POVERTY DYNAMICS IN KAGERA REGION – 1991-2010

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PhD (Economics) Dissertation

University of Dar es Salaam

October, 2016

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By

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A Dissertation Submitted in Partial Fulfilment of the Requirements of the Degree of Doctor of Philosophy (Economics) of the University of Dar es Salaam

University of Dar es Salaam

October, 2016

CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance by the University of Dar es Salaam a dissertation titled: ***Poverty Dynamics in Kagera Region -1991-2010,*** in partial fulfillment of the requirements for the degree of Doctor of Philosophy (Economics) of the University of Dar es Salaam.

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Dr. John Kedi Mduma

(Supervisor)

Date: 18/10/2016

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Dr. Innocent John Karamagi

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Date: 18/10/2016

DECLARATION

AND

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I, **Innocent Muganyizi Pantaleo**, declare that this dissertation is my own original work and that it has not been presented and will not be presented to any other university for a similar or any other degree award.

Signature ...……

ACKNOWLEDGEMENT

The topic on Poverty Dynamics has inspired me for some time, particularly due to my life experience in Kagera Region and what I have been witnessing among the people in the region, my ancestral home. The work has been facilitated by and benefited from a lot of people whose generosity and material and moral support have contributed a lot to the development and completion of this work. However, due to limitation of space, I cannot mention all of them. Still, the enormous intellectual debt that I owe them will always remain.

My deep appreciation should go to my main supervisor, Dr. John Kedi Mduma for his critical comments, encouragement and tireless guidance, which helped me to shape this study, from the research proposal stage to its present form. I am thankful also to Prof. Adolf Faustine Mkenda, who was my second supervisor before he was appointed as Deputy Permanent Secretary, Ministry of Finance, and later as Permanent Secretary, Ministry of Industry, Trade and Investment, for his guidance and critical comments during the preliminary stages of dissertation writing. In view of Prof. Mkenda's new responsibilities, it became difficult for him to continue with the supervisory role. Thus, Dr. Innocent John Karamagi accepted my request to take over as the second supervisor. Thus, I express my gratitude for his acceptance of the supervisory role and for his technical and editorial assistance. I also express appreciation to Prof. Longinus Rutasitara, Dr. Beatrice Mkenda and Dr. Aloyse Hepelwa for their technical comments.

Profound gratitude is also extended to the African Economic Research Consortium (AERC) for the financial support, including giving me an opportunity to attend the Collaborative Research Seminars from which I was able to receive valuable comments from scholars in poverty, development and health, in particular Erick Thorbeke, James Foster, John Strauss, David Sahn, Jean-Yves Duclos, Germano Mwabu, Tony Addison, Finn Tarp and Abebe Shimeles.

I would also like to express my thanks to the World Bank, Washington Office, for providing me with access to the Kagera Health and Demographic Survey (KHDS) datasets as well as for their financial support on poverty analysis. Special thanks should go to Kathleen Beegle (currently World Bank Programme Leader for Ghana, Liberia and Sierra Leone) for her technical support and for attending my presentation during the AERC's PhD Progress Reporting Workshop in Nairobi, Kenya. My thanks should also go to Joachim De Weerdt for his comments on the proposal and to Bjorn Van Campenhout for his technical support on poverty decomposition.

Similarly, during the pursuit of the programme I benefitted from the co-operation with my fellow PhD (Economics) students and friends, Dr. Hamza Mkai, Dr. Onesmo Selejio, Dr. Elineema Kisanga, Dr. Balozi Morwa, Nassor Hussein, Awe Safari, Dr. Suleiman Misango, Dr. Ernest Ngeh, and Dr. Delphine Magere, to mention but a few. Special thanks should go to the staffs of the Department of Economics at the University of Dar es Salaam for their invaluable comments and the University administration for granting me a study leave to undertake the programme.

Moreover, I exceptionally thank all members of my family and friends who relieved me of other responsibilities during the study period. My special thanks should go to my lovely wife Agnes N'nakanwaji Lubogo for taking care of the children and the family, and our sons, Ian Rwegasira and Ince Mugisha, for their patience and understanding "*bila kumlilia baba anapoenda kusoma*". I also thank my brothers, the late Denis (*who died in a car accident during my PhD. Studies; May God rest his soul in eternal bliss*), Placid, Jerome, Hermes, Geoffrey and Allan and my sisters, Flora, Flavia, Annatoria and Ninsiima. Their handling of family matters gave me the peace of mind and enabled me to concentrate on the academics. I also extend my thanks to my in-laws particularly my father-in-law, Mr. Onesphoriuos Lubogo, and my mother-in-law, Mrs. Leocadia Kebyela Lubogo, and I say to her "*Ugua pole Mama, na Mungu akubariki upone haraka"*. As well, the support and encouragement of Mr. Themistocres Katabazi (Nabii Cres) and his family, Gregory, Frank, Sylivia, Bonny, Kage, Rwesha senior and junior, Grayson, Mwesiga, Ta John, Diana, Prof. Severine Rugumamu and Mr. Amon Manyama is well appreciated; ***"MUKOZILE MUNO WAITU, RUGABA ABEMELE".***

Lastly, no errors and omissions should be accounted to any other person or institution, whether acknowledged or not, apart from me.

DEDICATION

I dedicate this work to my lovely wife Agnes and our sons, Ian and Ince. Your support, inspiration, love and affection during my study will remain unforgettable in my heart; and to my sisters and my surviving brothers.

Also, this work is in memory of my father, the late Pantaleo Benedict Rweshagara, my mother, the late Apronia Kagemulo Pantaleo, and my brother, the late Denis Mutayoba Pantaleo. May Almighty God rest their souls in eternal bliss. *You will always be missed!*

LIST OF ABBREVIATIONS

AIDS	Acquired Immunodeficiency Syndrome
CPL	Community Poverty Line
EDI	Economic Development Initiative
FAO	Food and Agriculture Organization
FE	Fixed Effect
FGT	Foster-Geer-Thorbeke
FYDP	Five Year Development Plan
GDP	Gross Domestic Product
GMM	Generalized Methods of Moments
H	Headcount
HIV	Human Immunodeficiency Virus
HT	Hausman Taylor
IG	Income Gap
KH	Kuznet Hypothesis
KHDS	Kagera Health and Development Survey
LCH	Life Cycle Hypothesis
LDC	Least Developed Countries
LSMS	Living Standards Measurement Study

NBS	National Bureau of Statistics
NPES	National Poverty Eradication Strategy
NSGRP	National Strategy for Growth and Reduction of Poverty
OCGS	Office of the Chief Government Statistician
PIH	Permanent Income Hypothesis
PSU	Primary Sampling Unit
PHHM	Previous Household Member
RE	Random Effect
TASAF	Tanzania Social Action Fund
THBS	Tanzania Household Budget Survey
THDS	Tanzania Health and Demographic Survey
TZS	Tanzanian Shillings
UNDP	United Nations Development Programme
URT	United Republic of Tanzania
UK	United Kingdom
USA	United States of America
USD	United States Dollar

ABSTRACT

This study examines the dynamics of poverty in Kagera Region during 1991-2010 period using the Kagera Health and Demographic Survey panel data. First, the study decomposes the Kagera headcount poverty index into growth, inequality and rural/urban population shift effects using Son (2003) approach. The results show population shifts was pro-poor and growth led to reduction of poverty within the region. These results imply that there is need for pro-poor employment creation strategies in urban areas and increased productivity in rural areas. Second, employing the fixed effects model and dynamic panel data estimators and borrowing from Ravallion (1988) approach, the study examines the dynamics of household's consumption and vulnerability. The dynamic panel data estimators show that Life Cycle Hypothesis for consumption smoothing does not hold, whereas the Ravallion (1988) approach show that risk to poverty is less for the 1991 poverty line and high for 2010 poverty line. Thus, pro-poor farming approaches and earmarking resources for consumption stabilization interventions are needed. Lastly, the study examines a household's duration in poverty and factors accounting for falling into or moving out of poverty. The non- parametric and semi-parametric discrete data spell approaches are employed. The non-parametric results show that poverty is transitory, and that male-headed households have a higher likelihood of exiting poverty than female-headed ones. The duration variables have significant positive effect for exiting poverty. In this regard, policy may entail enhancing social networks and improving the balance in resource distribution and allocation between sexes.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

This study examines the dynamics of poverty in Kagera Region during the period between 1991 and 2010, with regard to issues pertaining to several dimensions that consternated to make some households poor and others non-poor.[1] Understanding the dynamics of poverty may contribute to solving poverty problems facing Tanzania by providing timely empirical evidence which may be utilized to enhance future home-grown poverty reduction strategies, such as the National Strategy for Growth and Reduction of Poverty (NSGRP) and Five Year Development Plans (FYDPs). These strategies, among others, underscore the importance of economic growth in poverty reduction.

In Tanzania, the government over time embarked on a number of initiatives such as the National Policy on Productivity, Incomes and Prices; the National Poverty Eradication Strategy (NPES) and NSGRP, all of which targeted reduction of poverty and broad-based economic growth. Yet despite the fact that these initiatives have resulted in high sustained economic growth and real per capita income growth for some years now, the outcomes with respect to poverty reduction have continually not been very promising, especially in the rural areas (Mkenda *et al*., 2010 and Atkinson and Lugo, 2010). In

[1] These include issues such as consumption dynamics, vulnerability, migration and duration in poverty.

particular, since 1991, the percentage of the population living below the basic needs poverty line for Mainland Tanzania fell over time only very slightly, from 37 percent in 1991 to 34.4 in 2007 and 28.2 percent in 2011/12 (URT, 2001; URT, 2014b). Notable also is the fact that majority of the rural people, including those in Kagera Region, are still poor, with the percent of the population living below the basic needs poverty line in the rural areas being 33.3 percent in 2011/12 compared to 21.7 percent in 2011/12 for urban areas. Thus, poverty in Tanzania is largely a rural phenomenon.

Limited progress on poverty reduction worldwide has stirred a number of studies. These studies have resulted into inconclusive results. For instance, among others, Dollar and Kraay (2002), Kakwani and Subbarao (1990), Ravallion and Datt (1996), Datt and Ravallion (2002) and Agrawal (2008) find a positive correlation between growth and poverty reduction. On the other hand, Brock and Durlauf (2000) and Bourguignon (2000) basing in cross-country studies could not conclude on the clear direction of the relationship.

On Tanzania, Mkenda *et al.* (2010) raise questions on the outcomes of the poverty measurements which do not square well with some available evidence on health, education and asset accumulation. In particular, the way poverty has been measured is prone to constraints of conceptualizations, particularity of measurements and data inadequacies to enable it to depict fully the extent of poverty reduction, which necessitates a need for more dimensions and better measurements of poverty. Da Corta and Price (2009) find rural incomes (in nominal terms) to have fallen and the cost of

living to have risen during the period of their survey (2004-2008), thereby confirming that poverty is still widespread in Tanzania. They find the main obstacle to pro-poor growth to be ineffectiveness of social services (namely, health, education and water). Higgins (2013) explain chronic poverty and descent into poverty, despite the observed economic growth for the period 1999 to 2009 and find that only a limited proportion of the people in the sample are able to escape from poverty in that period, with stagnation being the most common poverty dynamic.

Unsatisfactory progress on poverty reduction in Tanzania, particularly for the rural areas, calls for tracing the economic engagements and poverty outcomes over time at household level and to assess attributes that are associated with the possibilities of a person or family moving out of poverty, remaining or moving into poverty. Whereas some of these attributes have been examined in a number of studies on Kagera Region (Litchifield and McGregor, 2008; De Weerdt, 2010; and Beegle *et al*. 2011), these studies have not addressed the probability related to the duration within which people of certain attributes move out of poverty (if poor), remain or move into poverty. From the accessed literature, it is indicated that the issue has not been explored in Tanzania, and this study has attempted to accomplish that task.

Additionally, it has been conjectured that trends of poverty can be explained by a combination of population dynamics, economic growth and inequality changes (Son 2003). This conjecture implies that poverty reduction initiatives will be more effective if they address the particularity of a given setting. Hence, these initiatives should emanate

from understanding the specific factors that are contributing locally to people's poverty and their extent (in relative terms). However, to date, very few studies on Tanzania have used a composite poverty index of growth, redistribution and population dynamics to examine the poverty trend. Some studies, which have been undertaken elsewhere, have decomposed the poverty index using cross-sectional data. This study has added a dimension of decomposing the poverty index using panel data sets, which are based on specific life-history of the households.

Moreover, using the panel data sets affords the examination of the risk over time of a household falling into poverty and the extent of the accompanying vulnerability. To this end, this study analyzes the consumption dynamics and vulnerability in Kagera, to understand the root cause of either moving out of, remaining or falling into poverty.

The choice of Kagera Region rests on the peculiar external circumstances that have affected negatively the region's economy. Up to the mid-1970s, Kagera was one of the economically well performing regions in the country. However, from the end of the 1970s, the region suffered a setback from internal and external shocks (URT, 1998), which have continued to push it down economically, such that it is now one of the poorly performing regions in the country. First was the Kagera war[2], which affected badly the productive capacity of the people and disrupted production. Second, the high rate and spread of HIV/AIDS decimated the region's active population and raised the

[2] This was the war between Uganda (under Idi Amin's regime) and the United Republic of Tanzania, whereby the West Lake Region (later named Kagera Region) was the battle field, after Idi Amin had unprovocatively invaded Tanzania and annexed a part of West Lake Region beyond Kagera River.

dependency ratio, with many elderly people and orphans left without care. Third, the fall in the price of coffee, the main cash crop, substantially reduced the incomes of smallholder farmers. Moreover, the food security of Kagera people was affected by a plunge in banana production, the main staple and cash crop, due to banana weevil infestation and other diseases and reduced soil fertility[3].

As these factors continued to affect the productive capacity of the region, many of the affected households became vulnerable to poverty. By 2004, the region was categorized among those with slow growth and ranked among the poorest regions in Tanzania at 16th position out of 22 regions (Mkenda *et al*. 2004) and 18th position out of 21 regions in Human Development Index (HDI) ranks by 2012 (URT and UNDP, 2014). Yet, by the early 2000s, the region was still faring well in terms of distributional aspects, and ranked sixth in the inequality regional ranking (Mkenda *et al*. 2004). These unfavorable economic conditions have been worsened by the population dynamics, especially in the form of the influx of migration both from within and out of the region due to political conflicts in neighboring countries of Rwanda, Burundi and Democratic Republic of Congo (Beegle *et al*. 2011).

Various researchers have attempted to examine the effects of the complex problems that have afflicted Kagera Region, particularly how they have affected the socioeconomic status of people in the region. De Weerdt (2010) used qualitative and quantitative panel

[3] As I was finalizing this study, Kagera Region was struck by yet another disaster: on the morning of September 11, 2016, an earthquake of 5.7 magnitude on a Richter scale hit the region, which left thousands of households homeless and hundreds of people injured or dead.

data to explore the growth trajectories of matched households in the region. His results show that the poor are more vulnerable compared to the non-poor, and agriculture and trade provided the two main routes out of poverty. Overall, his study finds that the interplay between initial conditions, shocks, networks and experiences of life beyond the village determine whether a person will move out of poverty or not in the next ten years. Other factors influencing moving out of poverty in Kagera Region include the following: migration (Beegle *et al*., 2011); social, physical and human capital (Litchfield and McGregor, 2008); and credit (Ikegami, 2008).

1.2 Statement of the Problem

This study was motivated by the evidence that the Tanzania's home grown poverty reduction strategies stimulated growth, albeit with less promising poverty reduction outcomes, especially in rural areas. Could it be that the poverty dynamics could not be generalized as to be tackled with pan-territorial initiatives? In addition, there is less empirical knowledge in Tanzania on the exact contribution of growth, redistribution and population dynamics on poverty index including little understanding of the risks and duration it takes to move out or fall into poverty and the contributing determinants. Moreover, Kagera Region has specific dynamism that are not experienced by other poor regions in Tanzania, including for example, border and proximity effects (migration, refugee, trade and HIV/AIDS), coffee price shocks and land characteristics, previous performance in relation to education and households income. On education, the region was affected by the government's "catch-up" approach for backward districts;

nationalization of secondary schools and policy of reserving places for students from outside the region (Tibaijuka, 1997). On health, the first HIV/AIDS patient in Tanzania was observed in the region. The question then is, what consumption and poverty implications do all these have at household level?

