surveys appear to be more reliable than those of survey income. There are, however, some problems with survey consumption as a monetary measure. For example, Teal (2005) argues that surveys in less developed countries suffers from a serious limitation of being observed only at the household level, rather than at individual level.

According to Teal (2005) and Appleton (2001), there are intra-household allocations that are often significantly skewed. Among the potential victims are children, women and the elderly. The discrimination grows sharper with the overall level of destitution of the household. This makes it hard to determine what each individual in the household consumes. If the households do not share equally among their members, it is likely that the monetary measure of well-being could wrongly estimate poverty and inequality. However, scaling consumption using the adult equivalents in a household adjusts for the presence of children, to a large extent. This conversion factor expressing the consumption of children as a fraction of a representative adult has thus been applied to the data in section 2.4 (Chapter 2).

Another issue addressed in the thesis are the short-term distributional effects that could have adverse impact on absolute poverty, possibly due to contextual factors not accounted for in Kraay (2005). These required a deeper micro-level based empirical research.

6.2 Decentralisation, Local Capture and Household Welfare

This section reviews the existing literature on the aspects of decentralised service mechanism of community targeting and wellbeing. Subsection 6.2.1 presents a theoretical review on decentralisation and local governance; subsection 6.2.2 reviews

the literature on the relationship between ethnicity and welfare. In subsection 6.2.3, a survey of empirical literature is presented.

6.2.1 Local Government Efficiency versus Local Capture

As highlighted in chapter 3, a number of models, such as; Oates (1972), Rondinelli, McCullough & Johnson (1989), Seabright (1996), and Tiebout (1956) have argued that being closer to people, local authorities can more easily identify people's needs. In their theoretical analyses, these authors argue that the lower levels of government have greater ability to live up to the expectations of the voters, since the local authorities supply the appropriate form and level of public services.

For less developed countries, decentralisation is often packaged together with attempts to minimise state interventions into economic activities. This is related to the literature on mechanism design, pitting policy coordinated by a price mechanism against a system of central commands and plans. According to the World Bank (2000), decentralisation contributes to improvements in accountability and governance of the state as well as to reduced discretion available to the bureaucrats. The fact that under decentralisation people are able to scrutinise local governments more closely than central governments makes the argument very appealing. In addition, Breton (1996) argued that competition between the levels of government will lead to less corruption that would otherwise be present.

Under decentralisation, the responsibility for composition and delivery of public services and identification of local beneficiaries is transferred from the centre to local governments. This shifting of the control from the central bureaucrat to a local government is meant to expand service deliveries, as power goes to those more responsive to the consumer needs. A variety of models has been developed to study the political economy of decentralisation, leading to divergent results and implications for production and provision of public goods and services. On account of the many failures of the centralized state, those who favour decentralisation view it as one way of making governments more responsive and efficient. The current technological changes, they argue, make it much easier than before to provide essential public services relatively efficiently in smaller jurisdictions or market places. In addition,

the models that emphasise inter-jurisdictional competition or direct monitoring of bureaucrats favour decentralisation.

In addition, the pro-decentralisation literature (Tiebout 1956; Oates 1972; Rondinelli, McCullough et al. 1989; Seabright 1996; World Bank 2000; Fisman and Gatti 2002) argues that because of the reduction of large bureaucracies at the centre, the limited public resources are more effectively and efficiently utilized under decentralisation. The services become more responsive to the different needs of different localities; owing to contiguity of service providers to those who need them. The proponents argue that centralisation diminishes accountability. According to them, decentralisation contributes to good governance and lowers corruption for it builds capacities in societies in which various stakeholders attempt to seek solutions that could bring positive outcomes for those concerned.

However, the local capture theory does cast a gloomy picture of decentralisation (Prud'homme 1995; Bardhan and Mookherjee 2000; Tanzi 2000; Tanzi 2000a; Bardhan 2002). This strand of literature takes a negative view of decentralisation particularly on the grounds of rent-seeking behaviour, bureaucratic incompetence and political market failures pertaining in less developed countries. Despite the underlying strength of decentralisation, the critics argue that it is also prone to a number of potential pitfalls. They observe that decentralisation might foster more capture by selfish local elites at the cost of the general population.

Thus, the pessimists argue that decentralisation might instead increase corruption at local level, and thus would not improve accountability. This is due to the fact that there are institutional mechanisms such as civic and non-governmental organisations that can be deployed to strengthen local accountability within the centralised setup. Moreover, the central government can effectively procure local information through appointed local agents. With the negative externalities such as those described in Appendix 1A, see for example Mamdani (1995), decentralization could thwart the benefits from policy coordination and economies of scale in investments.

Political accountability in less developed countries could be affected by the likelihood of corruption and capture by interest groups (Bardhan and Mookherjee 2000; Tanzi

2000; Bardhan 2002; Bardhan and Mookherjee 2002; Besley and Coate 2003). The fundamental argument is that while the local governments might have better local information owing to contiguity and are faced with accountability pressure, they could be more vulnerable to capture by local elites. The lower the level of government, the greater is the extent of capture by vested interests and the less are the poor protected. Thus, the proposition that decentralisation improves accountability might be far-fetched. On the same grounds, Tanzi (2000) argues that local governments are more likely to attract poorly trained officials than the central government, due to incentive problems. Besides, improved accountability goes hand in hand with good governance and democracy, which aspects are lacking in majority of the less developed countries (Bardhan and Mookherjee 2000).

Bardhan & Mookherjee (2000) model characterises electoral competition and governance issues that are largely missing in the less developed countries (LDCs). In the context of the less developed countries, there are problems of political accountability – in terms of allocation of control rights and incomplete contracts, and electoral processes are often flawed. Rather than improving accountability, the local elites might end up receiving a disproportionate share of spending on public goods, or be accorded favourable tax regimes at the expense of non-elites.

Moreover, the extent of capture depends on whether revenue generation and expenditure, or just expenditure is decentralised. Capture will be greater under the latter case. In many less developed countries public expenditure is financed by central government transfers, with very little revenue mobilised by the local governments.

The model by Bardhan and Mookherjee (2000) identifies the determinants of relative capture at different levels of governments. It is based on a model of a two-party electoral competition with probabilistic voting behaviour and lobbying by special-interest groups. A probabilistic voting model is less restrictive than the median voter model and therefore more versatile, since it takes account of even the poorest voter. The Bardhan & Mookherjee model that builds on the works by Baron (1994) and Grossman & Helpman (1996), identifies six determinants of capture namely; (i) the relative levels of voter awareness; (ii) electoral uncertainty; (iii) electoral competition;

(iv) heterogeneity of districts with respect to inequality; and (v) the electoral system. While some of the determinants entail capture at the national level, others are likely to create a tendency for lower capture at local level. The net effect is ambiguous. Like many others, this theoretical framework provides no clear-cut conclusions about the relationship between decentralisation and capture. But nonetheless, it contains useful features for the evaluation of the potential strengths and/or pitfalls of decentralisation.

Norris (2006) has argued that under greater capture of local governments the cardinal principles of efficient fiscal decentralisation are breached. Breaching these principles has a negative effect on the effectiveness of service delivery, which in turn negatively affects poverty reduction drive. Using the argument by Norris, one can therefore hypothesize that: "decentralisation is not a useful institutional reform for poverty reduction if adverse incentive mechanisms that promote greater local capture are present". Capture thrives and increases with voter ignorance, resulting in an increase in absolute poverty. In a number of poor countries, where voter ignorance is pervasive, owing to information asymmetry, decentralisation may become a potential source of the remaining poverty increases; not explicitly explained by the worsening inequality.

As argued in Bardhan and Mookherjee (2000), the extent of capture of local governments relative to that of central government is a critical determinant of the welfare impact of decentralisation. In particular, Bardhan (2002) argues that if the local governments are equally or less vulnerable to capture than the central government, then decentralisation is likely to improve both efficiency and equity. It may be the opposite if capture at the local level is much greater than at the central level. The extent of local capture depends on the levels of social and economic disparities within communities, voter awareness and the tradition of political participation (namely; fairness and regularity of elections); transparency in decision making processes as well as government accounts, media attention and influence peddling. However, according to Grossman and Helpman (1996), the elites are often more divided at the national level, with more competing and heterogeneous groups neutralising one another.

Tanzi (2000) is particularly pessimistic about the argument of minimising state interventions into economic activities through fiscal decentralisation. He observes that instead of transferring many governmental activities to the sub-national governments, these activities would serve a more useful purpose if transferred to the private sector. Tanzi strongly argues that the smaller the role of government in a country, the less need there is for decentralisation since a minimalist national government would act as a deterrent to rent-seeking bureaucrats and politicians. Thus, the need for decentralization may grow with the size of government. Privatisation in itself, however, is not free from problems, especially so in the less developed countries. In these countries, the markets are incomplete and the technological developments that are needed for private sector growth are very limited. Moreover, the presence of problems such as cream skimming, (or its opposite, adverse selection), asymmetry of information, and negative externalities, as discussed by Griffiths & Stuart (2001) complicate matters. These problems might exacerbate inefficiency in the production and delivery of public goods and services that are needed by the communities at the grass root level.

On balance, considering the mechanisms of the market forces and local capture, privatisation seems to be a better devil of the two institutional reforms. The more extensive the process of genuine privatisation, the lesser justification there must be for fiscal decentralisation. Thus, genuine privatisation is crucial in the process of economic development. However, giving away public assets and resources under the guise of privatisation, as happened in post-cold war Russia, and probably in other countries, see for example (Sachs 2005), can have devastating effects on fiscal balance and social welfare. Privatisation is useful if it maintains the chain of economic development, through increased national savings that must be channelled into investment. The investment must lead to capital accumulation which results in higher output and income, which must be feed back into savings. This thesis, however, abstracted from the issues of privatisation.

Another critical issue is that the predicted efficiency would depend on institutional set up, the structure of incentives and organisation in any given country. It has been argued that the presumed efficiency resulting from decentralisation under the Tiebout (1956) sorting might not hold for the less developed countries, whereas it could in the

developed countries (Brueckner 2000; Bardhan 2002). It is well-known that the two sets of countries differ in terms of the mentioned characteristics. Indeed, it is not unreasonable to believe that corruption is most likely to be less common in developed than in less developed countries. Moreover, the economic efficiency argument brought about by the intergovernmental competition under the Tiebout (1956) model appear to be very stringent.

In particular, Tiebout assumes that the different local governments offer different public expenditure bundles, enabling mobile individuals to allocate themselves according to their preferences. This presupposes that mobility across jurisdictions would induce local governments to be more efficient. However, this is not always the case. As Omar and Livingston (2001) have argued, citizens in less developed countries actually represent a more significant drain on expenditures than a source of revenue. Besides, the citizens might not be mobile enough for the migration to force a sizeable discipline on local governments. For these reasons coupled with high level of voter ignorance, local governance in less developed countries become less responsive to migration.

As discussed in chapter 3 (subsection 3.2.1), one of the major challenges of decentralisation is how the decentralised fiscal systems fit into national fiscal operations. A decentralised fiscal system here refers to public spending and local government revenue. In many less developed countries, the local governments lack the capacity to raise adequate revenue for public expenditure. The majority of local areas would find it hard to raise significant tax revenue (Tanzi 2000; Bardhan 2002). According to Bardhan (2002) and Tanzi (2000), the connection between local revenues and public expenditures on social services is very weak in the majority of less developed countries. These authors argue that many of the more elastic sources of tax revenue lie with the central government, and there is a built-in tendency towards vertical fiscal imbalance. It is, therefore, not surprising that the decentralisation issues discussed in poor countries are mainly about providing centrally collected tax revenue to lower levels of government, instead of seeking to empower them to collect taxes. Thus the public sector assignments are unaccompanied by any significant financial devolution. Moreover, the lower levels of

government lack a strong tax base and the tax effort necessary to raise a substantial amount of tax revenue.

In fact, the responsibilities of the sub-national jurisdictions are largely financed through central government grants and donors. The greater the regional differences in per capita income and the more uniform the standards of public services that the national government wants to provide, the greater must be the transfers from the national to the local governments (Tanzi 2000; Norris 2006).

Because of the tenuous relationship between local taxes and public spending, the discussions should thus focus on a transparent accounting mechanism and civic education at the lower local levels of government.

Political accountability in poor countries is affected by the likelihood of capture by interest groups. These groups are better organised at the lower levels of governments than at the national level - making the local governments more prone to capture by elites than national government. According to the local capture theory, the elites end up receiving a disproportionate share of spending on public goods. Indeed, as observed by Bardhan & Mookherjee (2000; 2002), the public goods and services meant for the poor are diverted in favour of the local elites. The extent of such inefficient and inequitable cross-subsidisation depends on the extent of local capture and the degree of fiscal autonomy of local government. Most sub-national jurisdictions, especially in less developed countries lack fiscal autonomy because of having very narrow tax base. Therefore, public expenditures on essential public services depend largely on central government transfers. With poor accountability mechanisms and democratic governance that are likely to prevail in these countries, public resources from central government end up being misused. This argument does not insulate the central government from capture, however. Sometimes, the national government can be captured even more than the local governments.

At the local level, however, it is reasonable to believe that collusion could be easier to organise and enforce in small proximate groups that involves bureaucrats, contractors and interest groups where there is high voter ignorance. As correctly observed in Fjeldstad (2004), the risk of being detected and reported is easily managed due to the

intermingled social and economic relationships among local influential people (Landa 1994). Hence, the small number of dominating elites within a smaller horizon would succeed in their exploitation and corruption practices.

However, it is the exact opposite with national level politics. At the national level, the policy choices are determined by the legislature consisting of elected representatives from each constituency. The constituency refers to any jurisdiction or group represented by a member in the national parliament. Since these members are from numerous interest groups, representing various constituencies, they are able to neutralise each other in the parliament. Grossman and Helpman (1996) have argued that the costs involved in coordinating a wider spectrum of lobbies are too huge to sustain coherence of the many interest groups, the free-rider problem notwithstanding. This brings to light the issue of the effect of ethnic cleavages on welfare discussed in the following subsection.

6.2.2 Ethnicity and welfare

The literature emphasising inverse relationship between household welfare and ethnic fragmentation such as Alesina, Baqir and Easterly (1999), and Easterly and Levine (1997), have argued that different ethnic groups have heterogeneous preferences over which type of public goods to produce with their tax revenues. They further argued that this would reduce each ethnic group's utility level for a given public good if other groups also use it, leading to its undervaluation. If this happens, then the dominant group in leadership would have an incentive to divert more public resources to private patronage, thereby reducing average wellbeing. The fundamental assumption in this argument is that leaders, especially in decentralised public service system, are not altruistic. Alesina and Perotti (1994) also argue that in heterogeneous sub-jurisdictions, political struggles undermine economic progress.

The outcome, however, would depend on whether the sub-jurisdictions contribute significant resources towards public goods provisions. It also depends on the degree of animosity between the different ethnic groups. Whereas this argument might be true in the United States cities as Alesina and his colleagues point out, and possibly in some other developed countries, it does not necessarily hold in the less developed

country case. Indeed, if local governance relies heavily on central government transfers, what could matter is the interest group cohesiveness (Tanzi 2000; Tanzi 2000a).

The local capture theory particularly provides some interesting predictions on the role of the heterogeneous preferences and wellbeing outcome (Oates 1972; Breton 1996; Grossman and Helpman 1996). First, it is well-known that in large heterogeneous societies the elites are usually more divided and more competing. Consequently, they end up neutralising one another. Second, fearing the risk of being detected and reported, political actors in heterogeneous communities will not easily divert public resources for private patronage. Third, the other groups not satisfied with the quantity of the services provided by the incumbent from the opposite ethnic group may form a coalition to defeat the rulers. The risk of losing an election or facing a violent protest from the disenchanted members of the opposite ethnicity could have a deterrent effect. The incumbent is likely to be forced to deliver quality services. This fact is corroborated in Acemoglu and Johnson (2005) when pointing out that a pluralistic society with many ethnic groups is likely to lead to a rebellion against the elite. They argue that ethnic cleavages cut different ways than class cleavages. Ethnicity would especially weaken the effect of class cleavages on local capture, fostering democratic reforms that would in turn promote accountability and good governance.

In a relatively homogeneous sub-national jurisdiction, on the other hand, the implications of the interest group cohesiveness are reversed. Areas which are near to complete ethnic homogeneity are likely get low quality and inadequate public goods and services, owing to stronger local capture. As discussed in chapter 3 (section 3.2), in the context of less developed countries, the collusion may be easier to organise and risks of being caught and reported are easier to manage, because local influential people and elites participate in a positive-sum game. This is due to the intermingled social and economic relationships among local influential people, who belong to the same ethnic tribe. Moreover, the stigma associated with having the kin and kith prosecuted and jailed for economic crimes erects a barrier to the path of justice. Cooperation yields benefits in excess of costs which are shared according to some agreed rule. Corrupt officials are frequently heralded as tribal heroes. On the other hand, however, interfacing with other ethnic groups yields a zero-sum game.