Thus, this study investigates the dynamics of poverty and consumption in Kagera Region and their contributing factors for the period 1991 to 2010. First, the study examines the contribution to poverty in Kagera Region over time of growth, inequality and migration. Secondly, the study seeks to understand whether there are consumption differences among households; and if there are, to examine whether they conform to theoretical underpinnings and have manifested themselves into making some household risky and vulnerable to poverty or not. Lastly, the study examines through duration analysis the time it takes to move out of or fall into poverty and the contributing determinants.

1.3 Objectives of the Study

The overall objective of the study is to investigate the dynamics of poverty in Kagera Region for the period of 1991-2010.

The specific objectives are the following:

i. To decompose the Kagera Region headcount poverty index into growth, inequality and population shift effects for the period of 1991-2010;

ii. To examine the dynamics of household's consumption and vulnerability for the period of 1991-2010; and,

iii. To investigate the duration it takes for a household and factors accounting for falling into or moving out of poverty for the period of 1991-2010.

1.4 Significance of the Study

The study contributes to knowledge through using different methodological approaches, incorporation of new information by including data of the sixth (new) wave of Kagera Health and Development Survey (KHDS), and providing more evidence with regard to poverty issues within a longitudinal data setting for the period 1991 to 2010. Moreover, the study extends the understanding of issues related to poverty dynamics in Tanzania, especially with respect to areas highly affected by several shocks such as Kagera Region. An understanding of the underlying issues will inform policy makers on the appropriate policy interventions for rural poverty reduction.

Moreover, when contrasted to other regions in Tanzania, Kagera Region as mentioned before has its own peculiarities. Thus, an understanding of poverty dynamics in such a setting will provide useful evidence and a platform that may be used to gauge whether or not poverty reduction initiatives in Tanzania should be geared at addressing the local context, rather than being generalized over the whole country.

1.5 Organization of the Dissertation

The study is divided into six chapters. Chapter Two gives an overview of Kagera's socioeconomic status. Chapter Three provides the decomposition and trends of poverty in Kagera Region. Chapter Four analyses consumption dynamics, whereas Chapter Five provides the duration analysis. Finally, Chapter Six presents summary, policy implications and areas for further research.

CHAPTER TWO

KAGERA REGION: A SYNOPSIS OF GEOGRAPHICAL, SOCIAL AND ECONOMIC CHARACTERISTICS

2.1 Introduction

Up to the early 1970s, Kagera Region was among the regions that had made substantial progress in education, agricultural production and other socio-economic areas. However from the early 1980s, as provided in the next sections, some of the social and economic services started to deteriorate. In this chapter, a synopsis of Kagera Region is presented to give an overview of geographical, social and economic characteristics that have had a bearing on poverty evolution of the households in the region. Sections 2.2 and 2.3 provide the geographical location, land size and administrative divisions. Trends in population and socio-economic indicators are given in Sections 2.4 and 2.5 and health and education indicators are given in Section 2.6; whereas Section 2.7 summarizes the chapter.

2.2 Geographical location

Kagera Region is located in the extreme north-western corner of Tanzania, and includes a substantial part of the waters of Lake Victoria. The region is bordered by three countries, namely, Uganda to the North, and Rwanda and Burundi to the West. The proximity to these countries carries the potential of being economically advantageous to the region, although the actual benefits have been insignificant to date. To the contrary,

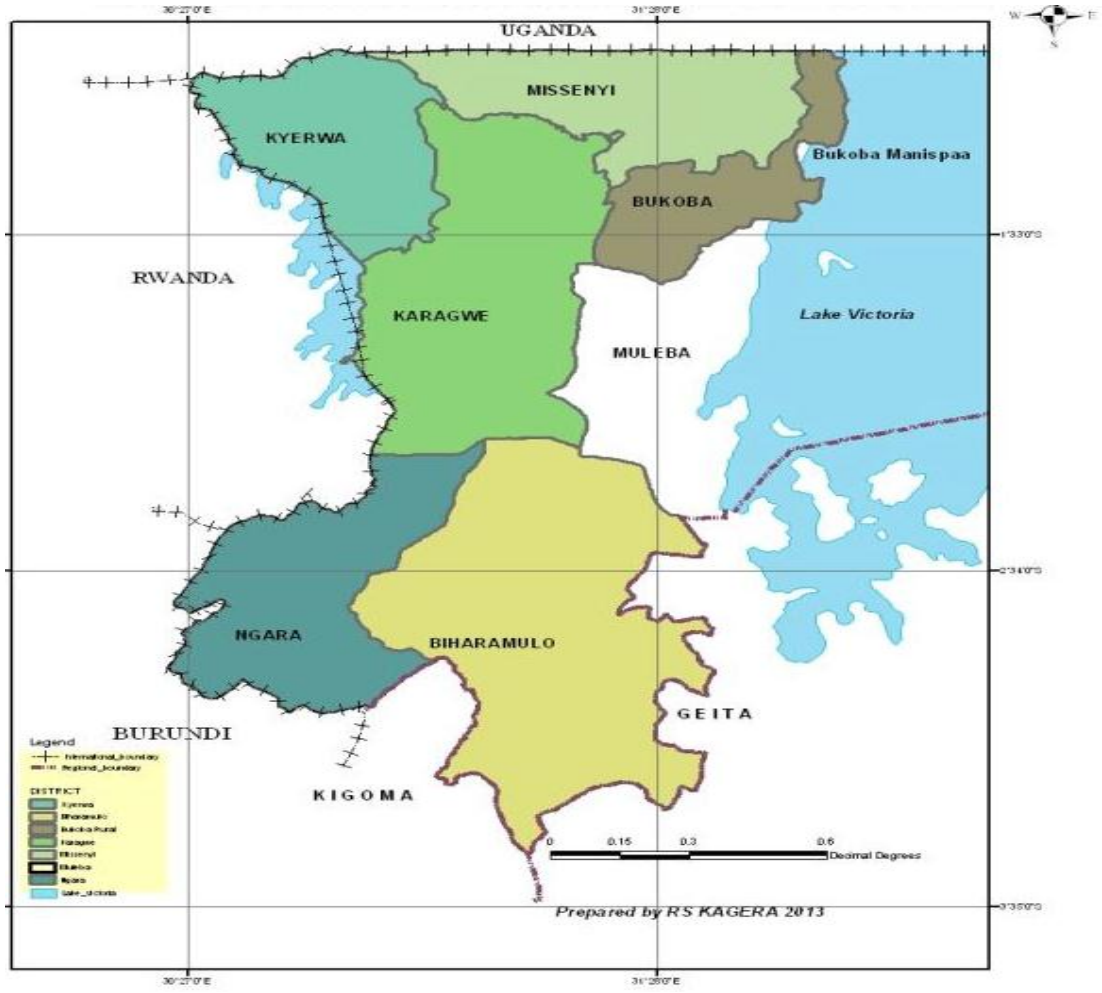
the region has been exposed to security risks and negative foreign influences such as refugee influx, smuggling of coffee, war effects and HIV/AIDS, more than any other region of Tanzania. Internally, Kagera Region is bordered by the regions of Kigoma to the South, Geita to the Southeast and Mwanza, and Mara to the East. The extremity of the region is indicated by the distance from major cities (for instance, Dar es Salaam is more than 1400 kilometers away from the region's capital, Bukoba, and Dodoma, the capital city, is 982 kilometers away).

2.3 The Region: Size and Administrative Districts

The region covers 40,838 square kilometers, of which 28,953 square kilometers is land and 11,885 square kilometers is water bodies of lakes (namely, Victoria, Ikimba, and Burigi) and rivers (namely, Kagera and Ngono). The land area is approximately 3.2 percent of the total 883,527 square kilometers of the total land area of Mainland Tanzania. The land constitutes as well some of the islands in Lake Victoria, including Bumbire, Lushanga, Iroba, Ikuuza and other 24 small islands. Of the 28,953 square kilometers which is land, about 440,393 hectares are under cultivation with 28 percent of this area being in Karagwe, the largest district. The region's altitude is between 1100 and 1800 meters above sea level.

The region is divided into eight administrative districts of Bukoba Urban, Bukoba Rural, Missenyi, Muleba, Ngara, Biharamulo, Karagwe and Kyerwa, as shown in Figure 2.1.

Figure 2.1: Map of Kagera Region



Source: URT (2013a)

2.4 Population

Kagera Region ranks fifth in terms of population distribution by regions in Tanzania, with the household size of 4.7 - which is a bit lower than the national average of 4.8 per household (URT, 2014a). Furthermore, in 2002 the total population of the region was 2,028,157 which increased to 2,458,023 in 2012 (Table 2.1). Hence the annual inter-censal rate (2002-2012) was 3.2 (ranked 6th out of 30 regions), which was higher than

the national average rate of 2.7 (URT, 2006a; URT, 2014a). This relatively high inter-census rate may have been partly a result of migration of people from the neighboring countries.

Table 2.1: Kagera: Population Trends

Year	Population	Inter-census Rate
1948	456,396	1.1
1957	514,431	1.3
1967	658,712	2.6
1978	1,009,379	3.8
1988	1,313,643	2.6
2002	2,028,157	3.1
2012	2,458,023	3.2

Source: URT (1998)-Kagera Profile; URT (2006a), URT (2014a) - Housing and Urban Census; Bryceson, D.F (1988)

In 2012, Kagera Region had a population density of 97, relative to the national average of 51, ranking it as 9th out of 30 regions of Tanzania. Coupled with decreasing soil fertility, this high population density creates land pressure within the region, which reduces the productive capacity of households, thereby resulting in increased poverty, if the affected households do not engage in producing alternative high value crops or other non-farm activities. As for the age distribution, Table 2.2 provides a comparative description of the region's age distribution between censuses.

The Kagera Health and Development Survey (KHDS), a panel dataset with six waves, collected since 1990 to 2010 is used for analysis. The comparative census used in Table 2.2 was conducted two years before the first wave and two years after the last wave. Contrary to expectation, the dependency ratio in Kagera Region has declined, albeit

slightly, from 52.6 in 1988 to 51.2 in 2012 census results. However, the dependency ratio would have been high if those between 60 to 64 years (defined as old people in the Old Age Policy) and those between 15 and 18 years (categorized as children under the UN Convention on the Rights of the Child) would have been considered among the dependents.

Table 2.2: Kagera Age Distribution: A Comparative Description between Census

Age Group	1988	2012
Children (0-14 years)	47.3 % (45.7%)	47.7 % (43.9%)
Economically Active (15-44 years)	37.60%	40.12%
Working Group (15-64 years)	47.20%	48.8 % (52.2 %)
Dependency Ratio	52.6	51.2 (47.8)
Dependency Ratio –out of 100	111 (100)	105
Percent of residents in rural area	94.7	90.8

Source: URT (1998a) and URT (2013a)-Kagera Investment Profiles; URT (2006a), URT (2014a)-Housing and Urban Census Report; URT (2013b)
Note: In brackets are National Averages

In Kagera, some of the orphans were left without care and had to take adult responsibilities and some old people had to care for their grandchildren rather than being cared for. Hence, instead of them being part of the dependency ratio, they have been thrown by economic circumstances (informally) among the "working group", which has contributed to increased poverty over time than it would have been otherwise.

The districts of Kyerwa and Biharamulo have average household size higher than the regional average; whereas Muleba District is the most populated district in the region (URT (2006b) and URT (2014a)). Household size has both positive and negative

bearings on a household's poverty status. On the one hand, household size contributes positively to the manpower and income, whereas on the other, if most of the household members do not belong to the productive age group, a larger size may contribute to increased dependency, thereby increasing a household level's poverty status.

Given the ambiguity of the contribution of the household size to poverty status, this study has included household size among the correlates of household's poverty status in the region. Generally, in the early years of the examined period, Kagera Region experienced high mortality rate due to the HIV/AIDS pandemic, relative to other regions. However, contrary to expectations, Ainsworth *et al.* (1995) observed that despite prime-aged adult deaths in Kagera Region, households maintain their size and dependency ratios. Thus, the death of household members in the region due to HIV/AIDS did not have a large impact on the levels of population and household size over time. Moreover, according to Hosegood (2009), in most countries in a panel data setting, the effect of death of household member(s) on household size was dependent on the age, sex and position of the member(s) who died. For example, households that suffered a female prime-age death were twice as likely as non-affected households to attract a new prime-age female.

2.5 Socio-Economic Indicators

Kagera Region is among the regions in Tanzania that has witnessed the positive and negative sides of migration, most of them being a result of the location of the region (Gould, 1995; Ongpin, 2008; and Baez, 2008). The region is affected by migration of

people from the neighboring countries, especially Rwanda and Burundi. Migration of a population, both internal and cross-border, could be triggered by various factors including search for new farm land, better pasture, water for livestock, conflicts in original areas of residency and search for better life through better employment opportunities elsewhere (Mabogunje,1970; Hoddinot, 1994; de Haas, 2007; and Beegle *et al.,* 2011). As for Kagera Region, the witnessed migration is associated with almost all the above factors, but the most notable is the massive migration due to conflicts in Rwanda and Burundi, searching for new farm lands and search for better life through better employment opportunities elsewhere (Beegle *et al*. 2011, Twinomukama, 2014). This study departs from Beegle *et al*. (2011) who investigated the effects of migration on consumption change and economic mobility by tracing the impact of migration through decomposing the poverty index in its contributing factors including migration, and including migration among the correlates in the consumption and duration analysis.

The GDP of the region has been growing over time, as shown in Table 2.3. For instance, the regional GDP in 1991, the year when the first wave of the used data was collected was TZS 38,715 million, which increased to TZS 588, 476 million in 2005 and increased further to TZS 1,260,688 million in 2010. However, the position of Kagera Region in terms of per capita income compared to other regions has continued to plummet due to the fact that over time the economic conditions in Kagera Region have continued to worsen more than in many of the other regions. For instance, the region ranked 12^{th} in 1994 out the 21 regions in Tanzania, falling to 18^{th} in 2005 and to 19^{th} in 2009 out of 21 regions. It fell in the category of four poorly performing regions, which include also

Dodoma, Kigoma and Singida, the regions which are not as well-endowed with natural resources as Kagera Region.

Table 2.3: Regional GDP and Per Capita Income (Selected Years)

Year	Regional GDP "000"	Per Capita Income	Rank of 21 regions Per Capita	National Standard Per Capita Income
1991	38,715	26,197		42,473
1992	49,101	32,307		50,431
1993	63,336	40,523		49,270
1994	80,537	50,105	12	48,918
2005	588,476	266,663	18	403,283
2006	676,919	306,268		433,783
2007	764,918	333,575		495,932
2008	907,128	381,204		568,771
2009	1,012,221	409,822	19	627,040
2010	1,260,688	491,722		770,464

Source: URT (2013a)-Kagera Investment Profile; NBS Tanzania 2010; BoT (2000)

Note: (i) Empty cell means data could not be found.

(ii) The data for 1994 and prior to that do not directly compare to those for 2005 and after due to the rebasing exercise of the National accounts data.

The economic activities in Kagera Region include farming, fishing, small scale mining and service-related activities. The non-farm activities are not as vibrant as they should be to allow for diversification out of farming. For instance, over time, the region has been characterized by poor industrial development (URT, 2013a). Moreover, the contribution of fisheries and livestock has remained low (URT, 1998; URT, 2013a), with the fisheries sub-sector being dominated by small-scale fishermen who use traditional fishing gear, with only a few using outboard engines. The use of poor technology in fishing negatively affects the level of income earned through fishing and the advancement of the fisheries industry. Moreover, despite the region having economic

potential in terms of minerals, such as gold, cobalt, glass, tin and nickel, this potential is yet to be fully exploited, which is denying the region the benefits from these minerals.

Agriculture in Kagera Region has not succeeded over the years to emancipate most of the households economically, which has inspired the response in terms of occupational shift within the region. Thus, the proportion of the population employed in agriculture in the region has been declining over time; from 88.2 percent in 1978, it declined to 70.7 percent in 1988 and declined further still to about 70 percent in 2013. Occupational shift has been instrumental for poverty reduction initiatives, particularly in geographical areas where agricultural productivity has been falling, as is the situation in Kagera Region.

In terms of crops grown, major crops are bananas, beans, coffee and tea. Table 2.4 shows the zone types and crops grown by district. The type of crops grown may explain the way people in a particular district cope with shocks and even how they diversify their agricultural production with a view to safeguarding their incomes, which is one of the important aspects in poverty analysis.