Landa (1994) for example, argues that ethnicity supplies a natural basis for group formation. Shared behavioural norms and repeated interaction facilitate the development of stable networks and credit markets. According to Buchanan (1980), the availability of rents promotes the formation of special interest groups that compete for access to them. The ability to distinguish and recognise individuals, to reward good behaviour and to punish bad, promotes reputation building, thus lowering transaction costs by controlling free-riding. It is this competition, with its associated economic benefits and reputation building that makes ethnic diversity important for economic progress. Moreover, innovation, and hence technological progress, is an increasing function of diversity of ideas – which can be harnessed from ethnic diversity.

6.2.3 Survey of Empirical Literature on Local Capture

A closer survey of the literature on the relationship between decentralisation, local capture and absolute poverty reveals that there are very few empirical studies on this subject. The few that are related to this matter such as Norris (2006); Fisman & Gatti (2002); Galasso & Ravallion (2001); and World Bank (2000) are based on cross-country analysis. Most of them employ macro-level determinants. These studies particularly exploit data on corruption derived from Corruption Transparency International (CPI). However, the policy relevance of these studies is tenuous due to serious data limitations and endogeneity bias. Indeed, Fjeldstad (2004) questions their policy relevance, citing the problems of endogeneity and the perception biases arising from the CPI cross-country regressions. In addition, the macro-determinants do not satisfactorily explain the within-country variations in corruption due to heterogeneity and aggregation of the data.

The studies by Reinikka and Svensson (2004) as well as by Omar & Livingston (2001) provide country-specific evidence on the presumed federalist discipline. These programme based case studies give little support for better provision of public services by the local governments in Uganda.

Omar & Livingston (2001) make a systematic assessment of the relative susceptibility of national and local governments to interest group capture. In particular, these

authors focussed on the demand for immunisation, access to media and knowledge, and voting and political action in Uganda. They provide evidence on the decentralized public service delivery system in Uganda, which is based on the mechanisms of the presumed fiscal federalism. As discussed in subsection 3.2.1 of chapter 3, the reliance on and use of community leaders as the main source of information for local politics by an absolute majority depicted the symptoms of elite capture (Omar and Livingston 2001). According to Omar and Livingston, those who depended on community leaders as their main source of public information were significantly less likely to have heard reports of corruption, compared with those who relied on the media. Despite a high turn out in elections, this casts doubts on the effectiveness of local politics as a disciplining device for local government.

Their paper uses micro-data drawn from 75 sub-counties (out of over 800), chosen from 10 "quasi" randomly selected districts (out of the 56 districts at the time). This kind of research would be very useful if a nationally representative micro-level based data drawing from a larger sample of districts was employed.

Using data from a "unique survey" covering a period of 1991-1995 in Uganda, Reinikka & Svensson (2004) assess the extent to which grants from central governments actually reached intended primary schools. Using the 1991-1995 education data for Uganda, Reinikka & Svensson compared disbursed flows (the capitation grant, in particular) from the central government with the resources actually received by the primary schools. They find that the bulk of the school grant was captured by local officials and politicians. It is important to note that their study was conducted before the fiscal decentralisation following the Local Government Act 1997. During the period in which that study took place, the central government was still running the service delivery systems, using district offices as mere distribution channels. It would be informative, therefore, to build from the studies by Omar & Livingston (2001) and Reinikka & Svensson (2004), taking advantage of the national household survey data that cover periods before and after decentralisation. That way, one would be able to test whether there is evidence of greater capture of local governance that affected household welfare in the post-decentralisation era. Chapter 3 of this thesis therefore provides robust evidence by using nationally representative

household survey data and also employing appropriate variables that can explain the effect of local capture during the pre- and post- decentralisation periods.

To sum up, in a fiscally decentralised regime, the local governments have a responsibility for planning, budgeting and resource allocation to key antipoverty programmes. This means that their actions have a major bearing on the wellbeing of the poor. It is now well understood that the local leaders' actions will, to a large extent, depend on the ability of the residents/voters to hold their leaders accountable. That ability is derived from the level of voter enlightenment. So, lack of voter enlightenment could promote greater capture of the antipoverty programmes by local elites. If this happens, then the level and amount of public goods and services provided would deteriorate sharply. It is now clear that the local capture-like symptoms that were identified by Reinikka and Svensson (2004) prior to the decentralisation in Uganda exacerbated after the 1997 Local Government Act that ushered in full decentralisation. To the extent that this is so, decentralisation could exacerbate absolute poverty instead of help alleviate it as much of the money would end up in the pockets of the few bureaucrats and interest groups.

6.3 Fertility and wellbeing

In this section, the arguments on the relationship between population growth and economic wellbeing are presented. Whereas the macro theory relies on the neoclassical paradigm that higher population growth rate depresses capital accumulation and wages, dynamic interactions between fertility choices and household welfare in the presence of market failures underpin the micro theory. Subsection 6.3.1 reviews theoretical literature on these issues. The empirical literature is reviewed in subsection 6.3.2.

6.3.1 Theoretical Literature: Arguments on Fertility and Wellbeing

As discussed in the introduction of chapter 4, the relationship between demographic developments and economic wellbeing has been a subject of debate since Thomas Malthus era, neo-Malthusian view facing a lot of criticism from the supply and demand- driven proponents of technological change and revisionists. The latter have argued that demographic consideration are largely irrelevant, emphasising that

institutional structures via the well-known "Institutional Hypothesis" (Acemoglu, Johnson et al. 2001), could counteract the negative effect of rapid population growth, unless there are clear market failures.

Contributions by Robert Solow (1956) based on a one-sector growth model, followed by the two sector growth models of Lewis (1954), and then by Fei and Ranis (1964) all yielded similar predictions to those of the Malthusian's. According to them, higher population growth and hence high labour force supply, lowers income, because the available capital must be spread more thinly over the population of workers (Solow 1956). With constant returns to scale and a constant rate of saving, faster growth of the labour force implies a lower capital-labour ratio and lower productivity of labour. The two-sector growth models that also treated population as exogenous argued that surplus labour from subsistence agriculture is absorbed into manufacturing only if savings and thus capital grows faster than population. Alternatively, this would happen if technological change in manufacturing offsets the combined effects of diminishing returns in agriculture and of population growth. The shift of labour into manufacturing occurs more rapidly the slower is the growth of population, *ceteris paribus*.

In the augmented Solow growth model by Mankiw et al (1992), human capital also must be spread more thinly, implying that higher population lowers total factor productivity. Thus, the conclusions about the effects of population growth remained largely the same - as long as there is (1) little room for adjustment in the capital-labour ratio and (2) constant or increasing capital-output ratios, the impact on total income of higher fertility - and, with a 15-year lag, of rapid labour force growth - is bound to be close to zero. The impact on per capita income is negative, even without taking into account of any negative effect of higher fertility on the savings rate and thus on capital formation. It is also negative even if a production function accommodating adjustment in the capital-labour ratio is used, as long as there is a negative effect of population growth on savings, and hence insufficient growth of capital stock. Even in the absence of diminishing returns to labour, rapid population growth is harmful. In the presence of technical change, however, the effect may be reversed. If there is sufficient technological progress, and it is responsive to factor scarcities and thus labour intensive, additional labour can lead to increases in per

capita income even without equivalent growth in capital (Barro 1991; Mankiw, Romer et al. 1992).

The steady-state neoclassical models treat population growth as exogenous, however. Such models do not attempt to incorporate the determination of population through the effects of economic change on fertility, mortality, or marriage rates. Critics have argued, for example that, models that treat population growth and labour force as equivalent and ignore the age structure of a country's population can lead to misleading results. A notable example is Samuelson's (1958) overlapping-generations model that introduced age structure and came to the opposite conclusion. In particular, Samuelson proposed two age groups, a younger working population and an older retired population. The young generation transfers consumption "loans" to the older generation, the "loans" to be repaid by the subsequent generation of younger workers. A sustained increase in population growth raises the proportion of people in the younger group and results in higher consumption transfers to the old. In this model, if a faster rate of population growth persists, each generation benefits, and a sustained higher population growth rate leads to higher lifetime economic welfare.

Meanwhile, the overlapping-generations model ignored dependent children. In doing so, the model assumed that children pose no costs to parents or to the wider economy. Some might argue that higher population growth that results from higher fertility will, as a matter of fact, increase the proportion of children in a population, and not increase labour supply until 15 years later, all else being equal. Critics may counter this by arguing that child labour exists in such kind of economy, especially in less developed countries. However, it can be appreciated that children will always consume more than they produce, since their productivity is relatively low. To the extent that this is so, their existence must reduce the consumption or the savings of workers and retired people, assuming the retired have any savings at all.

Even when population growth is considered as an endogenous variable that is influenced by income (Leibenstein 1954; Nelson 1956), small increases in income for population at the subsistence level lead to increases in labour supply. Then, the increase in labour supply swamps small increases in capital or, indeed, any other stimuli to the economy. This subsequently results in a low-level equilibrium trap; low

human capital formation, high fertility rates and persistence in extreme poverty. Only massive capital formation or a major stimulus, such as technological progress, can ensure that less developed countries avoid the poverty trap.