Table 2.4: Kagera Major Crops per Zone Types, by Districts

District	Zone Type	Crops Grown and Livestock
Bukoba Rural	Lake Shore and Islands; Plateau Area; Lowlands	Bananas; Beans; Coffee; Tea; Maize; Cassava; Some Livestock; Vanilla
Muleba	Lake Shore and Islands; Plateau Area; Lowlands	Bananas; Beans; Coffee; Tea; Maize; Cassava; Some Livestock; Vanilla; Sorghum; Millet
Ngara	Plateau Area; Lowlands	Bananas; Beans; Coffee; Maize; Cassava; Livestock; Cotton; Rice; Vanilla
Karagwe	Plateau Area;	Banana; Maize; Beans; Coffee; Cassava; Livestock; Vanilla
Kyerwa	Plateau Area;	Banana; Maize; Beans; Coffee; Cassava; Livestock; Vanilla
Biharamulo	Lowlands;	Cotton; Maize; Beans; Cassava; Rice; Sorghum; Millet; Tobacco
Misenyi	Plateau Area; Lowlands	Sugarcane; Coffee; Banana; Livestock

URT(2013a)-Kagera Investment Profile

The region has the largest planted area for coffee and the second largest planted area for paddy and sorghum than other regions in Tanzania (URT, 2013a). Crop husbandry has been poor over time, which has resulted in declining real production (URT, 2013a; Katega *et al*., 2014). Table 2.5 indicates a general decline in real production of food crops in the region, although the production of roots and cereals is shown to have risen after 2010/11.

Table 2.5: Food Crops Actual Production 2009/10-2011/12

		Actual Harvests (Tones)			
Year	**Area Maintained(Ha)**	**Banana**	**Roots**	**Cereals**	**Legumes**
2009/10	633,273	1,283,713	1,045,142	270,223	148,246
2010/11	552,453	1,215,163	897,060	200,703	104,310
2011/12	654,171	1,178,200	1,123,000	330,455	127,643

Source: URT (2013a)-Kagera Investment Profile.

Moreover, based on the 1991/92 producer prices, prices were better between the mid-1970s and the early 1980s than in the latter years (URT, 2013a). The price situation worsened in the early years after liberalization, specifically, from 1989 to 1990 (Baffes, 2003).

Low agricultural productivity is accounted mainly by subsistence farming and adverse soil conditions due to declining soil fertility coupled with little use of both organic and inorganic fertilizers. As well, productivity has been affected by crop diseases (URT, 1998; Katega *et al.,* 2014). From personal experience, the soil fertility problem is visibly worse in the districts of Bukoba Rural and Bukoba Urban and much less so in Karagwe District, where a large part of the land area is arable, with little degradation.

2.6 Health and education indicators

Knowing the health status of individuals and its implications on households' livelihood is very important for understanding the root causes of poverty dynamics in different places. According to Rugalema (1998) on HIV/AIDS in Kagera Region, a majority of those who were falling ill and dying of HIV/AIDS were producers, reproducers, and providers of their households. The implication of HIV/AIDS and other diseases involves understanding the pecuniary costs incurred and time used in taking care of the sick, the lost labour-force due to illness and the lost income that could have funded daily expenditure and education of children, to mention but a few.

In the region, the HIV/AIDS pandemic was the main health problem that significantly affected the well-being of many households. In Tanzania, the first HIV/AIDS patient was diagnosed and reported in 1983 from Kagera Region (Tibaijuka, 1997). Kagera was the region where the HIV/AIDS epidemic had the largest damaging effects from the late 1980s up to the early 1990s. The existence of orphans, neglected homestead, neglected banana and coffee farms is common, mainly as a result of the disease having decimated the number of economically active age group. However, Kagera has witnessed a decline in HIV/AIDS prevalence during the past two decades (Frumence *et al*., 2014); decreasing from 100 percent in 1983, to 24 percent in 1987 to 4.8 in 2009. Table 2.6 shows the comparative HIV prevalence rate for the selected regions.

Table 2.6: HIV Prevalence by Sex 2011/12, selected nearby Regions

	Women		Men		Total	
Region	**% HIV Positive**	**Number Tested**	**% HIV Positive**	**Number Tested**	**% HIV Positive**	**Number Tested**
Tanzania	6.2	9,755	3.8	7,988	5.1	17,746
Dar es Salaam	8.2	962	5.3	802	6.9	1,764
Kigoma	4.5	405	2.0	305	3.4	710
Shinyanga	8.1	368	6.6	313	7.4	681
Kagera	5.5	399	4.1	355	4.8	754
Mwanza	4.7	509	3.7	411	4.2	920
Mara	5.2	385	3.5	321	4.5	706
Geita	5.7	270	3.5	236	4.7	506

Source: TACAIDS, ZAC, NBS, OCGS and ICF International (2013)

In this study, the economic and poverty effect of a family member falling sick within a household is analyzed among the correlates of poverty in the region.

On literacy rate, although the literacy rate in Kagera Region has been rising over time, the ranking of the region in literacy has been on the declining trend. The region had a literacy rate of 52.4 (ranking 9^{th}) in 1978, 59.5 (ranking 11^{th}) in 1988, 66.9 (ranking 14^{th}) in 2002 and 76.8 in 2012. According to Tibaijuka (1997), the declining ranking in literacy trend may be attributed to a number of issues, including deliberate (and now discredited) national policies pursued after independence to decelerate the development of the relatively well-off districts and regions to enable the backward ones to "catch-up", and nationalization of secondary schools in the area and a policy of reserving almost half the places in such schools for students from outside the region. These led to declining economic and schooling opportunities, thereby prompting young men to travel frequently between home, towns and border areas in search of wage employment or to

engage in petty trade in essential commodities, which were always scarce in this remote border region (Tibaijuka, 1997). The literacy implication on households' poverty in the region is also been analyzed in this study.

2.7 Summary

Despite the impressive progress after independence in education, health, agricultural production and other socio-economic areas indicators in Kagera, some of the social and economic services started to deteriorate from the early 1980's. The chapter has attempted to shed some light on the evolution of basic socio-economic indicators, which are useful in explaining the trends and status of poverty in the region as compared to other regions in the country in general.

CHAPTER THREE

CONTRIBUTION OF POPULATION SHIFTS, INCOME GROWTH AND INEQUALITY TO POVERTY CHANGES IN KAGERA REGION, 1991-2010

3.1 Introduction

This chapter decomposes the Kagera headcount poverty index into growth, inequality and population shift effects. Over time, efforts to understand the extent to which growth and inequality contribute to poverty have continued to stir poverty decomposition initiatives. The scrutiny on the inequality-growth-poverty nexus, which was ushered in by Kuznet (1955), has been on-going and is still inconclusive. Kuznet (1955) explains the shape of the relationship between income inequality and income on the basis of factors associated with the shift of resources from agriculture to industry in the process of economic development. Although he focused on the shift of population from the rural to the urban sector in the course of development, he nevertheless, incorporated the analysis of distributional changes (Arnand and Kanbur, 1985).

In testing the Kuznet's model, Dollar and Kraay (2002) find that the correlation between growth and poverty reduction was positive. Other studies that support the contention of positive growth effects on poverty include Kakwani and Subbarao (1990), Ravallion and Datt (1996), Datt and Ravallion (2002) and Agrawal (2008), among others. On the other hand, Ravallion (2001) and Deininger and Okidi (2005) showed that higher growth was associated with higher poverty reduction and inequality. However, in cross-country

studies, the relationship was found to be inconclusive, for example, by Brock and Durlauf (2000) and Bourguignon (2000).

The understanding of poverty-inequality-growth nexus was given impetus by a methodology for decomposing poverty into growth and distributional aspects. The most common and widely used approach is by Datt and Ravallion (1992), which is based on estimating the parameterized Lorenz function. Some studies on Tanzania have decomposed poverty into growth and redistribution effects. Atkinson and Lugo (2010), using the Tanzania Household Budget Survey (THBS) and National Accounts data, contributed to the debate on the relationship between economic growth and national objectives particularly on poverty reduction. Their results show that it is the pace of growth that is instrumental for poverty reduction, rather than the final figure. Mkenda *et al*. (2010), using the THBS and National Income data, intended to determine the extent that the available data (survey and national accounts) is suitable for monitoring Tanzania's growth and distribution through invoking several methodologies including regression based decomposition of poverty index. Their study provides some clues as to why impressive growth has not led to poverty reduction, and dismiss the role of inequality. Lugoe (2003), using time series data on Tanzania, includes the effect of distribution by using distribution-corrected economic growth, and the results show that distribution-corrected economic growth reduces poverty.

As for Tanzania in particular, most of the studies have concentrated on growth and inequality effects. However, there is a need to examine also the contribution to poverty

that emanates from the migration or population shifts processes in both rural and urban settings. This study emphasizes the contribution of migration to poverty status in Kagera Region because the hardships and shocks that Kagera Region has experienced have been causing people to migrate to other areas, as one of the coping mechanisms. Hence in Kagera Region, migration is perceived as one of the major factors of population dynamics. In the analysis of factors causing poverty, De Weerdt (2010) shows that those who migrated in Kagera in the early years[4] faced difficulties due to lack of initial endowments in the areas they migrated to. Later, however, they picked up economically through networking well with the indigenous populations in their new community. Moreover, Beegle *et al*. (2011) points out that the unfavorable economic aspects have been worsened by the population dynamics, especially in form of the influx of migration both from within and out of Kagera Region; Using regression-based analysis on households in Kagera Region the study shows that the movement out of one of the community in the region results in higher consumption. Thus, an approach that includes population shift in the decomposition process will shed more light on the role of population shift to poverty dynamics.

According to Arnand and Kanbur (1985), Kuznet (1955) assumed that all rural people are homogeneous, such that migration will not be a selective process. But in most settings, Kagera inclusive, the rural population is heterogeneous. This heterogeneity implies that over time, the rural population will not migrate representatively to the urban sector. The poverty dynamics, particularly in the rural setting, dictate that to a large

[4] These are the years the households or individuals migrate to other places for different reasons.

probability people migrate internally or to urban areas as a coping mechanism. These dynamics require a different approach that has to take into consideration Arnand and Kanbur's (1985) criticisms. For example, in the decomposition process, to consider separately the migration aspects while still ensuring that all the dynamics of poverty are captured. In this regard, this study has responded to Arnand and Kanbur's (1985) criticisms by invoking Son's (2003) approach, which derives a poverty decomposition that explains changes in poverty incidence over time in terms of growth, inequality and migration components. This approach adds to the poverty index a dimension of migration, which was not considered by Datt and Ravallion (1992), the approach which other studies on Tanzania have used.

The rest of the chapter is organized as follows: Section 3.2 gives the conceptual and theoretical issues concerning poverty. Section 3.3 provides the decomposition methodology. Section 3.4 describes the data used while Section 3.5 presents estimation results and discussion of decomposition. Section 3.6 summarizes the chapter.

3.2 Conceptual and Theoretical Issues concerning Poverty

3.2.1 Evolution of Poverty Concept, the Measures and Desirable Normative Characteristics (Axioms) of Poverty Measures

The concept of poverty is central to the international development agenda. Theoretical and empirical studies have continued to engage in conceptualizing and explaining the constitution of poverty and advancing solutions to tackle the problem. Initially, poverty was primarily conceptualized in monetary terms, with the most common definition of

poor people as those who lack sufficient income to meet the minimum standard of living, i.e., the poverty line. This definition, though still widely used, has been linked with broader definitions and concepts. For example, Sen (1979) and some of his works from the 1980s to date (Sen, 1999; Sen, 2000; Sen, 2004) have brought to the fore a synthesis of a range of ideas about poverty, which were previously excluded (or inadequately formulated) in the traditional approaches to the economics of welfare. Through these initiatives, the poverty definition was broadened to incorporate capabilities to achieve full human potential. Thus, poverty was no longer regarded a matter of insufficient income or consumption alone but also of a state of relative powerlessness and exclusion from the decision making processes (World Bank, 2001). Additionally, it was considered to be capability deprivation. According to various Sen's works, both intrinsic and instrumental capabilities (including for example, income, education, health, human rights, and civil rights, among others), permit people to achieve functioning (the things they want to do) and being (the states of existence they want to experience).

In many settings, researchers study the poverty status by analysing the characteristics that define the endowment and potential of households and communities. The common practice in measuring poverty is to use consumption expenditures reported by respondents, based on their recollections of their recently incurred expenses[5]. Poverty measurement, however, is faced with two main problems (Kakwani, 1993); one is the

[5] In places where literacy rate is high or where researchers can pay frequent visits to assist in filling the information when the respondent has forgotten a diary approach is mostly used.

specification of the threshold below which people are considered to be poor, i.e., the poverty line[6]. The other is the construction of an index to measure the intensity of poverty suffered by those below the determined poverty line.

In addressing the issue of constructing an index to measure the intensity of poverty, the discussion has evolved following Sen's (1976) seminal work, which laid the foundation for an axiomatic approach to poverty measurements. According to Morduch (2008), economists have sharpened discussions by identifying a set of desirable normative characteristics of poverty measures (often stated mathematically as axioms) around which consensus can be built. Thus a good measure is regarded as the one that will satisfy as many axioms as possible. Table 3.1 summarizes the axioms that are expected to be satisfied by a poverty index.

[6] According to Kakwani (2003), absolute poverty line can be constructed by (i) Direct Calorie Intake method (ii) Food Energy Intake method (iii) The Cost of Basic Needs (iv) The 1.25 dollar a day for developing countries.

Table 3.1: Desirable Normative Characteristics (Axioms) of Poverty Measures

	Axiom	Description
1.	Symmetry	Allows incomes to be re-ordered without affecting the poverty value. Thus, if two or more identical populations are pooled, the poverty index should not change.
2.	Replication Invariance	Ensures that the index views poverty in per-capita terms so that comparisons across different sized populations are meaningful.
3.	Monotonicity	Requires that the index does not register an increase in poverty when an income of a poor person is raised. Alternatively, a decrease in the income of a poor person should increase the poverty index.
4.	Restricted Continuity	Index is a continuous function of a poor person's income.
5.	Strong Continuity	Removes from consideration all those indices which experience an abrupt change when a number of the poor people changes.
6.	Trivial	If its value is the same for all distributions and all poverty lines.
7.	Transfer	A transfer from a poor person to a richer person should increase the poverty index.
8.	Focus	The poverty index should be independent of the income levels of people above the poverty line/ non-poor.
9.	Transfer Sensitivity	The increase of a poverty index as a result of a transfer of a fixed amount of money from a poor person to a richer person should be decreasing in the income of the denominator.
10.	Decomposability	The poverty index should increase when poverty in a sub-group increases, other things being equal; and vice versa.

Source: Author's compilation from various studies

With the axioms considered, several indices have been developed. Most of the developed indices have utilized three poverty indicators, namely, (i) Headcount (ii) Poverty Gap, and (iii) The distribution of income among the poor.

Assuming an income distribution structure is given by a vector $Y = (y_1, y_2, ..., y_n)$, so that $y_1 < y_2 < ..... < y_n$, y_i represents the income of individual i in the community. If z represent the poverty line, then the three referred indicators can be defined as:

(i) Headcount Ratio (H)

(3.1) $$H = \frac{q}{n} ,$$

where q represents the number of people with income less than the poverty line z and n represents the total number of people in the community.

The Headcount Ratio can be used to track changes in the proportion of the population living in poverty. Hence, it is mainly useful in designing policies to reduce the number of people living in poverty. However, H have two major weaknesses (Blackwood and Lynch, 1994). First, it does not indicate the extent of immiseration of the poor. For example, the Headcount Ratio will remain unchanged even if all people with incomes below the poverty line were to experience a drop in income, however large it would be. Second, H assumes that an income distribution of the poor is homogeneous. Hence, it does not indicate the income shares of the poor and thus fails to make a distinction among the poor with respect to the severity of poverty. For example, it does not distinguish between a poor person who earns 500 shillings from a poor person who earns 5,000 shillings, as long as both earn less than the poverty line. However, despite these

drawbacks, the index remains the most often used, and in this study the index is the basis of results in this Chapter.

(ii) Poverty Gap or Income Gap (IG)

$$(3.2) \quad IG = \sum_{i=1}^{n} (z - y_i),$$

where y_i and z are defined as above. This index indicates the degree of immiseration[7]. The major weakness of the Poverty Gap index is it is insensitive to income transfers among the poor. That is to say, it is silent on the income distribution among the poor, in which case, it does not reflect the severity of the poverty problem in terms of the number of people who are suffering (Blackwood and Lynch, 1994).

(iii) The Distribution of Income among the Poor

The two indices (H and IG) led Sen (1976) to suggest an equation to measure poverty, defined as

$$(3.3) \quad S(z, y) = A(z, y) \sum_{i=1}^{q} (z - y_i) v_i(z, y),$$

where $S(z, y)$ is the aggregate income gap of people whose income is less than z, $v_i(z, y)$ is a non-negative weight to individual i, and $A(z, y)$ is a normalizing factor.

Thus, Sen (1976) considered the general poverty index to be the maximum aggregate income gap of the poor in the community, written symbolically as

[7] Means degree of impoverishment

(3.4) $P(Z,Y) = \max S(z,y),$

From Equation 3.4, Sen proceeded to invoke the rank preserving welfare criterion and desirable properties of monotonicity, transfer and normalization and specified the poverty index as

(3.5) $S(z,y) = H(I-(1-I))G_p$,

where $I = \frac{\sum_{i=1}^{q}(z-y_i)}{z}$, is the average income gap, and G_p is the Gini index among the poor. Thus, Sen's index captures the poor (H), their average deprivation (I) and relative deprivation to one another G_p. The index is therefore defined as the weighted average of the individual income shortfalls, where the weights depend on the rank order of the individual in the welfare ordering of the poor. This definition has had a big influence on poverty studies, although it suffers from a number of weaknesses.

In general, the Sen's index lacks continuity, violates the transfer axiom and is sub-group inconsistent.[8] Moreover, as Shorrocks (1995) has pointed out that the failure of the Sen Index is due to its normalization process. Additionally, the index is framed as a continuous function of individual incomes. However, its value will jump if the income of a poor person rises above z. This change is not disadvantageous if the experience of

[8] The measure is not additively separable because of its connection with the Gini measure of inequality and its reliance on rank order weighting. Kakwani (1993) identified the weakness on the ground that, if for some groups in the society poverty for one group changes and for the rest remains the same due to; for instance, government intervention, then implicitly poverty for the whole population will increase. This argument is not considered by Sen (1976), because the developed index is not additively separable.

those just below the poverty line is quantitatively different from those with slightly higher income. However, the change depends on the magnitude of the measurement error associated with income close to z. Thus, the poverty value would largely depend on whether those on the poverty line are deemed poor or non-poor. Several extensions to the three poverty indices have been proposed to address some of the discussed weaknesses, a few of which are explained shortly.

Thon (1979, 1983) show that some of the existing poverty indices violate the transfer axiom if the number of poor decreases as a result of transfer from a rich to a poor person. Thus, he suggests an alternative index, which weights the income gaps of the poor with the rank order on a total income distribution.

Takayama (1979) suggests the distribution where all incomes above the poverty line are set equal to the poverty line. He then uses the Gini index of the censored income distribution. Kakwani (1980) generalizes Sen's index by weighting each income gap by the rank order to the power *k*, where *k* is some positive number chosen according to the importance one attaches to the lowest income.

Blackorby and Donaldson (1980) provide a framework of equally distributed equivalent incomes, employing a social evaluation function, defined on the income of the poor. However ,with their index, it is possible that a transfer of income from poor person to the least poor person may reduce the value of the index if such a transfer enables the recipient to cross the poverty line. Thus, their index also violates the transfer axiom. Clack, Hemming and Ulph (1981) obtains their index by combining Takayama's

censored distributions and Blackorby and Donaldson's framework of equally distributed equivalent incomes, using Atkinson's (1970) social evaluation function.

Foster, Greer and Thorbeke (1984) proposes a class of decomposable poverty indices that vary with a "poverty aversion" parameter. The Foster-Greer-Thorbeke (FGT) poverty index (Foster *et al.* 1984), has been the mostly widely used in the recent years, as it meets most of the desirable properties/axioms highlighted in Table 3.1. In particular, the FGT index meets the "decomposability" or "sub-group consistency" property. This study uses the FGT index to analyze poverty. The index is defined as

$$(3.6) \quad P(z,y) = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z-y_i}{z}\right)^{\alpha},$$

where $\alpha \geq 0$, α is a poverty aversion parameter and shows the weight assigned to the poorest of the poor. If $\alpha = 0$, then $P(z,y)$ reduces to Headcount, whereas if $\alpha = 1$, $P(z,y)$reduces to the average income gap. A higher value of α indicates increased concern for the poorest. The Headcount measures the prevalence of poverty, whereas the Income Gap measures its intensity. An index with $\alpha = 2$, for example, indicates poverty severity.

Table 3.2 summarizes the criteria of selected indices with respect to the axioms they satisfy or violate. Most of these indices do not satisfy the "sub-group consistency" property. Foster and Shorrocks (1991) contend that "sub-group consistency" property is required for several reasons; most importantly, it is from a practical point of view. The property is essential for coordinating the effects of a decentralized strategy towards

poverty reduction. Typically, the coordination involves a collection of activities targeted at specific sub-groups or regions in the country. If the index does not satisfy the "sub-group consistency" axiom, it could happen that each local effort could achieve its objective of reducing poverty within its targeted group, while for the society as whole the level of poverty may increase.

Table 3.2: Selected Indices and the Axioms they Satisfy

Name	Formula	Monotonicity	Transfer	Symmetry	Proportion of the Poor		Focus	Transfer Sensitivity	Decomposability
					Monotonicity	Transfer			
Headcount (H)	q/n	No	no	yes	yes	yes	yes	no	yes
Income Gap Ratio (IGP)	$\frac{z-\overline{y_p}}{z}$	Yes	no	yes	no	no	yes	no	yes
Sen (P1)	$\frac{z}{(q+1)nz}\sum_{i=1}^{q}(q+1-i)(z-y_i)$	Yes	no	no*	yes	yes	yes	no	no
Takayama (P2)	$1+\frac{1}{n}-\frac{z}{n^2}\sum_{i=1}^{n}(n+1-i)\overline{y_i}$	No	no	yes	no	no	yes	no	no
Kakwani (P3)	$\frac{q}{nz\sum_{i=1}^{q}i^k}\sum_{i=1}^{q}(q+1-i)^k(z-y_i)$	Yes	no	no*	yes	yes	yes	yes for $k \geq 1$	no
Blackorby and Donaldsons (P4)	$q/n\ \frac{z-y_{EDEP}}{z}$	Yes	no	yes	yes	yes	yes	depends	depends

Name	Formula	Monotonicity	Transfer	Symmetry	Proportion of the Poor	Focus	Transfer	Decomposability
Clark, Hemming and Ulph (P5)	$1-\left\{\frac{q}{n}\left[\frac{Y_{EDEP}^{A}}{z}\right]^{\beta}+\left(1-\frac{q}{n}\right)\right\}^{\frac{1}{\beta}}$	yes for $\beta \prec 1$	yes for $\beta \prec 1$	yes	yes	no	yes	yes for $\beta \prec 1$	yes
Thon (P6)	$\frac{z}{n(n+1)z}\sum_{i=1}^{q}(n+1-i)(z-y_i)$	yes	yes	yes**	yes	no	yes	no	no
FGT (P7)	$\frac{1}{n}\sum_{i=1}^{q}\left(\frac{z-y_i}{z}\right)^{\alpha} \; for \alpha \succ 0$	yes	yes for $\alpha \succ 1$	yes	yes	yes for $\alpha = 0$	yes	yes for $\alpha \succ 2$	yes

Notes:*it does asymptotically fulfill this requirement assuming $q \to q+1$; ** it does asymptotically fulfill this requirement assuming $n \to n+1$; q is the number of the poor; n is the number of person in the population; z is the poverty line; $\overline{y_p}$ is the average of the poor; y^* is the censored income vector; $y_i^* = z$ if $y_i \geq z$ and $y_i^* = y_i$ if $y_i \prec z$; μ^* is the average income of the censored distributions; Y_{EDEP} is the Equally distributed equivalent income of the poor, according to a general social evaluation function, defined over the poor only; and Y_{EDEP}^{A} is the Equally distributed equivalent income of the poor, according to Atkinson social evaluation function, defined over the poor only.

3.2.2 Approaches to Measuring Poverty and the Poverty Line

Approaches to measuring poverty emanate from the way people perceive what it means being either poor or rich. In some cases people tend to compare their standard of living with that of others in their areas of residence. Thus, poverty may be measured as absolute poverty or relative poverty.

Absolute poverty measure considers exclusively the well-being of those who are defined as poor. Relative poverty defines the segment of the population that is poor in relation to the income of the general population. The implication of the relative poverty measure is that every society has poverty, since there is no society where everyone receives the same income. Hence a society may have relative poverty, i.e. some members may receive incomes less than others by some degree, and at the same time it may "not have absolute poverty". That is, all members receive income above the poverty line.

In developing economies, relative poverty is not appropriate even if it has a good objective (Kakwani, 1993; 2003). For these countries, it is desirable to ensure that nobody in society has a standard of living below the socially accepted minimum. Thus, taking Kakwani's observations, this study focuses mainly on the absolute poverty measure, i.e., using the poverty line.

The poverty line is used to gauge all households as either poor or rich. This study uses the newly proposed international poverty line of USD 1.25 converted to Tanzanian Shillings using respective exchange rates of the years in which the data used in the study

were collected[9]. The use of the World Bank international poverty line was a response to criticisms raised by people interviewed in Kagera in the Narayan *et al*. (2009) study, wherein they claim that national poverty lines are too low, such that they tend to paint a rosy picture that many people are relatively well off, whereas they actually perceive themselves as very poor[10]. These perceptions are reflected in the following statement:

> "When you give a person that much [income at the official poverty line], also prepare a prison for him or her, because after a few hours she or he will already start stealing". Discussion Group, Chubaka, Kagera, Tanzania, as quoted from Narayan *et al.* (2009), pp. 13.

The approach by Narayan *et al.* (2009) identified the Community Poverty line (CPL). The CPL they estimated showed much higher percentages of the poor relative to those that would result from applying the "a dollar a day" measure often used internationally as the poverty line. However, participants in the focus groups had perceptions that often were closer to the 'USD 1 a day' standard. Hence, even from the people's perceived poverty line, the international poverty line was deemed appropriate relative to using the official poverty line. Moreover, poverty measures based on an international poverty line attempt to hold the real value of the poverty line constant across countries, thereby facilitating comparisons over time (World Bank, 2007).

[9] The poverty line that was used was roughly USD 1 per day per capita. In 2008, the World Bank, based on Ravallion *et al*. (2009), came up with a figure of USD 1.25 (revised largely due to inflation) at the 2005 Purchasing Power Parity (PPP).

10 Narayan *et al*. (2009) uses peoples' own understanding of freedom, equality, empowerment, aspirations and how they define poverty to develop more effective strategies to reduce poverty. The researchers conducted 21 studies from different countries, with two studies each in the Philippines, Sri lanka and Tanzania.

3.3 Poverty Decomposition Methodology

In the empirical literature, several methods for decomposition of the change in growth and redistribution effects have been used. Some of these include approaches by Kakwani and Subbarao (1990), Ravallion and Huppi (1991), Datt and Ravallion (1992), Tsui (1996) and Shapley.

Ravallion and Huppi (1991), for example, introduces the sectoral decomposition of the change in poverty. This decomposition quantifies the contribution of changes in poverty within sectors as well as the inter-sectoral population shifts relative to the changes in total poverty. In their work, a sector can be defined as rural or urban, sector of employment or even sub-national region. The decomposition framework cannot tell whether alternative processes, for example different population shifts, would have been either more or less beneficial to poverty reduction (Kirama, 2014). Thus, some of the changes in poverty are unaccounted for.

Datt and Ravallion's (1992) method has been the most commonly used. The methodology decomposes poverty reduction into three components: growth, redistribution and the residuals. The growth (redistribution) component is defined as the change in poverty due to change in mean income (Lorenz Curve) holding the Lorenz curve (mean income) constant. The residual is the difference between the growth (redistribution) components evaluated at the terminal and initial Lorenz curves (mean incomes), respectively. lf the mean income and/or the Lorenz curve remains unchanged over the decomposition period, then the residual vanishes. However, the Datt and

Ravallion's (1992) method also has limitations. First, the growth and redistribution effects are not symmetric with respect to the base year and the final year. Second, the decomposition is not exact as it contains the residual term, which entails the difference between growth component evaluated at the final and initial Lorenz curve, and the redistribution component evaluated at the final and initial income. In contrast to the Datt and Ravallion (1992) method, the Shapley decomposition approach does not contain a residual component.

The main deficiencies of the approaches discussed above is that either they are not decomposable or they do not account for the migration effects. Hence, this study adopts Son's (2003) approach, as implemented by Mulenga and Van Campenhout (2008) on Zambia.[11] Son (2003) explains interactions between poverty, growth and inequality through poverty decomposition that explains changes in the poverty incidence overtime with respect to growth, inequality and migration. His index is additively decomposable and valid for the entire class of additively separable poverty measures, with no residual term.

For each classification, Son's decomposition shows that the change in the incidence of poverty can be broken down into four elements:

[11] Although Mulenga and Van Campenhout (2008) applied the method using Zambia's Household Budget Survey data, this study has used household panel data for Kagera Region. Mulenga and Van Campenhout's (2008) study presents poverty trends, since the data the researchers used give inter-temporal changes in aggregate poverty. However, this study uses data that trace specific households' variables over time. Hence it presents poverty dynamics.

i. An element that reflects shifts in population between segments that have different degrees of poverty;

ii. An element that measures the impact of the overall growth in income in the economy;

iii. Another element that takes into account different growth rates that different segments experienced different growth rates; and

iv. One that reflects changes in the distribution of income within each segment.

Therefore, in examining the evolution of poverty, Son's (2003) approach decomposes the percentage change in aggregate poverty into four components:

i. The overall growth effect, which quantifies the change in poverty that would have occurred if living standards of each sub-group[12] had been changing at the average aggregate rate;

ii. Sub-group growth effect, which takes into account that growth rates may vary from one sub-group to the other, thereby capturing sub-group heterogeneity in growth;

iii. Inequality effect, which reflects the impact of changes in the distribution of standards of living within different sub-groups; and

iv. Population shift effect, which reflects changes in poverty due to changes in the population shares of different sub-groups.

[12] These sub-groups can be by area of residence, sex of the household head, household size, sector of employment, etc.

In decomposing the poverty changes, Son (2003) expresses aggregate poverty as the population weighted mean of sub-group poverty measures:

$$(3.7) \quad P_t = \sum_i f_{it} P_{it} \ ,$$

where *t* denotes time and i stands for a mutually exclusive sub-group in society, f_{it} is the population share of sub-group *i* at time *t*, P_t is aggregate poverty at time *t* and P_{it} is poverty at time *t* in sub-group *i*.

Changes in aggregate poverty over time is then decomposed into two categories, namely, changes reflecting within-group poverty, ΔP_{it}, and changes reflecting population shares between groups, Δf_{it} , as shown in Equation 3.8:

$$(3.8) \quad \Delta P_t = \frac{1}{2}\left[\sum_i f_{it-1}(\Delta P_{it}) + \sum_i f_{it}(\Delta P_{it})\right] + \frac{1}{2}\left[\sum_i P_{it-1}(\Delta f_{it}) + \sum_i P_{it}(\Delta f_{it})\right],$$

Then the within-group change in poverty is further decomposed into an income effect and an inequality effect for each sub-group *i*:

$$(3.9) \quad \Delta P_{it} = (\Delta P_{it})_M + (\Delta P_{it})_I$$

The first term on the right-hand side of the equation is the growth effect, which measures the change in poverty within group *i* that results from growth in average (mean) wealth over time, keeping inequality constant. The second term is the inequality effect, which measures changes in poverty due to changes in the distribution of wealth, with mean income remaining constant.

Combining Equation 3.8 and Equation 3.9 and expressing changes in aggregate poverty relative to initial poverty yields:

$$(3.10)\quad \frac{\Delta P_t}{P_{t-1}} = \sum_i \frac{0.5\left(f_{it} + f_{it-1}\right)\left(\Delta P_{it}\right)_M}{P_{t-1}} + \sum_i \frac{0.5\left(f_{it} + f_{it-1}\right)\left(\Delta P_{it}\right)_I}{P_{t-1}} + \sum_i \frac{0.5\left(P_{it} + P_{it-1}\right)\left(\Delta f_{it}\right)}{P_{t-1}}$$

Equation 3.10 is a decomposition of aggregate changes in poverty into three components, namely the sum of growth effects over the sub-groups (the first term), the sum of inequality effects over the sub-groups (the second term) and the population shift effect (the third term), composed of the sum of changes in aggregate poverty due to changes in the population shares of the different sub-groups.