The debate continued unabated since the 1960s through to the early 1980s. By that time, the economics literature attempted to link technological progress with population growth (Kuznets 1966; Boserup 1981; Simon 1981). These authors argued that the pace of technical progress is endogenous in the sense that it is affected by population size. Take the "demand-driven" view explored by Boserup (1981), for example. It argued that population growth can spur technical progress out of pressures created by high population density. According to Boserup (1981), increasing population density induces a shift to more labour-intensive farming systems; the shifts from long fallow to more frequent cropping then confronts the farmers with new possibilities for innovation. Boserup argued that the use of new tools and techniques brings large increases in productivity, which in turn increases income. There is also the "supply-driven" argument taken by Simon (1981), that population growth creates a larger pool of potential innovators and thus a larger stock of ideas, diversity, and innovations, which can be put to economic use. Thus the rate of technological progress should increase with population size. In fact, the argument regarding greater population density and diversity in rural areas has some empirical support, especially with ethnic diversity, as shown in the previous chapter. However, in theory, the things that population growth may encourage like technological innovations and scale economies can also be encouraged independently of rapid population growth, especially through sound economic policy.

During the mid 1980s, there were efforts to redirect the debate towards the role of markets and institutions. Spearheaded by Demeny (1986), for example, the revisionists viewed population change as the aggregate outcome of many individual decisions at the family level, and thus as one aspect of a larger complex system. The main argument was that micro or family level decisions are made in response to signals provided by the larger system. In Adam Smith's notion, this is the invisible hand mechanism whereby family decisions are presumed to maximize not only individual welfare, but also social welfare. According to Demeny (1986), rapid population growth is not a primary obstacle to economic wellbeing, although it can

exacerbate the effects of failings in economic and social policy. As such, the revisionists' view is that the negative effects can be mitigated by family and social adjustments, particularly in the long run. This would, therefore, imply that differences in the negative effects of rapid population growth depend on differences about the pervasiveness and relevance of market failures. However, though of intuitive appeal, these arguments are not well supported empirically (Birdsall 1989).

In the context of less developed countries where there are clear market failures, however, children are considered as an essential part of the household's work force to generate household income. They are also perceived as an insurance against old age. The paradox is that by acquiring children, the share of household resources that is available for each member will decrease. Moreover, newborn children may decrease the productivity of the mother either by taking more resources, such as food, from her or by hampering her work prospects. But again, although childbearing may reduce women's working time or decrease their productivity in the short run, children may bring more resources as they grow older through work. Therefore, the overall net effect of childbearing on welfare is not necessarily clear cut (Aassve, Engelhardt et al. 2005).

As discussed in section 4.2 of chapter 4, the demand side argument considers the poverty-trap equilibrium to be a result of a market failure in which education has a positive externality (Becker and Lewis 1973). This theory assumes that both child quality and child quantity is a normal good, and a rise in income has two opposite effects on the quantity of children. While the increase in income has a direct positive effect on the quantity of children, it also increases their quality and thus their cost, negatively affecting their quantity. Hence, in spite of the normality of the demand for children, if preferences are non-homothetic, the observed relationship between quantity of children and income can be negative. This implies a positive relationship between fertility and poverty. According to Becker and Lewis (1973), the cost of an additional child increases with the desired level of child quality, and the cost of quality increases with the number of children, generating a non-convex budget set.

Moav (2005) makes an extension to the original demand theory that Becker and Lewis (1973) advanced. According to Moav (2005), individuals' productivity in

educating children increases with their own human capital; whereas the fraction of the individual's time endowment that is required in order to raise a child, regardless of quality - the quantity cost - is equal across individuals. This implies that the ratio between the price of quantity and the price of quality increases with the individual's wage, which generates a comparative advantage for the poor in child quantity and a comparative advantage for the wealthy in raising quality children. Thus, Moav (2005) observes:

"It therefore would appear that the impact of changes in wages is amplified by the non-convexity of the budget set, bringing about the negative correlation between income and fertility, and multiple equilibria. A simple dynamic system generates multiple steady states that emerge from the comparative advantage of educated workers in the production of educated children. Individuals with a high level of human capital would invest highly in their offspring's education, even in poor countries. Moreover, high-income families will choose low fertility rates with high investment in education, and therefore, high income (welfare) persists in the dynasty".

Conversely, it may be argued that a decline in parental education will most likely lower their income, thereby leaving fewer resources for the offspring's education. Besides, less educated parents have lower time cost, which in turn increases fertility compared with more educated ones. The increased fertility further reduces resources for education that are spread more thinly among more children. To poor parents, many children are expected to bring more resources as they grow older through work. Unfortunately however, the productivity of these uneducated children is very low, and hence their labour earnings will be below subsistence level.

Therefore, the endogenous fertility framework, with a trade-off between quality and quantity, poses serious concerns. Poor parents care about both the quality of each child and the quantity of children. These parents make the fertility decisions in the household. In almost all cases, poor households will choose relatively high fertility rates with relatively low investment in their offspring's education; and therefore, their offspring are poor as well (Birdsall and Griffin 1988; Moav 2005). Consequently, extreme poverty will persist in the dynasty. The converse is true for richer parents.

These demand side arguments, whereby children are viewed as one manifestation of a set of household decisions constrained by costs and income, rely on the fact that parents are able to make choices about their fertility. Economists have since

recognized that the crucial component in this respect regards access and take-up of family planning. For example, Rosenzweig and Schultz (1985) argued that the fertility level is determined by the allocation of resources required to limit the biologically determined fertility supply. Lack of adequate resources, poor availability of family planning information and services mean that, women in particular, will not be able to plan their fertility career very well. The end result is a significant amount of unintended pregnancies. Hence, there is likely to be a negative relationship between unavailability of family planning and observed fertility levels, just as there is likely to be a negative relationship between economic growth and fertility. In the absence of perfect markets, there is likely to be a lower contraceptive prevalence rate among households with lower human capital and wealth. However, as in Aassve, Engelhardt (2005), it is well understood that the distinction between supply side effects and demand side effects is difficult to establish.

To the extent that fertility control is costly and imperfect, and the biological capacity to bear children is random and very possibly not affected by choice behaviour, the number of children to a couple may not exactly correspond to either the couple's expectations of or preferences for its family size. Thus, fertility within a household is determined by the dynamic interactions between its supply of and demand for births. It is also determined by unobserved heterogeneity in both the biological supply of births and in preferences for family size. The latter is what Aassve, Engelhardt (2005) have called "couple-specific supply propensities".

According to Rosenzweig and Schultz (1985), fecundity (the positive shock in fertility is a persistent individual effect) is likely to reduce fertility demand because of costly fertility control. These authors argued that when a couple realizes an unanticipated birth they will adopt a more effective contraceptive regime than it would have been, *ceteris paribus*. Why? Because persistence implies that the couple will already have more births before the current period, and they may appreciate that they can expect more births in subsequent periods. Indeed, Rosenzweig and Schultz (1985) predict that this larger number of births cumulated before the current period would strengthen the couple's motivation to restrict further births, whether or not the couple can identify its individual fecundity. In that case, experience that may be manifested through the couple's age would be important. Hence, there exists exogenous inter-

couple variation in both the supply of births and prices, income (or consumption) and demand for children.

6.3.2 Empirical Literature on Fertility and wellbeing

As far as this paper is concerned, by using micro-level panel data, Kim et al (2006), Francavilla and Mattei (2006) and Aassve et al (2005) have made a significant empirical contribution to the understanding of the causal effects of fertility on household welfare, particularly in the context of the developing world. The first two focus on the dynamics of poverty and fertility in Indonesia and Albania, respectively; while Aassve and his colleagues undertake a comparative analysis of poverty and fertility for four countries namely; Albania, Ethiopia, Indonesia and Vietnam.

The studies by Kim et al (2006) and Francavilla and Mattei (2006) both analyze whether, and to what extent births may lead to changes in economic wellbeing in Indonesia and Albania, respectively. Both use a matching approach to evaluate the effect of childbearing on a measure of household welfare. In order to identify which variables constitute a significant predictor for the fertility decision, Kim et al (2006) first estimated a probit model for having a child between the two survey periods, with a set of control covariates that satisfied the balancing property. That study, however, does not attempt to make an assessment of the effect of fertility on wellbeing, for the same model structure.

On the other hand, Francavilla and Mattei (2006) fit a multiple linear regression model linking welfare measure to an indicator variable for childbearing, with some covariates controlling for background characteristics. Note, however, that both studies fail to address the problem of joint determination, because the treatment indicator used appears to be endogenous to the welfare measure. By neglecting this issue, the inferences drawn from the probit and the multivariate analysis become extremely tenuous. For the same reason, because the matching model used in the two studies fails to meet the independence condition, the estimates of the average treatment effect are highly likely to be implausible.

In fact, this could be one of the reasons behind the positive relationship result obtained for Albania. Notice that Francavilla and Mattei (2006) explain the positive relationship by arguing:

"Even though there are no direct and specific child benefits, general economic assistance is allocated on a means-tested basis for families with low earned income".

It might well be true that child benefits, coupled with maternity benefits and family allowances could negate the likely negative effects of childbearing. The point is that one cannot tell for sure whether the benefits are responsible for the positive coefficient, when in fact the endogeneity issues have not been addressed. After all, such results cannot be taken to hold everywhere, given that the benefit system alluded to is not available in many other less developed countries. No doubt, this leaves an important gap to be filled.

The comparative study by Aassve, Engelhardt et al (2005) reveals that there is a substantial difference in the relative importance of the determinants of poverty dynamics and fertility. This is due to the fact that the countries under study –Albania, Ethiopia, Indonesia and Vietnam –differ greatly in their history, per capita income, social structure, economic and political institutions, and demographic feature. The persistence of high levels of fertility and extreme poverty in Ethiopia, for example, is largely driven by lack of economic growth and poor access to family planning. On the other hand, education and health provisions are found to be crucial elements in reducing fertility and poverty in Vietnam, Indonesia and Albania.

Indeed, over the last two decades, developing countries have shown different paths in terms of fertility transition and economic progress. While some have witnessed sharp impressive economic growth and fertility decline, others have remained static with high fertility levels, low economic growth and persistent extreme poverty. However, there are also countries such as Uganda that have experienced very impressive economic growth, but still fertility and poverty rates remain worryingly very high. This might serve, therefore, to strengthen the argument that even if growth does or does not increase, the poverty-fertility relationship is contingent upon other issues, such as social and institutional characteristics. So, it is not unreasonable to posit that beyond economic growth, there are other intrinsic country-specific factors and

individual behavioural responses that determine fertility choices, which in turn affect household wellbeing.

There are some studies that tried to reconcile these discrepancies by differentiating countries by their level of economic development and demographic transition. Unfortunately, due to data limitations these studies relied mainly on either cross-sectional or aggregate data. In sum, the findings were that the relationship between poverty and fertility is not unidirectional. Whereas many studies suggest a positive relationship between poverty and fertility, others find it to be negative, and yet others find it to have an inverse J-shaped relationship. For further details on this literature, see Aassve et al (2005), Birdsall et al (2001), and Schoumaker and Tabutin (1999), for example. As noted earlier, studies based on aggregate or cross-sectional data do not provide robust causal information about the relationship between fertility and economic wellbeing.

Since the turn of this century, with the availability of longitudinal data, research on poverty dynamics for developing countries started emerging. Notable examples of this literature include Jalan and Ravallion (2000) using a panel from rural China to focus on the issues of transient and abject poverty. They show that large reductions in poverty can be achieved through policies aimed at smoothing household incomes, since a large portion of poverty is transitory. Dercon and Krishnan (2000) using three waves of the Ethiopian rural household panel show that individual consumption levels varies widely by year and season. Their study specifically reveals that a much larger proportion of households is vulnerable to poverty than cross-sectional data on poverty may imply. Bigsten et al (2003) use both Ethiopian rural and urban household panels to provide detailed analysis of poverty dynamics. Note, however, that this strand of literature does not put much emphasis on the relationship between wellbeing and fertility.

In general, issues of joint determination remain a major concern in the economics literature regarding the relationship between household welfare and occurrence of life events such as childbearing. Therefore, there is still a need to clarify the conditions under which an estimated effect can be considered causal. In addition, no studies have applied panel data sets from countries with strong growth, while at the same

time having high fertility and absolute poverty rates. Identifying the dynamic relationship between wellbeing and fertility in such economies would provide a strong basis for assessing commonalities and differences, pinpointing the various channels through which poverty and fertility interacts, emphasising how they relate to the country-specific characteristics.

Clearly, there remained a gap to be filled in the empirical literature on the relationship between welfare and fertility in the context of less developed countries. Chapter 4 of this thesis has contributed towards filling this gap by using a dynamic household model structure based on Ugandan micro data.

Appendix 1B Robustness/Sensitivity Analysis of the Poverty line

In this appendix, an investigation is conducted to find out if the results of the decomposition would change if different poverty lines were used. This is done by shifting the paper's poverty line by plus and minus 10% and then re-estimating the poverty rates and changes due to growth component and the redistribution subcomponents. For brevity, the results reported are the national level head count rates only. The decomposition results are reported in Table 6.1. The upper panel shows percentage changes in poverty attributable to each of the components. Their relative contributions (proportions) are reported in the middle panel. The bottom panel shows the new summary statistics for respective poverty lines shifts.

Table 6.1: Decomposition of Changes in Poverty into the Growth and the Redistribution Components

Period	When Poverty line is shifted by	Total change in Poverty	Growth Component	Redistribution Component	Residual
Changes in percentage points					
1992/93 - 1997	+10%	-11.1	-9.6	-1.7	0.17
	-10%	-11.6	-9.7	-1.9	0.06
1997 -2002/03	+10%	-6.3	-5.7	1.4	-2.0
	-10%	-6.9	-6.1	1.5	-2.2
1997 - 1999/00	+10%	-10.3	-14.8	3.9	0.8
	-10%	-10.8	-15.3	3.7	0.9
1999/00 - 2002/03	+10%	4.0	-3.4	3.2	1.5
	-10%	3.9	-3.2	3.0	1.3
Contribution of poverty changes in Proportions					
1992/93 - 1997	+10%		0.864	0.153	-0.015
	-10%		0.836	0.163	-0.005
1997 -2002/03	+10%		0.904	-0.222	0.317
	-10%		0.884	-0.217	0.318
1997 - 1999/00	+10%		1.437	-0.379	-0.077
	-10%		1.417	-0.343	-0.083
1999/00 - 2002/03	+10%		-0.850	0.791	0.375
	-10%		-0.821	0.769	0.333
Summary Statistics		1992	1997	1999/00	2002/03
Poor dummy	+10%	0.451 (0.697)	0.362 (0.554)	0.278 (0.428)	0.301 (0.476)
	Original	0.427 (0.669)	0.340 (0.533)	0.259 (0.408)	0.289 (0.453)
	-10%	0.403 (0.662)	0.311 (0.512)	0.240 (0.392)	0.277 (0.436)
HC Index	+10%	57.4 (13.88)	45.7 (15.9)	34.7 (20.39)	38.3 (18.50)
	Original	55.7 (13.61)	44.4 (15.6)	33.8 (19.99)	37.7 (18.14)
	-10%	54.1 (13.34)	43.1 (15.4)	32.5 (19.57)	36.6 (17.78)

Note: (i) Figures in parenthesis are the standard deviations; (ii) Though shifted, the poverty line stays constant in 1997/98 prices through out the entire study period; (iii) these results are comparable with those reported in Tables 2.8 and 2.9 (chapter 2), and are very close.

The qualitative evidence does not suggest any sensitivity to small shifts in the absolute poverty line, within the range of -10% and +10%.

Appendix 2A Adjusting for Household Composition and Size

The estimation of effective adult equivalent is based on Lanjouw and Ravallion (1995). It attempts to reflect two aspects of equivalence scale: (i) the weight assigned to children relative to adults, and (ii) the economies of scale in household consumption are appropriately reflected in the paper's welfare measure. This is done by estimating the number of adult equivalents from the household demand systems. More broadly, the welfare measure that incorporates these aspects takes the following form:

$$W = \frac{H}{(A + \alpha K)\theta} \quad (4.14)$$

where H denotes household consumption expenditure, A and K are the numbers of adults and children, α is the number between zero and one that indicates the fraction of an adult each child represents or equivalence scale of a child, and θ is also the number between zero and one which reflects possible scale economies favouring larger households, due to the allocation of fixed costs over a greater number of people. For a detailed discussion on these aspects, particularly how demographics exert price-like effects in the case of household public and pure private goods, see (Barten 1964; Deaton and Paxson 1998), for example. Consistent with the arguments in Deaton and Paxson (1998), the paper's welfare measure is food consumption expenditure.