The growth effect in equation 3.10 is further decomposed into overall growth effect and sub-groups growth effect as:

$$(3.11)\quad \sum_i \frac{0.5\left(f_{it} + f_{it-1}\right)\left(\Delta P_{it}\right)_M}{P_{t-1}} = \sum_i \frac{0.5\left(f_{it} + f_{it-1}\right)\left(\Delta P_{it}\right)_{OG}}{P_{t-1}} + \sum_i \frac{0.5\left(f_{it} + f_{it-1}\right)\left(\Delta P_{it}\right)_{SG}}{P_{t-1}}$$

where,

$$(3.12)\quad \left(\Delta P_{it}\right)_{OG} = 0.5\left[P\left(z, \mu_{it}\left(1+g\right), L_{it-1}\left(p\right)\right) - P\left(z, \mu_{it-1}, L_{it-1}\left(p\right)\right) + P\left(z, \mu_{it}\left(1+g\right), L_{it}\left(p\right)\right) - P\left(z, \mu_{it}, L_{it}\left(p\right)\right)\right]$$

and

$$(3.13)\quad \left(\Delta P_{it}\right)_{SG} = 0.5\left[P\left(z, \mu_{it}, L_{it-1}\left(p\right)\right) - P\left(z, \mu_{it-1}\left(1+g\right), L_{it-1}\left(p\right)\right) + P\left(z, \mu_{it}, L_{it}\left(p\right)\right) - P\left(z, \mu_{it-1}\left(1+g\right), L_{it}\left(p\right)\right)\right]$$

with *g* being the average growth rate of the welfare of the whole population, and $P(.)$ is a poverty measure that is determined by the poverty line (z), mean income (μ) and the Lorenz curve (L).

Following the above decomposition of the growth effect, the final decomposition of aggregate changes in poverty is given as:

$$(3.14)\ \frac{\Delta P_t}{P_{t-1}} = \sum_i \frac{0.5\left(f_{it} + f_{it-1}\right)\left(\Delta P_{it}\right)_{OG}}{P_{t-1}} + \sum_i \frac{0.5\left(f_{it} + f_{it-1}\right)\left(\Delta P_{it}\right)_{SG}}{P_{t-1}} + \sum_i \frac{0.5\left(f_{it} + f_{it-1}\right)\left(\Delta P_{it}\right)_{I}}{P_{t-1}} + \sum_i \frac{0.5\left(P_{it} + P_{it-1}\right)\left(\Delta f_{it}\right)}{P_{t-1}}$$

= overall growth effect + sub-group growth effect + inequality effect + population shift effect.

Equation 3.14 states that a change in aggregate poverty can be decomposed into four components. The first component is the overall growth effect, assuming inequality remains unchanged. The second term takes into account the growth rates among sub-groups. The third term reflects changes in the distribution of wealth within different groups. The last term constitute changes in poverty accounted to changes in the population shares of different sub-groups. It captures the effects of migration of population between groups in the total poverty incidence.

According to Son (2003), the direction of the changes are as follows: the overall growth effect will always be negative if there is positive growth in the economy. The sub-group growth effect can be either positive or negative, depending on whether the difference in growth rates of different groups has contributed to an increase or decrease in total

poverty respectively. The inequality effect also can be either positive or negative. If positive, it indicates that a change in inequality within group has contributed to an increase in total poverty incidence, and vice versa for a decrease. The population effect is deemed to be pro-poor if the respective term is negative, as it leads to reduction in poverty. For example, when migration is from poor to richer areas. The opposite case is also possible.

3.4 Data

3.4.1 Data Types and Sources

This study has addressed the specific objectives in three empirical chapters. These empirical chapters have utilized data from one secondary source, namely, the Kagera Health and Development Survey (KHDS) data set.

The KHDS delves into the long-run wealth and health dynamics of households and individuals within Kagera Region- Tanzania. The data was collected by the World Bank in collaboration with Economic Development Initiative (EDI), University of Dar es Salaam and Muhimbili University of Health and Allied Science. This is a longitudinal data set collected since 1991 with the last wave (the sixth wave) being collected in 2010. Earlier waves of the survey include the four waves from 1991-1994 and the fifth wave in 2004. Originally, the World Bank's Living Standards Measurement Study (LSMS) questionnaire was adopted with some slight modification in later waves to accommodate changing analytical demands for these panel data, without compromising comparability among waves.

The data set is rich in information on household characteristics, income and consumption, health and education, migration, deaths and community development. It also has associated datasets on asset and crop prices, distance to service centers and rainfall pattern.

3.4.2 The Sample

KHDS 91-94 Household Sample

According to World Bank (2004), the KHDS 91-94 household sample was drawn in two stages, with stratification based on geography in the first stage and mortality risk in both stages. The 550 primary sampling units (PSUs)[13] in Kagera Region were classified in the first stage according to eight strata, defined over four agronomic zones and, within each zone, and the level of adult mortality (high and low). Enumeration areas of households from the PSUs in each stratum were drawn using a random probability of selection proportional to the size of the PSU. The ward was assigned in the "high" mortality category if its adult mortality rate was at the 90th percentile or higher of the ward adult mortality rates within a given agronomic zone, an approach that led into the selection of 51 communities as PSUs (also referred to as clusters).

The second stage (within enumeration areas) used a stratified random sample, in which, households expected to experience an adult death due to either living in communities suffering from an HIV epidemic, or having a history of prior adult death or illness in a

[13] A PSU is a geographical area delineated by the 1988 Tanzanian Census that usually corresponds to a community or, in the case of a town, to a neighborhood.

household were over-sampled. After the two stages, a total of 816 households in 51 enumeration areas were drawn.

KHDS 2004 and 2010 Household Samples

According to De Weerdt *et al.* (2010), a total of 6,353 people who were household members in any wave of the KHDS 91-94 were re-interviewed for the KHDS 2004 and KHDS 2010 surveys. The household questionnaire was administered to the households in which these previous household members (PHHMs) lived. The information for the household member who was alive during the last interview in 1991-1994, but found deceased by the time of the fieldwork in 2004 and 2010 was collected in the mortality Questionnaire. The longevity of the KHDS panel makes it difficult to define a household, yet attempts were made to consider re-contact rates in terms of households. Table 3.3 shows the rate of re-contact of the baseline households in KHDS 2004 and KHDS 2010, where a re-contact is defined as having interviewed at least one person from the household[14]. Excluding households in which all previous members are deceased (17 households and 27 respondents), the KHDS 2004 re-contacted 93 percent of the baseline households, whereas the KHDS 2010 re-contacted 92 percent of households.

[14] In this case, the term household is defined by the baseline KHDS survey which spans a period of 2.5 years.

Table 3.3: KHDS 2004 and 2010 Households

KHDS 91-94	KHDS 2004 Re-interview Rates			KHDS 2010 Re-interview Rates			
Number of Interviews During 1991-1994	**Re-interviewed**	**Deceased**	**Untraced**	**Re-interviewed**	**Deceased**	**Untraced**	**Total**
1	22	4	15	22	4	15	**41**
	54 %	*10 %*	*37 %*	*54 %*	*10 %*	*37 %*	
2	38	2	6	36	2	8	**46**
	83 %	*4 %*	*13 %*	*78 %*	*4 %*	*17 %*	
3	59	1	9	54	2	13	**69**
	86 %	*1 %*	*13 %*	*78 %*	*3 %*	*19 %*	
4	713	13	33	706	18	35	**759**
	94 %	*2 %*	*4 %*	*93 %*	*2 %*	*5 %*	
Overall	**832**	**20**	**63**	**818**	**26**	**71**	**915**
	91 %	*2 %*	*7 %*	*89 %*	*3 %*	*8 %*	

Source: De Weerdt *et al*. (2010)

Notes: "Re-interviewed" means that at least one member of the baseline household was re-interviewed. "Deceased" means that all Previous Household Members are reported to be dead. "Untraced" means that no Previous Household Member was re-interviewed.

Table 3.4 provides the KHDS 2010 re-contact rates by location. According to De Weerdt *et al.* (2010), more than 50 percent of the re-interviewed panel respondents were located in the same community as in KHDS 91-94, nearly 14 percent were found in other regions than Kagera, and around one percent of the interviewed panel respondents were located outside the country, Uganda in particular.

Table 3.4: KHDS 2010 Re-Contact Rates by Location

	Number	Location	%
Baseline sample	6,353		
Re-interviewed	4,336		
		Same community	52
		Nearby village	9
		Elsewhere in Kagera	24
		Other region	14
		Uganda[a]	1
Untraced	742		
		Kagera	53
		Dar es Salaam	9
		Mwanza	9
		Other region	10
		Other country[b]	8
		Not known	11
Deceased	1,275		

Source: De Weerdt *et al.* (2010)

Notes: Location for untraced respondents is reported by other household members from the baseline survey who were successfully located, interviewed, and able to provide location information on the respondent. In some cases, this information comes from other relatives or neighbors residing in the baseline communities.

a. KHDS 2010 tracked international migrants in Uganda only. b. Countries to which the 58 untraced respondents had moved are: Burundi, Denmark, Kenya, Norway, Rwanda, South-Africa, Sweden, UK and USA.

Given the time, technical and financial constraints, this study used four of the six KHDS waves, namely Wave 1, Wave 3, Wave 5 and Wave 6. The choice of the wave was arbitrary but aimed at ensuring that the current information was reflected in our analysis, without missing the baseline information.

3.5 Poverty Decomposition: Results and Discussion

This section reports and analyses results of the decomposition of poverty in Kagera Region for the period 1991 to 2010. Following Son's (2003) decomposition approach,

two waves (years) are comparatively taken at a go to examine the extent and magnitude of the headcount poverty decomposition into the components of growth, inequality and population shifts.

Tables 3.5 and 3.6, for both rural and urban areas of Kagera Region, show that overall growth effects are negative, which implies that growth has resulted in the reduction of poverty within the region for the years between the waves under consideration. These results are supported by positive growth reported in Table 2.3 and Figure 3.1, which show that regional GDP has witnessed positive growth since 1990 to 2010, with a kinked increase witnessed in 1994.

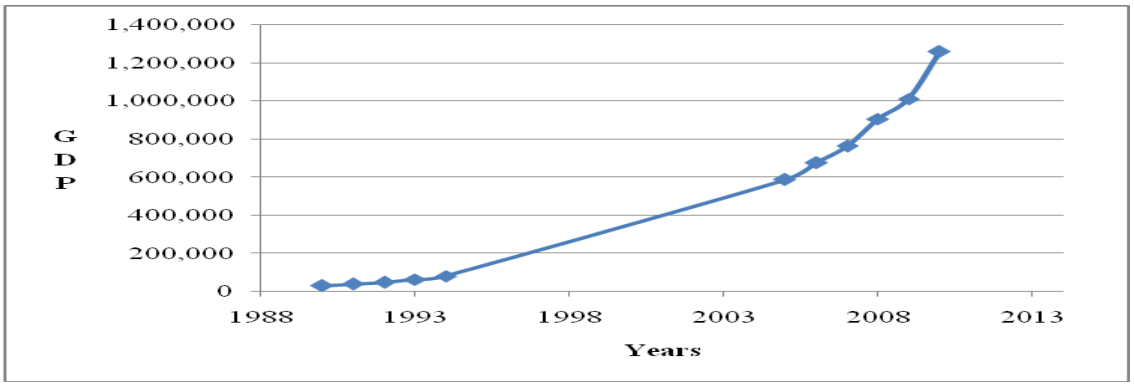
Table 3.5 : Kagera Region Rural-Urban Poverty Decomposition, 1991-2010 (Headcount)

	Urban	**Rural**	**Urban**	**Rural**
	1991-1993		**1991- 2004**	
Overall Growth Effects	-0.0001	-0.0055	-0.0001	-0.0056
Sub-group Growth Effects	0.0668	0.0672	0.0048	0.0199
Inequality Effects	0.0254	0.0225	0.0034	0.0055
Population Shifts Effects	3.1455	0.0543	1.4343	0.0495
	1991-2010		**1993-2004**	
Overall Growth Effects	-0.0003	-0.0054	-0.0006	-0.0041
Sub-group Growth Effects	0.0018	0.0157	0.0064	0.0012
Inequality Effects	0.0034	0.0039	0.0005	-0.0001
Population Shifts Effects	3.3373	-0.2656	2.6037	-0.3898
	1993-2010		**2004-2010**	
Overall Growth Effects	-0.0005	-0.0056	-0.0001	-0.0058
Sub-group Growth Effects	0.0002	0.0014	0.0005	0.0048
Inequality Effects	0.0000	-0.0001	0.0003	-0.0001
Population Shifts Effects	1.1965	-0.0539	2.3062	-0.1005

Source: Authors' own computations.

The sub-group growth effect is positive (Tables 3.5 and 3.6), which indicates that the differences in growth within the rural-urban sub-group led to an increase in poverty between 1990 and 2010.

Figure 3.1: GDP Trend for Kagera Region, Selected Years



Source: Authors Computation

Empirical evidence on Tanzania indicates that these results on Kagera with respect to sub-group growth effects share commonality with those on Tanzania as a whole (Beegle *et al.*, 2011). According to Beegle *et al*. (2011),

> "There is also evidence that growth accelerated in the last few years of the period 1994-2004 compared with 1990s. However, growth was not sufficiently broad based to result in rapid poverty reduction. On the basis of available evidence, poverty rates declined only slightly and most of the progress in poverty reduction was in urban areas" (pp. 1011-1012).

With regard to changes in inequality, when considering 1991 (i.e., wave 1) as the base year, changes in inequality within the rural and urban households in Kagera contributed to the increase in total poverty. However, when the base year is changed to 1993 (wave 3) or 2004 (wave 5), the results also change. For the rural areas, changes in inequality within groups contributed to a decrease in poverty.

Table 3.6: Poverty Decomposition Effects by District – Kagera Region, 1991-2010 (Headcount)

District	Overall Growth	Sub-group Growth	Inequality	Population Shifts
	1991-1993			
Biharamulo	-0.0004	0.0873	0.0304	6.5318
Bukoba Rural	-0.0004	0.0520	0.0188	3.7222
Bukoba Urban	-0.0001	0.0668	0.0254	3.1455
Karagwe	-0.0004	0.0435	0.0169	2.7495
Muleba	-0.0006	0.0626	0.0223	4.5777
Ngara	-0.0039	0.1514	0.0535	8.7104
	1991-2004			
Biharamulo	-0.0005	0.0250	0.0089	3.0883
Bukoba Rural	-0.0005	0.0196	0.0072	1.1944
Bukoba Urban	-0.0001	0.0048	0.0034	1.4344
Karagwe	-0.0001	0.0276	0.0110	1.0873
Muleba	-0.0006	0.0033	0.0013	1.2492
Ngara	-0.0038	0.0263	0.0084	2.8474
	1991-2010			
Biharamulo	-0.0004	0.0044	0.0015	1.9787
Bukoba Rural	-0.0005	0.0191	0.0073	1.1572
Bukoba Urban	-0.0001	0.0032	0.0025	1.8159
Karagwe	-0.0004	0.0001	0.0002	0.7183
Muleba	-0.0005	0.0114	0.0034	2.0649
Ngara	-0.0031	0.0227	0.0060	1.9926
	1993-2004			
Biharamulo	-0.0013	0.0018	0.0000	0.8841
Bukoba Rural	-0.0018	0.0016	-3.873e-08	0.4484
Bukoba Urban	-0.0002	0.0004	0.0000	0.4135
Karagwe	-0.0007	0.0023	0.0001	0.2407
Muleba	-0.0009	0.00004	-0.00002	0.4581
Ngara	-0.0012	0.0019	0.00002	0.9071
	1993-2010			
Biharamulo	-0.0011	0.0004	-0.00002	0.5815
Bukoba Rural	-0.0018	0.0017	0.0000	0.4409
Bukoba Urban	-0.0003	0.0029	0.0001	0.5331
Karagwe	-0.0006	0.0000	-0.00002	0.1453
Muleba	-0.0007	0.0010	0.0000	0.3958
Ngara	-0.0009	0.0020	0.00003	0.5174
	2004-2010			
Biharamulo	-0.0011	0.0014	0.00005	0.9812
Bukoba Rural	-0.0023	0.0058	0.0004	0.5703
Bukoba Urban	-0.0001	0.0009	0.0002	1.0957
Karagwe	-0.0013	0.00002	-0.0001	0.1995
Muleba	-0.0001	0.0036	0.0003	0.9119
Ngara	-0.0006	0.0069	0.0006	0.8788

Source: Author's computations

This decrease in poverty implies that the percentage change in consumption (a proxy for income) has been more rapid in the rural areas than in the urban areas[15]. This might happen when the poverty line is above median expenditure. This implies that resources have been distributed from better off households to worse off ones, which may cause some better off household to fall below the poverty line, thereby cause the headcount to increase.[16]

Alternatively, the above results could arise from issues that may cause the Kuznet Hypothesis (KH) to fail (Ravallion, 2005); that is to say, with the migrating units moving into different sectors in the urban areas, the poverty measures would be heavily influenced by differences in growth patterns across sectors in the economy. Also, the results could be attributed to the negative effects of urbanization, through what Christiansen *et al.* (2013) term "Urbanization of Poverty" (pp. 2). These results are close to what is depicted in Datt and Ravallion (1992) for rural areas, but are different for urban areas. However, they tend to concur with the findings by Mkenda *et al.* (2010).

Furthermore, the results show that population shifts (migration) effects for rural households is negative for the 1991-2010 decomposition and for other years when the base year is either 1993 or 2004 (Table 3.5), indicating that in those years, the population shift was pro-poor for rural households. When 1991 is the base year, there is no poverty reduction effect for migrating households. These results relate closely to

[15] It is theoretically known that an increase in consumption measure may result in poverty reduction (Naschold, 2002)

[16] In the sample for the study, the consumption data for 2004 and 2010 for both rural and urban areas in Kagera Region, the poverty line used is above the median consumption aggregate.

Beegle *et al*. (2011) who show that, for the 1991 panel households there was no difference in consumption and poverty between those who moved from and those who stayed in the same community. Du *et al.* (2005) find the overall impact of migration on poverty to be modest. However, for urban households the populations shifts effects are found to be positive (Tables 3.5 and 3.6), which indicates that for urban households, migration is not pro-poor. These results imply that there is a tendency for the net movement of population to shift from rich urban settings to poor rural settings[17]. Even though the results for the rural-urban partitioning depicts ambiguous and inconclusive results (especially when the gaps between the baseline year and the year considered is not too wide), in general population shifts tend to lead to a decline in poverty. The results of poverty decomposition by districts for Kagera Region are reported in Table 3.6. The overall growth effects are found to be negative, which implies that positive growth experienced by the districts have had the effect of reducing poverty. However, the results with respect to the sub-groups effects are positive, which indicates that between 1991 and 2010, the sub-group growth tended to increase overall poverty within the region and the respective districts.

As for rural-urban district partitioning, the population shifts effects are all positive, which indicates that for the individual rural districts, the results did not find migration to be pro-poor, in contrast to results for the rural setting for the whole region for the 1991-

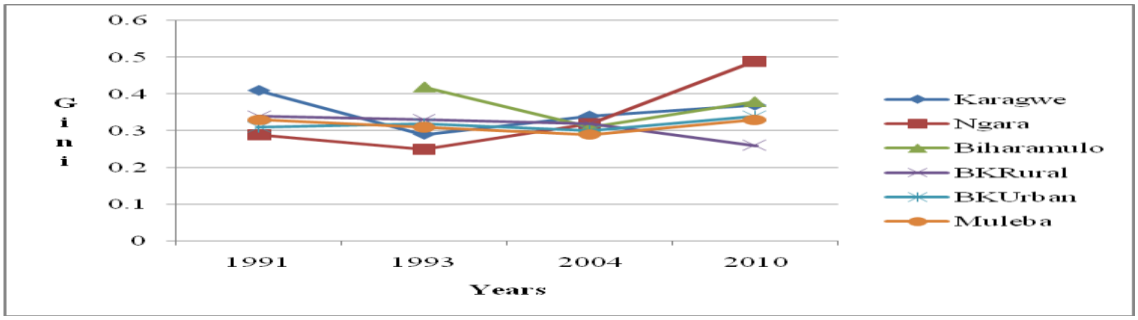
[17] Beegle *et al.* (2011) show that by 2004, about 51 percent of households experienced some movement from their original villages, with only few moving to Bukoba Urban and outside the region. The movement was within the rural areas, which makes it difficult to ascertain whether it was from rich to poor settings or vice versa. Moreover, the movement maybe explained by the fact that people who fail to sustain their life in urban areas may easily get land resources for agricultural and other activities as a coping mechanism in rural areas.

2010 period. These results imply the existence of bias resulting from aggregating the units of analysis. Alternatively, such results may be due to less population movement beyond the households' administrative districts, thereby making it difficult to trace out inter-district movements. Beegle *et al.* (2011) show that only 32 percent of the sample households moved beyond their districts of origin.

The result imply that the distributional changes of the wealth indicators are significant in Kagera Region when considering between rural-urban movements vis-à-vis the between district movements. This calls for a critical analysis of individual effects on the impact of migration in the region.

Table 3.6 further presents the results on the inequality effects, which are negative for the districts of Bukoba Urban and Muleba for the period 1993 to 2004. These negative inequality effects indicate a reduction of poverty in these districts in the period 1993 and 2004 . These results match a reduction in the Gini coefficients of the two districts, as shown in Figure 3.2. However, the results show a different picture for the period 1993 to 2010, whereby the inequality effects imply poverty reduction in the period for the districts of Biharamulo and Karagwe, whereas for Muleba and Bukoba Urban districts, inequality changes are shown to have led to increasing poverty. For the period 2004 to 2010, the negative inequality effects for Karagwe District in the period 2004 and 2010 indicate a reduction of poverty in the district in this period.

Figure 3.2: Trends of Gini Coefficients by Districts, KHDS Data – 1991 -2010



Source: Authors Computation

There are a number of notable issues that happened within the districts during the period 1993 to 2010, which probably may have a contributing impact to either the trend of inequality, wealth or even the population movements. As per De Weerdt (2010), between 1994 to 2004 several shocks affected the region including collapse of coffee prices,[18] El-Nino in the years 1997 and 1998 and various crop diseases that affected banana and cassava such as "*batobato*" and pests.[19] The only district not to have been hit much by the diseases and land fertility losses is Karagwe. Hence some people were migrating from other districts of the region to Karagwe due to attraction of fertile land. During the study period, land fertility in Karagwe was still high, and the district had not

[18] Karagwe had some leeway by smuggling coffee to Uganda where coffee prices were at least favorable, and Biharamulo did not depend much on the crops that are perennial such as coffee and banana to the extent of having long-term effects.

[19] As a native of Bukoba Rural District, born in Katoma Ward, during my days in Bukoba, I witnessed the dearth of the traditional type of banana plants due to infestations by banana weevils and other diseases. The peasants had no option but to uproot the traditional banana plants and replace them with other types, which were unpopular in the market. I also witnessed the uprooting of coffee trees due to the plummeting of coffee prices although of recent, young people are now engaged in tree cultivation such as soft wood.

yet been hit much by banana diseases. Hence its high productive capacity might have acted as a balancing item for poverty reduction.[20]

Similar results were observed by Datt and Ravallion (1992), who find negative redistribution effects (i.e., poverty reducing), using the consumption aggregates with consumer durables when considering the base to last year of their study period. Above all, in considering base year to its immediate year, the distribution effects are also negative and the distribution effects are also negative for the consecutive periods and for overall urban area.

3.6 Summary

The chapter has decomposed poverty (as represented by headcount) by rural-urban partitioning and by districts using Son's (2003) approach. This approach is used to decompose poverty into overall growth effects, sub-group growth effects, inequality effects and population shifts (migration) effects, which is an up-grade over various poverty decomposition approaches that do not consider all the above aspects in a single decomposition.

The results are mixed, depending on the type of partitioning in question. However, as hypothesized, migration was shown to be pro-poor in most of the cases, with some exceptions for some years especially when considering the gap from those years to the base-line. These results are similar to those of other researchers, such as Du *et al.*

[20] This interpretation should be taken with caution, given the evidence that sometimes in the actual setting, there is no direct relationship between inequality and poverty reduction (see Mkenda *et al.* 2010 for further discussion on this issue).

(2005), who conclude that the overall impact of migration on poverty in some settings might even be modest. For most of the studies that conclude that migration is pro-poor, either use a regression or life history approach, which assumes the same path from the baseline year to the last year of observations, whereas the decomposition approach used in this study compares the poverty behavior between two data-points, taking the remaining data points as given.

The main implication from the results is that short of considering population shift effects, the conclusions would have leaned heavily towards increasing poverty in the region. Hence, an appropriate policy response is to just intervene in those initiatives that would have increased peoples or farmers' productivity. However, by filtering and decomposing poverty in its urban-rural effects and in its district effects, it is found that the urban areas have implications on poverty trends, as they affect the direction of migration over time and thus the policy response has to ensure pro-poor based employment creation in urban areas.

CHAPTER FOUR

CONSUMPTION DYNAMICS AND HOUSEHOLD'S VULNERABILITY TO POVERTY IN KAGERA REGION

4.1 Introduction

The chapter examines the dynamics of households' consumption and vulnerability. Understanding the dynamics of consumption and extent of households' vulnerability provides a framework later for examining the transition of households into or out of poverty. In practice, poverty has been modeled as a dependent variable. However, according to Datt and Jollife (2005), this approach tends to suppress information about the household's standard of living above the poverty line. As such, all non-poor households are treated alike as though the data were censored. As a means to analyzing poverty, this study has attempted to examine the consumption dynamics, whereby the non-poor households have not been censored.

The estimation process derives from the theories of consumption smoothing. These theories assume that when income is affected by transitory shocks, for example, agents' consumption should not change since they can use savings or borrowing to adjust. This implies that the anticipated changes in income will not affect consumption, as households are smoothing consumption. However, as argued in the extensions of these theories, and in a world of uncertainty and imperfect credit market, consumption may not be smoothed as anticipated. In Less Developed Countries, including Tanzania and for that matter in Kagera Region, households have borrowing constraints, especially the

poor ones. Hence, in the presence of any shock, even a transitory one, consumption may be negatively affected. Such shocks include, for example, those that afflicted Kagera Region at the end of the 1970s.

As discussed in chapter one, Kagera Region was vulnerable to internal and external shocks, for example, the Kagera War, the high rate of HIV/AIDS spread, the fall in major cash crop prices, the loss of land fertility and different kinds of diseases that affect both cash and food crops. These shocks negatively affected most of the households' capacity to smoothen their incomes, and continue to do so, which has rendered the households vulnerable to poverty. How these shocks have affected the Kagera households is well documented by a number of studies, which have used different approaches (Dercon *et al.*, 2006; De Weerdt and Dercon, 2006; Beegle *et al.*, 2008; De Weerdt, 2010).

Furthermore, the welfare implications of not insuring consumption against shocks and risks has been examined at length. The empirical studies in particular have dwelt variously with examining the following aspects: whether subsistence economies smoothen consumption (Bhargava and Ravallion, 1993; Fafchamps *et al.*, 1998; and Kazianga and Udry, 2006); whether imperfections in the credit market cause consumption instability (Morduch, 1994; 1995); whether consumption of wealthy and poor households grow differently, and if so why? (Ogaki and Atkeson, 1997); how transitory shocks affect welfare (Dercon and Krishnan, 2000; Dercon, 2004; and Asfaw and von Braun, 2004); whether agricultural households engages in wage labour as a way

to smoothen consumption in cases when they face shocks to agricultural income (Davis, 2015). Other writers have examined the conditions needed for initial distribution of wealth and income to affect future income distributions (Jappelli and Pistaferri, 2000).

As for Kagera, a number of studies have assessed the dynamics of consumption, including the effect of shocks (De Weerdt, 2010 by triangulation of regression results and using life history approaches; Obara, 2009 by testing the consumption smoothing hypothesis using different shapes of utility functions that considers issues of insurance; Beegle *et al.*, 2008 using panel Ordinary Least Square; Dercon *et al.*, 2006 by life-history approaches; De Weerdt and Dercon, 2006 by IV regression). This study adds a new dimension to the corpus of literature on consumption in Kagera Region, by using a different approach from those used by previous studies, and by incorporating vulnerability to poverty in the analysis.

In this chapter, the study investigates the nature of consumption growth within the life-cycle/permanent income theoretical framework to characterize consumption and determine the extent of vulnerability to poverty. It focuses on multiple shocks that are manifest through earning processes and accumulation of assets. The test of the Life-Cycle Hypothesis is geared at finding out whether when people are faced with constraints, they tend to change their consumption patterns or to retain them. Changing their consumption pattern may lead to drawing down their reserves. The findings are essential for poverty analysis as they highlight the importance of capital accumulation for consumption smoothing, hence poverty reduction. Vulnerability to poverty is

examined to bring to light implications to poverty changes when people are considered to be coping on average consumption or fully stabilized income as against actual consumption. The overall determinants of consumption in Kagera Region is also estimated.

The rest of the chapter is organized as follows: Section 4.2 provides theoretical and methodological issues underlying the estimation of the consumption dynamics. Section 4.3 presents and analyses the results from the estimation of models. Section 4.4 constitutes the summary of the chapter.

4.2 Consumption Dynamics: Theoretical, Empirical and Methodological Issues

The dynamics of wealth and poverty are explained by a combination of factors, risk being among them (Hoogeveen *et al.,* 2005). For dynamic poverty analysis, it is imperative to understand how people or households protect themselves from both income and consumption risks. In the literature, risk issues are linked to poverty status and poverty dynamics in the context of households' decisions to smooth income, consumption or in taking risks. These decisions are based on consumption and human capital models. Hence, they do not only refer to the level of current income or consumption, but to the likelihood of experiencing highly stressful declines in income and consumption levels.

This study draws from consumption theories, the models on how households decide on how much of their income to consume today *vis á vis* how much to save for the future. The consumption theories provide frameworks for inter-temporal choice, which relate to

the dynamics of poverty. Moreover, their propositions theoretically tend to give some clues on the conclusions that may emerge from the study. The studies explaining these theories were independently put forward in the 1950s by Modigliani and Brumberg (1954; 1980) and Friedman (1957). In their explanations, the authors assume rational expectations and demonstrate the applicability of their results using Irving Fisher's model of consumer choice, which provides a framework for analyzing how rational, forward-looking consumers make inter-temporal choices (Dornbusch and Fischer, 1990). Fisher's model shows the constraints consumers face, the preferences they have, and how these constraints and preferences together determine choices about consumption and saving. These decisions relate to peoples' and households' characteristics. In this regard, this study hypothesizes that certain types of households have characteristics that make them more vulnerable and more likely than others to fall into poverty or to stay in poverty for a long period of time.

In trying to solve the consumption puzzle, in the 1950s, Franco Modigliani and Richard Brumberg developed the Life-Cycle Hypothesis, which posits that individuals plan their consumption and saving behavior over their life-cycle by choosing to maintain stable life styles. Thus, according to the Life Cycle Hypothesis, because people want to smooth consumption over their lives, the young who are working save, while the old who are retired dissave.[21]

[21] The life-cycle is challenged by the fact that sometimes the elderly do not dissave but may save for precautionary saving or for the aim of accumulating bequest for their children (Shimeles, 2005)

Contrary to the Life Cycle Hypothesis, which emphasizes that income follows a regular pattern over a person's lifetime, Milton Friedman proposed the Permanent Income Hypothesis (Friedman, 1957), which emphasizes that people experience random and temporary changes in their income from year to year. The Permanent Income Hypothesis explains robustly the experienced income patterns, particularly in developing countries, such as Tanzania. It views current income as the sum of permanent income and transitory income. The permanent income is the income that is expected to persist, for example, income based on one's education. Transitory income is the income that is not expected to persist, for example, agricultural income from a bumper harvest. The consumption smoothing process as explained in both the Life-Cycle Hypothesis and Permanent Income Hypotheses relates to the peoples' decisions on how to use their assets and labour income and when to save or dissave.

These theories provide a framework to explain issues related to poverty changes over time within households. That is, whether they are rooted in human capital or physical capital. Finally, these theories have benefitted the study with respect to understanding what structures, processes and livelihood strategies can affect households over time as they work to get out of poverty.

The Life Cycle and Permanent Income hypotheses have been estimated empirically in many ways, especially depending on the functional form of the underlying utility function. Hall (1978) was the first to test these theories with the assumption of a quadratic utility function with a "Bliss Point" and constant rate of discount rate and

interest rate[22]. This assumption provides an estimable equation of the following form (Shimeles, 2005).

(4.1) $c_{t+1} = \beta_0 + \gamma c_t + \varepsilon_{t+1}$

where c is consumption at time *t*. A parsimonious model of consumption growth, i.e., $\gamma = 1$, obtains if the rate of time preference and interest rate are assumed to be equal, such that there is no bliss point. This means that current consumption has a unit root with respect to lagged consumption. Hence, consumption growth is a random walk, except for its trend.[23]

If equation 4.1 is true and its variant imply that utility is time separable and additive. In this case households over life time are assumed to be fully insured from income risk hence income is free from transitory changes in income, i.e., independent of past, current or predictable changes in income.