The distribution of food consumption is unlikely to be uniform across household members. As shown in equation (4.14), the solution is to impose an assumption on intra-household resource allocation, and adjustment is done by applying an equivalent scale that is consistent with the assumption made – producing a measure of expenditure per adult equivalent. However, there is no consensus on the appropriate choice of equivalence scale, partly due to different patterns of household allocations between countries, regions and even cultures. In Uganda, for example, all children are allocated weights ranging from 0.4 for children under 5 year, and 0.5 for those between 5 – 16 years in official poverty statistics. An implication of this approach is that the age of children within the household is well catered for in the intra-household

resource allocations. In this part, consistency with official statistics is maintained with respect to $\alpha = 0.4$, and 0.5, but considers relaxing the homogeneity restrictions imposed on household size in line with Lanjouw and Ravallion (1995). It should be noted that many studies, however, continue to assume homogeneity, i.e., economies of scale in consumption are assumed to be unitary. Unfortunately, as will be shown below, this condition may not always hold. To better approximate the equivalence scale, the restriction ought to be relaxed, by estimating the “effective adult equivalents” from the food share equation for Uganda. For a more recent related example, see Francavilla and Mattei (2006). The basic specification for estimating the demand function for food can be written as

$$\begin{aligned} w_{jt} &= \mu + \beta \ln\left(\frac{x_{jt}}{n_{jt}^\theta}\right) + \mathbf{Z}'_{jt}\delta + u_j + \varepsilon_{jt} \\ &= \mu + \beta \ln(x_{jt}) - \beta\theta \ln(n_{jt}) + \mathbf{Z}'_{jt}\delta + u_j + \varepsilon_{jt} \end{aligned} \quad (4.15)$$

where w_{jt} is food share of household j in period t , x_{jt} is total expenditure for household j , n_{jt} stands for the “effective household size” n_e which is equal to $(A + \alpha K)^\theta$ as defined in (4.14), $\mathbf{Z}'_{jt}$ is a set of demographic variables, u_j represents community-level specific characteristics including prices in areas where the household resides, ε_{jt} denotes the error term, and θ is the size elasticity which in this paper, is estimated by running a community fixed-effects regression model. In estimating a community fixed-effects model of the food share equation, one is able to control for relative prices across regions and/or strata (Hsiao 2003). The estimate of the size elasticity θ is obtained by taking the ratio of the coefficient on log of household size to that of log household expenditure in equation (4.15). The equation is estimated using panel data from 1992/93 and 1999/00 household surveys. For each household, the estimated n_e will be applied as the deflation factor to household food expenditure measured in constant 1997/98 Uganda shillings prices. Different specifications of the Engel curve for food are considered.

Models 1 – 3 do not have the homogeneity restriction, while models 5 and 6 have the restriction imposed, that is, $\theta = 1$. Model 1 is a very simple community fixed-effects regression of the food share on the log of total outlays and log of the household size.

Model 2 is an augmented model including both household size and household composition, represented by the number of members in each demographic group as explanatory variables. Models 5 is equivalent to Model 2, but with the homogeneity restriction imposed on the former. As an alternative, Model 3 and 6 include demographics as proportion of children; the homogeneity restriction is imposed in Model 6. In order to check whether the Engel curve for food has budget shares in log expenditure that display any nonlinearities (Banks, Blundell et al. 1997), a Quadratic Ideal Demand function augmented with demographic composition of households (proportion of children) is estimated in Model 4. That is, the second-order term in log total expenditure is included. The results are presented in Table 6.2 below.

Table 6.2 Engel Curve Estimation of the Size Elasticity using Panel Data from Uganda Household Surveys 1992 & 1999: Community Fixed Effects Regression of Food Share Equation

Explanatory Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Log total expenditure	0.115*** (0.011)	0.118*** (0.011)	0.114*** (0.011)	0.306* (0.155)		
Log total expenditure square				-0.008 (0.007)		
Log household size	-0.008 (0.016)	-0.045 (0.029)	-0.082* (0.024)	-0.083** (0.024)		
Log expenditure per person					0.109*** (0.011)	0.110** * (0.011)
No. of adults		-0.014* (0.006)			-0.004 (0.005)	
No. of children		0.018* (0.006)			0.031*** (0.004)	
Proportion of children			0.025** (0.006)	0.025** (0.006)		0.031** * (0.004)
Constant	-0.847** (0.120)	-0.845** (0.1215)	-0.800** (0.199)	-1.891* (0.893)	-0.718** (0.109)	- 0.730** (0.109)
Observations	2621	2621	2621	2621	2621	2621
R-squared: within	0.0817	0.0984	0.0952	0.0962	0.0942	0.0938
Implied size elasticity θ	0.07 (0.345)	0.38 (0.189)	0.72 (0.235)	0.27 (0.015)	1	1

Notes: (1) All reported standard errors (in parenthesis) are robust. (ii) * shows significance at 10%, ** significance at 5%, and *** significance at 1%. (2) The standard error for θ is computed based on the Delta method (Cochran 1954; Armitage 1955). (3) The nonlinearities are not apparent for food, and hence no need for adding a quadratic term.

In model 1, the estimated size elasticity of the money metric of welfare is very negligible, i.e., 0.07 and homogeneity restriction is not rejected ($t = -0.2$). The augmented model (Model 2) yields a value for θ of 0.38, with a std error of 0.189. The homogeneity restriction is weakly rejected ($t\text{-value} = -2.01$). For this model, the parameter for log household size is not significant and is weakly significant for demographic composition (the regression coefficients on number of adults and of

children appears to be significant at the 10% level). Only when the homogeneity restriction is imposed (Model 5) does one observe significant inter-household differences in food share with different numbers of children, but no differences with the number of adults. Model 3 that includes proportion of children in household as the demographics gives an elasticity of 0.72, and rejects the homogeneity restrictions ($t - value = 3.1$). This model suggests that there is a positive and strong relationship between demographic composition and food share in the Engel curve, the coefficient on proportion of children appears to be significant at 5% level. In addition, the regression coefficient on log household size negative, but slightly significant (at 10% level). Thus, once relaxed, the equivalence scale implied by the Engel curve appears to be approximated quite well by n_e^θ with adjustment for the proportion of children in the household. The coefficient on log expenditure square is close to zero and not statistically significant. It therefore turns out that the demand for food in Uganda displays PIGLOG preferences, i.e. the expenditure share for food is linear in log total expenditure.

Hence, this paper estimates θ to be 0.72. Not surprisingly, the size elasticity implies substantial falls in food spending per head for consumers, as Deaton and Paxson (1998) predict. According to these estimated scale economies, ten individual each spending 1 shilling per day, for example, in separate single-dweller households while retaining their original incomes could achieve the same welfare level living in a 10-person household with total expenditures of approximately 5 shilling per day (i.e., $10^{0.72} = 5.25$). The size economies would in this case enable each person to spend only 50 cents, thereby doubling their income, and hence are better off. This adjustment is applied to the household model structure, and is used in estimation of the effect of childbearing on individual welfare (see result reported in Table 4.7).

Appendix 3A Macroeconomic Policies and other Initiatives

This Appendix discusses the major macroeconomic policies and economic initiatives in the Sub-region. Since the historical environment in which economic policies and programmes are dispensed is very crucial (Mamdani 1995; Acemoglu and Robinson 2006), the appendix tries to place these issues within historical context. The argument in political science and political economy is that the problem of Sub-Saharan Africa is its internal markets are restricted not only by the location and size of the individual countries but, most crucially, by the fact that the majority of its working population represent no effective purchasing power that can ensure mass consumption. According to Mamdani (1995), their internal markets have long been restricted to those for luxury goods for small but affluent minorities, thereby hindering a boost in production and in creation of wealth. Mamdani has argued that the stabilisation programmes and structural adjustment policies of the late 1970s to the early 1990s did not address this problem. The following subsections discuss these issues in greater detail. The first part focuses on the stabilisation programmes, policies as well the initiatives. In the second part, an overview of the political and economic history of Uganda is presented.

(A) Stabilisation Programmes and Initiatives

The early 1980s through to the 1990s were characterised by unprecedented implementation of stabilisation and structural adjustment programmes in the Sub-Saharan Africa. These programmes were aimed at reversing the economic decline and eventually leading to sustained growth. The growth would in turn help alleviate extreme poverty in these countries. Although many of the countries experienced substantial growth following these programmes, a large number of their population remains impoverished. Pessimists such as Mamdani (1995) have argued that the stabilisation programmes through implicit subsidization only served to promote luxury-consuming class of minorities, agricultural production and other social services ended up being crowded-out. Yet, it is these sectors that matter most to the majority of the population in the Sub-Region. Therefore, they argue that this aspect

ended up undermining the “embryonic beginnings” of markets for mass consumption (Mamdani 1995), making these economies became less integrated.