Empirically, the Life Cycle or Permanent Income Hypothesis can be tested if Equation 4.1 is augmented with current disposable income and other wealth variables, $x_{kit}'s$, as in Equation 4.2:

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[22] The utility function used by Hall (1978) is $u(C_t) = -\frac{1}{2}(\bar{c} - c_t)^2$, where the constant c is considered as a "Bliss Point" and the intercept term is composed of the constant terms of the Euler Equation. This utility function assumes that households are risk neutral in the Arrow-Pratt sense of measuring risk aversion.

23 The model can be interpreted as the equality between the marginal rate of substitution between future and current consumption with the marginal rate of transformation.

$$(4.2)\ c_{it+1} = \beta_0 + \gamma c_{it} + \sum_{k=1}^{k} \beta_k x_{kit} + \varepsilon_{it},$$

where β_k are coefficients of the asset variables and the subscripts refer, respectively, to individual household i, time t, and k asset holdings. The implication of Equation 4.2 in the context of less developing countries has been investigated empirically in various settings (Deaton, 1992; Ravallion and Chaudri, 1997; Jacob and Skoufia, 1998; Skoufias and Quisumbing, 2003; and Shimeles, 2005).

Deaton(1992) examines the extent to which households in Ivory Coast save and dis-save as a consumption smoothing process. He tests the Permanent income Hypothesis in situation of absent credit markets. The situation and nature of farming in Ivory Coast resembled that of Kagera and in such a way that a farmer may a prior predict the future income by looking at the current trend of harvest and prices. He consistently found that saving predicts falls in income hence those who save in one year are likely to experience a fall in income in the next year concluding that farmers plans ahead.

Ravallion and Chaudri (1997) examines whether there are consumption insurance among households in India. They find that there is no clear evidence of village level sharing of income risk. Jacob and Skoufia (1998) tests the theories of consumption behavior especially to rural agricultural households in India. They examines how the households responds to anticipated and unanticipated seasonal income fluctuations to find no evidence against the assumptions that income fluctuations are smoothed by households.

Skoufias and Quisumbing (2003) synthesizes studies done in Bangladesh, Ethiopia, Mali, Mexico and Russia to find that food consumption is easily insured than non-food consumption but poor households find it difficult to insure their income in situation where initial wealth is required as collateral. Shimeles(2005) on Ethiopia find current consumption to be correlated with household asset and past consumption. In the long-term he find consumption dynamics to be non-linear.

If either Life Cycle or Permanent Income Hypothesis is valid (or both), then consumption equals permanent income. In terms of the evolution of the distribution of income (consumption) and also the persistence of poverty, changes in past income, wealth and other important indicators of wellbeing do not matter (Ogaki *et al.* 2004). For LDCs, the life-cycle may not hold. This failure in LDCs is accounted to Hall's (1978) argument that if consumption was correlated with past income and wealth, including consumption, this could be due to either the consumer facing a liquidity constraint or the variables used were proxies for permanent income. Additional reasons for the failure of the Life Cycle Hypothesis include precautionary saving and habit persistence (Shimeles, 2005).

The estimation of Equation 4.2 raises a number of econometric issues, especially because the dependent variables can also be explanatory variables. The first issue raises the problem of collinearity between lagged consumption and the random term, that is, $\text{cov}(c_{it}, u_{it}) \neq 0$. For panel data, the error term ε_{it} of Equation 4.2 has to take into consideration the unobserved time invariant individual effects and individual invariant

time effects i.e., $\varepsilon_{it} = \alpha_i + \lambda_i + u_{it}$. Moreover, there can also be simultaneity between consumption and income determinants. Finally, the measurement error, especially when lags are considered, could have a systematic effect across households.

Thus, in a panel setting, Equation 4.2 is modified as;

$$(4.3)\ c_{it+1} = \beta_0 + \gamma c_{it} + \sum_{kit}^{k} \beta_k x_{kit} + \alpha_i + \lambda_i + u_{it},$$

Equation 4.3 can be estimated as random or fixed effects. Using the fixed effects variant especially for non-linear panel data models generates inconsistent estimates due to the "incidental" parameter problem[24]. On the other hand, treating the effects as random may result in the endogeneity problem of the explanatory variables.

The presence of a lagged independent variable raises the issue of initial condition, if maximum likelihood estimation has to be used (Bond, 2002). The available options to consistently estimate Equation 4.3 are to use either the Instrumental Variable Method (IVM) or Generalised Method of Moment (GMM). However, the GMM involves the loss of at least two period observations during differencing to find instruments, whereas the IVM loses only one observation, with mainly lagged values of the explanatory

[24] The incidental parameter appears in one finite dimensional probability law, thereby involving one finite number of observations and in consequence, rendering the corresponding maximum likelihood estimator inconsistent. In the context of panel data, the incidental parameter problem typically arises from the presence of individual-specific parameters. These may relate to individual consumer, firm, or country fixed intercept (or mean) effects. They may also involve incidental trends that are specific to each individual in the sample. The challenges presented by incidental parameters are particularly acute in dynamic panels where behavioral effects over time are being measured in conjunction with individual effects. If these are estimated with maximum likelihood estimation, leads to inconsistent estimates of the parameters that govern the dynamics.

variable as well as dependent variable as instruments.[25] To test the LCH/PIH, this study focuses on the GMM results because the data satisfied the $T \geq 4$ criterion.

In estimating the determinants of consumption, we follow Datt and Jollife's (2005) approach in which the log of consumption is derived as a linear function of a set of household and community characteristics that are thought to determine income and expenditure. Borrowing further from Shimeles (2005), a flexible functional form is specified. This functional form controls for the interaction effects of closely correlated determinants of consumption or expenditure as well as for the scale effects of some variables, for example, household size and land, which are relevant for the rural setting. The specification is thus written as follows:

$$(4.4)\ \ln c_{it} = \alpha + \sum_{k}^{K} \beta_k x_{kit} + \sum_{i}\sum_{k} \gamma_k x_{kit} x_{jit} + u_i + \varepsilon_{it}$$

It is assumed that

$$E(u_{it}) = 0, E(u_i^2) = \sigma_u^2;$$

$$E(\varepsilon_{it}) = 0,\ E(\varepsilon_{it}^2) = \sigma_\varepsilon^2$$

$$\text{cov}(x_{kit}, \varepsilon_{it}) = 0,\ \ \text{cov}(x_{kit}, u_i) \neq 0 \text{ for some } k$$

[25] If we difference Equation 4.3 without the unobserved time-varying effects as follows: $c_{it+1} - c_{it} = \gamma(c_{it} - c_{it-1}) + \sum_{k=1}^{k} \beta_k (x_{ikt} - x_{ikt-1}) + u_{it} - u_{it-1}$ with OLS to the equation we get inconsistent estimates of γ and β_s since Δu_{it} and u_{it-1} are correlated. A two-stage least square (2SLS) with instrumental variables can solve this but it works for panels with large N and small T (see Hsiao, 2004). However, 2SLS becomes asymptotically inefficient with $T \geq 4$. For our case as the model becomes overidentified as the number of orthogonality conditions and instruments increase with T (Bond, 2002).

Equation 4.4 is a linear function of k exogenous variables (x_{kit}) plus a non-linear component (the third term) that captures curvatures as well as interaction among households and community characteristics that are correlated with consumption or expenditure. The variables were classified in the following categories of indicators: Demographic; Wealth; Social Networks and Coping Mechanisms; Shocks; Occupations and Location; and proximity to regional markets. Equation 4.4 can be estimated using either the fixed effects or random effects models. The Hausman Test was used to find out whether to use the fixed or random effect estimation method. The test compares an estimator, say θ_1, known to be consistent (in this case, the fixed effects) with another estimator, say θ_2, assumed to be efficient (in this case, the random effects). If the assumption is true, then both estimators are consistent, which implies that there is no systematic differences between the two estimators, thereby confidently confirming the random effect model.

While the concern of establishing who are poor and the underlying causes has not been relinquished, for example with regard to their low levels of income, consumption or capabilities, increased attention has been paid to the possibility of experiencing a decline in these levels. This makes poverty to be seen as the probability (actual or perceived) that a household will suddenly (but perhaps also gradually) reach a position in which it is unable to cope, leading to catastrophe (Hulme *et al.* (2001)). This lack of assurance of the state in which a household expect to be over time is what is known as vulnerability to poverty.

In the study area, poverty was perceived to be widely spread, which made the incomes of households to be highly uncertain from one year to another, thereby causing consumption variability. Due to this variability, households were over time exposed to the high risk of falling into poverty. This risk was attributed to lack of income smoothing solutions. Thus, the study sought to examine the vulnerability to poverty by finding out the extent to which income/consumption variability increases or decreases the risk of being poor. Kamanou and Morduch (2002) define vulnerability of a population as being linked to the following three elements:

i. *The pattern of possible 'shocks'*. These may be losses due to say losing a job, experiencing a bad harvest, increases in needs due to for example illness, child birth or costly occasions etc;

ii. *The strength of coping mechanism*. This is the degree to which provisions are not in place to fully address shock; and,

iii. *Structural and behavioral ramifications of consumption declines*. That is, whether they are apt to lead to a temporary shortfall or to lead to poverty traps.

In this study we focus on whether there are possibilities of consumption decline among households over time and its implication to the risks of becoming poor. The Ravallion (1988) approach gives a more accurate measure of contribution of poverty to variability, which is why we adopt it for estimation in this chapter. According to Ravallion (1988), for any value of α (in FGT), the contribution of poverty to variability can be obtained by

comparing mean poverty over the study period, $\overline{P}_\alpha$, to the level of poverty at stabilized income.

The mean poverty over the period under study is given as,

(4.5) $\overline{P_\alpha} = \frac{\sum P_{\alpha t}}{T}$,

and the level of poverty at stabilized income is given as,

(4.6) $P_\alpha^* = \frac{\sum_{t=1}^{m^*} \left(\frac{z - \bar{y}_i}{z} \right)^\alpha}{n}$

where $\bar{y}_i$ is the average income/consumption overtime of the i^{th} household, m^* is the household for whom that income is below the poverty line. Thus $\overline{P}_\alpha - P_\alpha^*$ is an increase in expected poverty attributable to variability in y.

A convenient money metric of the cost of variability due to poverty is obtained by calculating the number τ such that:

(4.7) $\overline{P_\alpha} = \frac{\sum_{t=1}^{m^*} \left(\frac{z - \overline{y_i} - \tau}{z} \right)^\alpha}{n}$,

where τ is the amount by which the mean income of all poor households (i.e. all i with $\bar{y}_i < z$) would have to be reduced to achieve the actual mean level of poverty over the

study period. Hence, the difference between $\overline{P}_\alpha$ and P_α^* indicates the extent to which income variability increases or decreases the risk of being poor.

Vulnerability refers not to the current status of a household with respect to a given poverty line, but rather to the risk or probability that a household could be poor in some future period (McCulloch and Calandrino, 2003). This definition provides what would result from estimating Equation 4.7.

The above measure of vulnerability has the following advantages:

i. It is based on long-term average welfare rather than from a single period;

ii. It takes into account the ability of households at all consumption levels to smooth their consumption over time. Thus, if a household is above the poverty line and can smooth consumption across time very well, it is correctly deemed to be less vulnerable to poverty than a non-poor household with highly vulnerable consumption.

4.2.1 Data

As for the decomposition in Chapter Three, this chapter uses the Kagera Health and Development Survey (KHDS) data set, a dataset rich with data related to long-run wealth, health and other socio-economic correlates. We also use associated data sets on distance and rainfall to further our analysis. We only use the four waves out of the sixth with reasons provided in Chapter Three. The details of the data set are provided in Chapter Three and in World Bank (2004) and De Weerdt *et al.* (2010).

4.3 Estimation Results and Discussion of Consumption Dynamics and Vulnerability

The study has analyzed consumption dynamics and its determinants using fixed effects models. A test of the LCH/PIH as a measure of consumption persistence is analyzed using two of the Arellano-Bond dynamic panel data estimators (Arellano and Bond, 1991), namely difference Generalized Method of Moments (GMM) and the system GMM (Arellano and Bover, 1995). On the other hand, the analysis of vulnerability follows Ravallion's (1988) approach, which filters out poverty due to current consumption and poverty due to stabilized income or consumption. Table 4.1 provides the definition of variables used in this chapter, their scale and the descriptive statistics.

Table 4.1: Variable description and descriptive statistics

Variable Name	Variable Label	Value Label	Mean (Standard Deviation-Overall)*
headage	Age of household head	Years	51.5 (17.2)
headage2	Age of household head squared	Number	2945.5 (1850.3)
hsize	Household size	Number	5.8 (3.2)
grd	Head's highest grade of schooling	Number/ years	4.3 (3.4)
lrddist_rw	Log of road distance to Rwanda border	Number	5.66 (0.64)
lrddist_ug	Log of road dist. to Uganda border	Number	4.65 (0.91)
hsex	Head's sex	1=Male 0=Female	0.7 (0.5)
bldown	Owning building	1=Yes 0=No	0.9 (0.3)
coffee	Main crop coffee	1=Yes 0=No	0.3 (0.44)
cotton	Main crop cotton	1=Yes 0=No	0.003 (0.05)
cbanana	Main crop banana	1=Yes 0=No	0.3 (0.5)
fmmigrate	Household member migrated	1=Yes 0=No	0.5 (0.5)
hmjoclerical	Household member job clerical	1=Yes 0=No	0.003 (0.1)
hmjoconstr	Household member job construction	1=Yes 0=No	0.02 (0.14)

hmjofarm	Household member job farming	1=Yes 0=No	0.6 (0.5)
hmjofishing	Household member job fishing	1=Yes 0=No	0.01 (0.1)
hmjomerchant	Household member job merchant	1=Yes 0=No	0.04 (0.2)
shambano	Number of plots owned by household	Number	3.6 (2.5)
hhdied	Household head died	1=Yes 0=No	0.04 (0.20)
lrainfall	Log of rainfall	Number (mm)	7.1 (0.13)
shamsize	Total size of plots owned by household	Number (Acres)	5.4 (6.6)
sizeland	Interaction of household size and plot size	Number	38.4 (67.2)
sizeed	Interaction of household size and head's education grade	Number	26.2 (27.2)
fremitance	Household member receive remittance	1=Yes 0=No	0.57 (0.50)
L1conspc	Lagged value of consumption	Number	
aduwork	Total household member above 14 years and below 65 years	Number	2.7 (1.7)
*** Reported is the Overall Standard Deviation (S.D), the Within and Between S.D is not reported**			

To estimate the determinants of consumption, two approaches, namely the fixed effects or random effects models were tested to establish their appropriateness. To establish whether the random effects model is appropriate (i.e., testing for the exogeneity of the regressors), the Hausman's (1978) specification test was used to find out whether the fixed effects and random effects models are distinct, both in rural and all Kagera households. The results of the tests are reported in Appendix 1. The χ^2 test in both settings was highly significant implying that the assumption of an efficient and consistent random effects model could not be confirmed. The study did not invoke the Hausman-Taylor (H-T) (1981)[26] approach, which takes care of the time-invariant

[26] Using H-T means we need to classify the explanatory variables into those that are purely exogenous with respect to any unobserved individual specific characteristics (called x_2 and z_2). Each group includes both time varying (x_1 and x_2) and individual specific time invariant (z_1 and z_2) characteristics. Thus Equation 18 can be written as: $\ln c_{it} = x_{1it}\beta_1 + x_{2it}\beta_2 + z_{1i}\delta_1 + z_{2i}\delta_2 + u_i + \varepsilon_{it}$.

variables. The approach was not invoked due to the longevity of the panel and the used unit of analysis, i.e., the household, which nullifies the existence of the expected time invariant variables, such as sex, education and location. The longevity of these variables allows changes in household heads' characteristics, leading to change in most of them.

Based on these results, the study discusses the results with respect to the fixed effects model. The estimated coefficients of determinants of consumption per-capita for Kagera Region households are given in Table 4.2.

The results in Table 4.2 show that consumption dynamics in Kagera Region are influenced by the following factors: for rural households, the results show that all demographic indicators are statistically significant, with some having a positive influence, while others having a negative one on the consumption pattern. Indicators found to have a positive influence include number of people within a household who are in the working age group; age and sex of the head of household; and highest school grade by head of household. On the other hand, the household head's age was found to exert a significant negative quadratic effect, implying that the more the household head continues to age, the more his/her negative effect on consumption pattern within the households. The same negative effect applies to household size. These results are similar to what Shimeles (2005) finds for rural Ethiopia and Datt and Joliffe (2005) for Egypt.