As discussed in the main introduction (Chapter 1), the debt-service ratio was over 90% for many countries in Sub-Saharan Africa by the end of the 1980s. In the early 1990s, it became clear that the countries in the Sub-Region could no longer sustain their repayment schedule to their creditors. As a response to that debt crisis the IMF and World Bank shifted to the Poverty Reduction and Growth Facility (PRGF). This facility was administered outside the stabilisation resource envelope commonly called the General Resources Account. In addition to stimulating sustainable growth, the new facility now focussed on the reduction of extreme poverty levels. It also focussed on overcoming the moral hazard of debt forgiveness and on ensuring that resources were appropriately utilized by recipient countries. Later on, in the mid-1990s, the IMF/World Bank introduced the Highly Indebted Poor Countries (HIPC) Initiative. This was aimed at bringing the debt burden of these countries to sustainable levels.

The HIPC initiative was revised in 1999 but the framework remained largely the same. Consequently, a number of countries in the Sub-Region became eligible for the highly concessional assistance from the International Development Association (IDA), and for the IMF's Enhanced Structural Adjustment Facility/Poverty Reduction and Growth Facility (ESAF/PRGF). This arrangement required the participating governments to develop a Poverty Reduction Strategy Paper (PRSP) jointly with the civil society, outlining key priority areas that would be undertaken over a period of three to four years. In Uganda, one of the eligible countries, this overarching framework is called the Poverty Eradication Action Plan (PEAP). As of now, the second PEAP 2004/05-2007/08 is in its last year of implementation period and is being revised into the National Development Plan (NDP). It remains to be seen, however, whether these initiatives actually had a serious impact on the lives of poorest people.

Since the early 2000s, there are other initiatives that have been suggested within the global fraternity. At the Millennium Summit held in September 2000, the United Nations launched a comprehensive economic and social programme called, “The

Millennium Development Goals, (MDGs)” to assist poor countries. The eight broad targets are: (1) Eradication of extreme poverty and hunger; (2) Universal primary education; (3) Gender equality and empowerment of women; (4) Reduction in child mortality; (5) Improvement in maternal health; (6) Fighting HIV/AIDS, Malaria and other diseases; (7) Ensuring environmental sustainability; and (8) Develop a global partnership for development.

Consistent with the MDGs’ target number eight, the “New Partnership for Africa’s Development (NEPAD) was adopted in July 2001 at the 37th Summit of the then Organisation of African Unity (OAU), now African Union (AU). This initiative represented a bold step by the African leaders, having all the ingredients that could stabilise their economies, promote sustainable growth and development, and more particularly to eradicate extreme poverty if implemented properly. The strength of this initiative comes from the expected policy coordination and implementation by, foremost, the African leaders themselves, and importantly appears to have support from G-8 countries. Political action within the AU and G-8 will be needed if the role of globalisation on reduction of extreme poverty is to be realised.

Therefore, there has not been any shortage of programmes and initiatives with the potential to fight against extreme poverty in Uganda, and in other countries the Sub-Region. Economic historians and political scientists have, however, observed that history can be a rich soil for theory which could be exploited to understand the development problems. This notion is in fact captured in the institutional hypothesis by Acemoglu et al (2004), among others, and in the local capture theory advanced by Bardhan and Mookherjee (2000). Thus, understanding the historical perspectives within the development process in a typical less developed country could help inform the current debate.

For example, Dasgupta (2005) argues that policies and investment programmes are not plucked from air but are shaped by social and political struggles within society. The struggles determine the type of institutions developed. With strong institutions, good policies and programmes can bring about economic progress. Moreover, institutions consolidate depending on a given country’s history; the nature of political and economic crises a country experiences, the structure of the economy, and the

form and extent of globalisation. See for example Acemoglu and Robinson (2006) and Mamdani (1995), for greater detail. These presumptions illustrate the main mechanisms that could be crucial for absolute poverty reduction, and help to redirect the development debate. The historical context of Uganda is presented in the remaining part of the appendix.

(B) Historical Perspective of Uganda

It is now well-known that social and class struggles characterising the country's history play a crucial role in shaping institutions (Acemoglu and Robinson 2006). These institutions in turn would determine the development path the country takes over time. The period from the mid-1890s to 2000 in particular provides salient events that could be exploited to understand more deeply how the country's economy continues to unfold. For example, while giving a public lecture at the Main Hall, Makerere University on March 10, 1989, Prof Mahmood Mamdani, see Mamdani (1995), argued thus;

"A person who does not learn from his or her own past – who has lost memory – has lost the capacity for finding direction for the future. To find direction because we are in danger of being lost, we must return to our history"

In that lecture, Mamdani chronicled Uganda's history into four periods: 1890s-1920s, 1928-1949, 1949-1972, and 1972-1989. In fact, including the PGRF and HIPC period, in 1990-2000, completes an account of Uganda's modern economic history spanning for 110 years.

The important question between the 1890s and 1928 was who would be the agent of change in agriculture. The sector was to be the engine of growth in Uganda given the country's rich soil and tropical climate. That period started with a political struggle between the European planters, the local landlords and chiefs on one side, and the peasants on the other. According to Mamdani, the peasants prevailed due to the fact that: (a) because the landlords together with chiefs were parasitic and the planters were semi-parasitic, none of them could provide cheap raw materials for export; (b) because peasants organised politically as indigenous people who worked the soil – through the *Bakata* Movement - to protect their interests, they succeeded in getting

the colonial government to address their concerns (Mamdani 1995). This culminated into the Land Law, the *Busulu* and *Envujjo* Law, which gave peasants the security of land tenure. Consistent with the view that elites change institutions in response to popular pressure as proposed in Acemoglu and Robinson (2006), the colonial state thus acted by enacting this law. In fact, that Land Act was the key factor for the expansion of commodity agriculture in the subsequent period of 1928 - 1949.

During this period, there was clear division of labour that was not rivalled in the rest of colonial Africa. While the peasants worked the soil in their small farms, Indian immigrants were controlling the processing of exports and export trade. But again this period ended with another political crisis. The indigenous middle class organised the peasants against the immigrants, leading to the peasant uprising and the workers' general strike of 1945 and 1949. The colonial state was for the second time forced to reform the economy; the peasants were allowed to form cooperatives with the assistance of their middle class compatriots. These cooperatives then took over the marketing and processing of primary exports, driving the Asian immigrants out of this sector and also out of export trade. Meanwhile, the incentives provided by the colonial state policy facilitated the Asians to relocate to the manufacturing sector. Consequently, that period became the golden age of the Ugandan colonial economy: there was a boost in agricultural production and the peasants were handsomely rewarded for the efforts; and the manufacturing sector grew beyond the naive processing of exports. In fact, by the early 1950s the GDP of colonial Uganda was more than that of what turned to be the present day Asian tigers namely South Korea, Taiwan and Malaysia.

The legislations and subsequent incentives ushered in during the period of 1890s to 1949 by the colonial state were central to economic progress, emphasizing the importance of good institutions. They also took place in the context of peasants' emancipation, rapid agricultural growth and deepening of manufacturing. However, as Glaeser et al (2006) point out, a more serious question is how effective institutional change can be enduring and also be a commitment device. New laws might be legislated to undermine the old ones, reversing the gains from the old order.

This is exactly what happened during the subsequent period from 1951 to 1972. This is when serious agency problems started to emerge. The greed of the indigenous middle class made them turn against the peasants they had helped to form cooperatives. The former now started to control and use the cooperatives for their own enrichment. This was when the "local capture" symptoms by elites started to emerge in Uganda. Unfortunately but not surprisingly, the colonial state and also the post independence legislations worked in favour of the middle class at the expense of the peasants. The immediate post independence period, in 1962-1971, saw a shift to state-controlled commodity marketing bodies ensuring that rents would flow more freely towards the political elites. Things would only get worse. In January 1971, General Amin captured power in a military coup leading to radical and unprecedented actions. The Constitution was suspended and the Asian immigrants were expelled and their businesses expropriated in 1972. The manufacturing sector would eventually be controlled by General Amin's *mafutamingi*. This issue has a great significance in Uganda's economic history and development process. Because this group lacked the technical capacity required effectively to run the burgeoning manufacturing activities, the entire sector absolutely collapsed.

At the same time, the peasants' power in agricultural production was greatly undermined by the autocratic regime. For example, the 1975 Land Reform Decree dismantled the security of tenure that the peasants had gained in 1928. Every peasant became a squatter on their own land. By now, the peasants could easily be evicted by any local elite after successfully "convincing" a District Land Board, which of course happened to comprise of the local elites themselves. In addition, the East African Community, the then vibrant economic union for the three East African countries, was disbanded in 1976. This meant that trade was restricted, the common currency discarded, international relations with the majority of third country trading partners frozen, and human rights seriously abused. In fact, the social, political and economic activities came to a standstill. Consequently there was a total collapse of the economy. As it turned out, Amin's regime was to be toppled on 11th April 1979 following the liberation war that was launched from neighbouring Tanzania by Ugandan exiles, with the help of the Tanzania People Defence Forces.

However, this liberation held much promise to the poor but failed to usher in the political and institutional changes that could promote a change from autocracy to democracy, which in turn would promote economic growth. The elites working through the National Consultative Council (NCC) and the "Gang of Four" – Nabudele, Omwony-Ojwok (RIP), Rugumayo and Tendon – still held disproportionate influence in politics in spite of the liberation. This meant that the liberation had little effect on economic institutions because the elites invested more in their de facto political power (Acemoglu and Robinson 2006). Acemoglu and Robinson argue that when elites have power, the equilibrium changes in political institutions favouring the masses will induce offsetting changes in the de facto political power. The consequence of this is that economic outcomes could remain largely unchanged.

It is worth noting that in a space of just over one year, the above named elites toppled two Presidents, Prof. Y. K. Lule and Godfrey Binaisa (QC). These were replaced by a Military Commission led by Paul Muwanga and Yoweri K. Museveni, as Chairman and Vice Chairman respectively. This Military Commission organised a general election under a multiparty political system in December 1980, returning the Uganda Peoples' Congress (UPC) party, which General Amin had toppled, to power. This government took control of the cooperative unions in 1981. The state control meant that the peasants' interests were further jeopardised as there was no longer any democratic voting for cooperative officials. It was the Minister of Cooperatives and Marketing that now appointed them directly. Meanwhile Yoweri Museveni, who participated as a Presidential candidate for the Uganda Patriotic Movement (UPM) party, disputed the general election in spite of the fact that he was a Vice Chairman of the Military Commission that organised it. Instead of seeking judicial redress, Museveni launched a guerrilla war in the "Luwero Triangle" (comprising the present day districts of Kiboga, Luwero, Mityana, Mpigi, Mubende, Nakaseke, Nakasongola and Wakiso in central Uganda) to fight the elected government. The justification for this action has been that there was no effective judiciary at the time. In general, the median voter, a poor agent in the democratic process, was the loser. This turned out to be another missed opportunity for fostering democracy, which could in turn have promoted economic development in Uganda.

During the subsequent period of February 1981- January 1986, the country witnessed one of the most devastating civil wars in her history. This 5-year bush war by the National Resistance Army (NRA) against the UPC government ravaged much of the central Uganda, and crippled the economy even more. In addition to its strategic location, being the seat of central government, this region was well-known for producing Robusta Coffee which was a major foreign export earner. This war practically crippled the UPC government; it was not only exhausted economically but was also discredited morally. Consequently, the reign of that elected government came to an end through a military coup led by General Okello in July 2005. The Okello junta had a very short reign following rapid military successes of the NRA. The chaos abated on 26th January 1986 when the National Resistance Army/Movement (NRA/M) government led by Y. K. Museveni captured state power, this time the civil strife shifted to the Northern region, though.

The NRA/M “no party system” of government spearheaded wide ranging political and economic reforms, including stabilisation and adjustment programmes. Notable reforms included – introduction of resistance councils (RCs) right from the village to district level (now called Local Councils, or LCs) with the National Resistance Council (NRC) as the national assembly and currency conversion in the late 1980s, as well as privatisation of state enterprises from the early 1990s and dismantling of produce marketing monopoly in the mid-1990s. These reforms (particularly the removal of marketing monopolies) enabled farmers to get competitive farm-gate prices. However, instead of reforming the cooperatives, the NRM government decided to subdue them completely. Other reforms included the Public Service Restructuring where many civil servants were retrenched and other austerity measures that cut down spending in social services sector.

Since the mid 1990s, the government has instituted further institutional changes. These included - the 1995 Constitution replacing the 1967 constitution; the 1997 Land Act repealing the Land Decree of 1975; and the Local Government Act 1997 repealing the District Administration Act 1967. However, the 1997 Land Act also failed to address the peasants’ interests decisively. The peasants largely remained squatters on their own land. It is worthy to note that the 1997 Local Government Act gave the lower-tier governments the resource-generating and resource-absorbing

powers in a far-reaching community targeting mechanism, whereas the 1967 Act merely used the districts as agents of the central government for resource allocation. On the face of it, therefore, the 1997 Local Government Act was designed within the framework of the standard efficiency advantages theory of community targeting.

However, while the decentralisation in Uganda was economic, in the sense of the efficiency advantage theory, the calculation was largely political. It is worth noting that the debate between the decentralisation and the federal advocates in the early 1990s was, in fact, not about whether and how far to decentralise, it was about the unit of decentralisation (Mamdani 1995). As it turned out, two crucial factors drove the fiscal and institutional aspects of decentralisation in Uganda at the time. First, the evolution of development thinking and changes in the way major international donors thought about governance, including moving away from the blueprint approaches to the reform to emphasis on accountability and media attention. The second can be considered broadly as the political motives of the elites. Note that these two are interlinked. The appeal for multiparty democracy particularly from the donors eventually became an important driver. The NRA/M government could not be sure of securing an electoral victory, and hence feared losing political power, under the proposed multiparty dispensation. According to Mamdani (1995),

"The NRA/M government eager to shift political centre of gravity from the centre to the local, it acceded to the thirst of local elites for a share of the pie by introducing a far-reaching decentralisation programme".

Thus, the key question is whether the motive was about community targeting - in which case the poor would benefit - or whether it was about who would pull the strings, in which case the selfish local elites would end up capturing public information and the antipoverty programmes. This aspect is very critical for the current debate, given that the forces of *mafutamingi* are already entrenched in society and also given the present social and political structures in Uganda.

The economic history of Uganda therefore reveals an extraordinary pattern where institutions and economic structures were created in 1928 – 1949, then undermined in 1951 – 1971, destroyed in 1972 – 1979, stayed in a state of uncertainty in 1980 – 1986, and re-established in the 1990s though still weak. The political history of Uganda is that of never-ending instability and conflict. Economic process, evolution

of class structure, and widening inequality that occurred as a result of privatisation from the mid-1990s (The Republic of Uganda 2004), coincided with the interest groups pressure to fragment the districts. The latter aspect compromised the community targeting objective of the decentralised service delivery mechanism as the local elites captured public information for their selfish motives. The decentralisation reform of the 1997 only exacerbated poverty.

Overall, the picture from Uganda's historical account raises a number of concerns. First, when the peasant lacks security of land tenure, and thus lacks the incentive to invest any savings or money received from micro-creditor on land, macroeconomic stability might not be that effective in determining how much to invest in agricultural production. Second, when the economic and political institutions do not favour the peasant majority who would be the agent of change in agriculture, instead strengthening the autocratic forces and widening economic inequality gap between the elite and the poor, it is unreasonable to think that sustainable economic development can be achieved. Third, the absence of functioning savings scheme and safety nets coupled with high infant mortality rates in any society compounds the problem as fertility rates could increase. According to the demand driven fertility theory, the poor people are likely to prefer more births as they view children as their only source of security and insurance in old age.

An important by-product of this Appendix is a rich set of implications about circumstances under which economic development could be jeopardised and ends up stagnating. In particular, this appendix provides additional clues to the answers for the question: why is it that extreme poverty can still persists even amidst growth? The empirical evidence from chapter 2 shows that the worsening inequality stemming from distributional mechanisms wipes out growth gains. And what does this suggest? Some few entrepreneurs accumulate capital and wealth from the owners of factors of production. In the case of Uganda it is the workers, the farmers and the peasants who lose out. And who gains? It is few entrepreneurs and the rent seeking bureaucrats and the local elites, or the *mafutamingi*! Consistent with the development literature of the early 1980s, this process of inequality could continue until there is: (1) sufficient technological progress to shift productivity gains to the workers; (2) adequate institutional growth to redistribute income through improved social welfare payments

to the workers and better provision of public goods and services to the population; (3) sufficient labour union pressure to force the entrepreneurs to pay market wages to the workers; and (4) a big number of modern farmers who participate more into the determination of the prices of their produces, through cooperatives or commodity exchange.

Another explanation for the persistence of absolute poverty is greater elite capture of antipoverty programmes (see chapter 3, 3.4). This appears to have originated from the early 1970s under General Amin's regime. Moreover, the local capture theory casts a gloomy picture on the effect of decentralisation especially when there are incomplete political markets and informational constraints. Decentralisation is meant to make the provision of public goods and services more relevant to the people to whom they are supposed to be provided. However, greater local capture makes decentralisation not fit for purpose. This could continue unless individuals/households are enlightened so that they are able to hold their political leaders to account, through regular free and fair local and national elections. In addition, the provision of public goods and services assumes that there is local government efficiency. This might not exist in Uganda given the current district fragmentation responding largely to ethnic and interest group pressures.

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