This equation is then estimated as the fixed effects regression to obtain consistent estimates of β_1 and β_2 and using these to obtain the within residuals for each household and thereafter regressing the within residual on z_1 and z_2 using x_1 and x_2 as instruments to obtain δ_1 and δ_2.

Table 4.21: Determinants of Consumption Dynamics for Kagera Region Households, Fixed Effects (FE) Estimation

	KAGERA RURAL HOUSEHOLDS		ALL KAGERA HOUSEHOLDS	
	Coefficients	Standard Errors	Coefficients	Standard Errors
Demographics				
aduwork	0.0514	0.0110***	0.0485	0.0097***
headage	0.016	0.0048***	0.0138	0.0041***
headage2	-0.0001	0.0000**	-0.0001	0.0000**
hsize	-0.0787	0.0086***	-0.0771	0.0075***
grd	0.0217	0.0097*	0.0315	0.0081***
hsex	0.1478	0.0406***	0.1536	0.0356***
Wealth indicators				
bldown	-0.2462	0.0547***	-0.119	0.0449**
coffee	0.0505	0.0294	0.0431	0.0267
cotton	-0.2126	0.1994	-0.1965	0.1983
cbanana	0.0813	0.0266**	0.0733	0.0239**
shambano	-0.0321	0.0065***	-0.0331	0.0059***
shamsize	-0.0072	0.0049	-0.007	0.0044
sizeland	0.0018	0.0005***	-0.0035	0.0011**
sizeed	-0.0035	0.0013**	0.0018	0.0005***
Social Networks and Coping mechanism				
fmmigrate	0.0583	0.0234*	0.0723	0.0210***
Shocks				
lrainfall	-0.2603	0.0841**	-0.2476	0.0808**
Occupations				
hmjofarm	-0.1269	0.0281***	-0.1709	0.0254***
hmjofishing	0.09	0.1159	0.0563	0.1091
hmjomerch-ant	-0.0064	0.0755	-0.0701	0.0614
hmjoclerical			-0.4158	0.1988*
hmjoconstr			0.1789	0.0848*
Location and proximity to regional markets				
lrddist_rw	0.1324	0.4235	0.0041	0.3098
lrddist_ug	1.4211	0.6609*	0.639	0.4284
_cons	7.2387	4.7305	11.5499	2.8874***
N	2650		3257	
ll	-1399.3***		-1730.4***	

Note(i) Standard errors in third and fifth column; (ii)Refer to Table 4.1 for variable labels

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Authors' computations.

As for wealth indicators, the results with respect to size of the farm, growing coffee and growing cotton are not statistically significant, implying that these factors had no influence on consumption over time. These results reflect the situation during the studied period, since cotton and coffee growing was highly affected by the fall in their prices to the extent that some households opted to concentrate on other crops or to uproot these crops altogether. As a result, the significance of these crops in the region took a nosedive as per Narayan (2009):

> "Some of communities in Kagera region, Tanzania, have given up coffee farming entirely. The fall in the price of coffee was dramatic over the five years between 1995 and 2000, as much as 90 percent in some communities. In Nyakahura in Kagera, women said they no longer plan for their income……..actually, they have even uprooted a good number of coffee plants" (pp. 195-196).

Moreover, there has been land fertility concerns in the region, as well crops being attacked by several types of pests and diseases. These factors have negatively affected the farm size, thereby negatively influencing household consumption patterns, except for farms with large tracts of arable land. Furthermore, the results show that migration has a positive statistically significant effect on consumption. These results share commonality with what De Weerdt (2010) and Beegle *et al.* (2011) find. Other statistically significant determinants of consumption include rainfall and being a farmer.

For all Kagera Region households (Table 4.2), all demographic indicators are statistically significant, with a negative sign on the coefficients on the square of the age of head of household and household size. Additionally, undertaking clerical, farming

and construction job activities by some members within households were statistically significant.

The Life Cycle Hypothesis for Kagera Rural and all Kagera Region households was tested. The variables used in testing the Life Cycle Hypothesis as proxies for human capital included age of the household head, household size, and highest grade reached by any household member. These variables were chosen because they have a bearing on the way households engage in the production process. The proxies for physical capital or the wealth variables for all households included number of households' farm plots, owning a house and size of the households' farm plots. As explained before, future income or smoothing capacity may be affected by shocks. Thus, the death of household head was used as a proxy for shock, and the receiving of remittances was used as proxy for households' coping mechanism, especially in cases where the financial markets are not perfect and there are credit constraints, as the case is in Kagera Region.

The Generalized Method of Moments (Arellano and Bond, 1991) was used, since there is a lag of the dependent variable. Arellano and Bond (1991) argue that the Anderson-Hsiao estimator, although consistent, fails to take into account all the potential orthogonality conditions. The Arellano-Bond estimator begins by specifying the model as a system of equations, one per period, and allows the instruments applicable to each equation to differ (for instance, in later periods, more lagged values of instruments are available). The instruments include suitable lags of the levels of the endogenous variables, which enter the equation in differenced form, as well as the strictly exogenous

regressors and any other that may be specified. Arellano and Bover (1995) and Blundell and Bond (1998) modified the Arellano and Bond estimator to include lagged levels as well as lagged differences. Thus, the Arellano and Bond estimators are known as Difference GMM, and the modified ones as System GMM.

The log of rainfall is used as instrument for income/consumption shock in both rural and all Kagera Region households. Given the climate of the region, rainfall has significant role to play in determining income of the household, mainly by influencing the level of output that a household may generate out of their farms. Moreover, lagged consumption is used as a proxy for past information on consumption and household's wealth. The value of the household's farm is used as instrument for multiple sources of income on the assumption that the value of the plots owned by a household may determine how much the owner can borrow[27] to smoothen consumption over time or even what they can earn if the family decided to sell part of the plots for consumption smoothing. Another instrument for income is whether a family member has been suffering chronic illness, since illness has a bearing on the time household members allocate for productive purposes; thereby decreasing households' income.

The satisfactoriness of the instruments was tested using the Hansen Test of over-identifying restrictions and that of exogeneity of the instruments, including those generated within the GMM approaches, and one and two-step GMM for rural and all

[27] The farm plot is used as collateral

Kagera households. Moreover, the Sagan test of over-identification restriction concludes that the models are not weakened by many instruments.

Table 4.3: Determinants of Consumption Persistence for all Kagera Region Households

	DIFFERENCE GMM	SYSTEM GMM-ONE STEP	SYSTEM GMM-TWO STEP
Log of Consumption (Lagged)	-0.3723 (0.0273)***	0.5358 (0.1643)**	0.5828 (0.2071)**
headage	0.0033 (0.0012)**	0.0099 (0.0075)	0.0103 (0.0089)
hsize	-0.0555 (0.0054)***	0.0312 (0.0452)	0.0294 (0.0511)
grd	0.0263 (0.0062)***	0.0756 (0.0319)*	0.0856 (0.0653)
hsex	0.1250 (0.0457)**	-0.1065 (0.4003)	-0.0109 (0.4603)
shambano	-0.0485 (0.0065)***	-0.0003 (0.0496)	-0.0033 (0.0608)
bldown	-0.1330 (0.0575)*	-1.2878 (0.5788)*	-1.4266 (0.8067)
shamsize	0.0015 (0.0025)	-0.0054 (0.0264)	0.0009 (0.0354)
hhdied	-0.0369 (0.0908)	0.4016 (0.8861)	0.7602 (1.1861)
fremitance	-0.0959 (0.0289)***	-0.8100 (0.2443)***	-0.8692 (0.2817)**
constant	17.7740 (0.3574)***	6.7103 (2.1644)**	6.1219 (2.4064)*
N	1383	2345	2345

Note(i) Standard errors in parentheses; (ii) Refer to Table 4.1 for variable labels

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Authors' computations

The results are given in Table 4.3 and Table 4.4. The coefficient on lagged consumption is significant in both rural and all Kagera region households, which indicates that households recover from shocks. These results imply that the consumption path is sometimes stable, even though it takes time to be so. The tests of whether the lagged coefficient is unit was rejected in both rural households and all Kagera Region households and in all GMM approaches, indicating that the Permanent Income Hypothesis (PIH) failed in this study, as it did in most of the studies. Hence, for Kagera households, the persistence of poverty, changes in past income, wealth and other important indicators of wealth matters alot.

The results on the determinants of consumption persistence in all Kagera Region households is shown on Table 4.3. Both the one-step and two-step GMM approaches show that all wealth indicators are statistically not significant, which suggests that transitory income shocks, which may sometimes affect consumption, are sometimes not fully insured, hence making households vulnerable to poverty overtime. However, receiving remittance was statistically significant in all GMM settings, whereas the head's education and owning a house are statistically significant at 10 percent for only the one-step GMM approach. Similar results as those of all Kagera Region households are found by Shimeles (2005) and Asfaw and von Braun (2004) for the category of poor households in Ethiopia and Deaton (1992) for Ivory Coast.

For rural Kagera households (Table 4.4), the household size and sex of head of household is statistically significant in the one-step and two-step GMM approaches.

Working as a farmer has a statistically significant negative effect on consumption over time. This negative effect was similarly observed by Higgins (2013), whereby engaging in farming activities results in downward mobility for households in Tanzania.

Table 4.4:Determinants of Consumption Persistence for Kagera Region Rural Households

	DIFFERENCE GMM	**SYSTEM GMM-ONE STEP**	**SYSTEM GMM-TWO STEP**
Log of Consumption (Lagged)	-0.3839 (0.0293)***	0.5227 (0.1759)**	0.5579 (0.2349)*
headage	0.0015 (0.0013)	0.0049 (0.0059)	0.0055 (0.0104)
hsize	-0.0627 (0.0059)***	-0.0980 (0.0416)*	-0.0979 (0.0478)*
grd	0.0207 (0.0069)**	0.0771 (0.0303)*	0.0829 (0.0742)
hsex	0.0795 (0.0487)	1.0222 (0.4041)*	1.1038 (0.5011)*
shambano	-0.0194 (0.0077)*	0.0090 (0.0665)	0.0215 (0.0765)
hmjofarm	-0.2187 (0.0312)***	-0.4595 (0.1857)*	-0.4657 (0.2519)
shamsize	0.0024 (0.0025)	0.0172 (0.0329)	0.0125 (0.0411)
lrainfall	-0.3782 (0.0946)***	-0.2724 (0.3401)	-0.3130 (0.3746)
constant	20.5658 (0.8276)***	7.4349 (3.9761)	7.1498 (4.1307)
N	1162	1925	1925

Note(i) Standard errors in parentheses; (ii) Refer to Table 4.1 for variable labels

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Authors' computations.

Tables 4.5 and 4.6 show results of the estimates of: (i) Mean poverty (ii) Poverty when consumption is stabilized at its mean and (iii) increase or decrease in expected poverty attributable to variability in consumption and percentage increase in poverty. The presented results are based on both the absolute poverty line for 1991 (wave 1) and the poverty line for 2010 (wave 6). These estimates are for both the Headcount and Poverty Gap Ratio. Based on the 1991 poverty line for both Kagera rural and all Kagera Region households, the welfare indicator indicates that risk may not have increased the mean number of poor households. The headcount and poverty gap ratio declined and are very low. The decline was 99 percent of the mean poverty index. Basing on the 1991 poverty line, the findings imply that stabilization of consumption is advantageous to poverty reduction initiatives.

Table 4.5: Estimated Effects on Poverty of Consumption Variability for all Kagera Region Households

Welfare Indicator	**Poverty Measure**	
	Headcount	**Poverty Gap Ratio**
Consumption		
Mean Poverty $\overline{P}_\alpha$	45.24	18.57
At fully stabilized consumption $P^*_{\alpha 1991 pline}$	0.031	0.006
$\uparrow$ in expected poverty attributable to variability in y	45.22	18.57
% increase in poverty $((P^*_{\alpha 1991 pline} - \overline{P}_\alpha)/\overline{P}_\alpha)*100$	99	99
At fully stabilized consumption $P^*_{\alpha 2010 pline}$	86.52	39.33
$\uparrow$ in expected poverty attributable to variability in y	-41.28	-20.76
% increase in poverty $((P^*_{\alpha 2010 pline} - \overline{P}_\alpha)/\overline{P}_\alpha)*100$	91	112

Source: Authors' computations

Note: $\uparrow$ means increase

When considering the poverty line for 2010, the estimates are different in that expected poverty attributable to variability in consumption is shown to have increased. For both Kagera rural and all Kagera Region households, the increase is 87 percent and 91 percent for headcount indices, respectively, and it is 110 percent and 112 percent for the poverty gap ratio index, respectively. Thus, the problem becomes more pronounced by not filtering out urban households in the estimation processes. Based on the 2010 poverty line, consumption stabilization increased the incidence of poverty over time, indicating that the risks of households falling into poverty increases over time. Hence, households that are only occasionally poor prior to stabilization may become persistently poor as a consequence.

Table 4.6: Estimated Effects on Poverty of Consumption Variability for Kagera Region Rural Households

Welfare Indicator	**Poverty Measure**	
	Headcount	**Poverty Gap Ratio**
Consumption		
Mean Poverty $\overline{P}_{\alpha}$	47.91	20.27
At fully stabilized consumption $P^{*}_{\alpha 1991 pline}$	0.038	0.007
$\uparrow$ in expected poverty attributable to variability in y	47.87	20.26
% increase in poverty $((P^{*}_{\alpha 1991 pline} - \overline{P}_{\alpha})/\overline{P}_{\alpha})*100$	99	99
At fully stabilized consumption $P^{*}_{\alpha 2010 pline}$	89.51	42.66
$\uparrow$ in expected poverty attributable to variability in y	-41.60	-22.39
% increase in poverty $((P^{*}_{\alpha 2010 pline} - \overline{P}_{\alpha})/\overline{P}_{\alpha})*100$	87	110

Source: Authors' computations *;*

Note: $\uparrow$ means increase

In general, the results show that long-run factors may be more important in explaining current poverty. The results based on the 2010 poverty could be rationalized by other studies; for example Mkenda *et al.* (2004) pointed out that Kagera Region is among the regions with slow growth, faring poorly in regional poverty ranking. Da Corta and Price (2009) and Higgins (2013) show that poverty in Tanzania is still very high. The discussion in Chapter Two points to a decline in production in the region, with the prices of most of the major crops in the region having fallen, particularly after liberalization, which made income stabilization difficult.

4.4 Summary

The chapter has examined consumption dynamics by estimating the fixed effects to establish the determinants of consumption. The random effects model was ruled out as inappropriate by the Hausman Test. In addition, the Life-Cycle Hypothesis was tested through analyzing consumption persistence, and as well as vulnerability was estimated. The Life-Cycle Hypothesis was tested using a dynamic panel data approach, which follows the Arellano-Bond Approach (1991), and a two-step Generalized Method of Moments and its extensions. The vulnerability test was conducted to examine the extent of poverty by comparing the stabilized consumption with the mean consumption, following the Ravallion (1988) approach.

The results with respect to consumption dynamics showed that demographic factors are statistically significant determinants of mean consumption for both Kagera rural households and all households in the region. The Permanent Income Hypothesis (PIH)

was rejected in all partitioning. Additionally, the results for rural Kagera households and of the whole region show that households recover from shocks, which implies that the consumption path is stable. Moreover, depending on the poverty line used, the risk of the number of poor people increasing varies; it increases when the 2010 poverty line is considered and declines for the 1991 poverty line.

The implications that emanate from these findings are as follows: (i) migrating from one's original location has a positive effect on final consumption, since in a new location, they manage to have more opportunities such as more land with diversified agriculture. Thus the policy response would have been to ensure pro-poor farming approaches; (ii) wealth indicators are not statistically significant determinants of consumption. Hence, they cannot be relied on to cover households from transitory shocks. In this regard, the associated wealth creation systems, such as markets for agricultural produce need to be vibrant; (iii) vulnerability analysis shows that any existing and current income stabilization strategies lead to increased incidence of poverty. Thus, consumption stabilization strategies are not likely to be a panacea, since they could turn previous occasionally poor households to being chronically poor.

CHAPTER FIVE

DOES TIME IN POVERTY SPELL MATTER: ANALYSIS OF WHO MOVES OUT OF POVERTY, WHO FALLS IN AND WHY?

5.1 Introduction

This chapter explores the duration it takes for a household in Kagera Region and factors accounting for falling into and moving out of poverty for the period 1991 to 2010. Over time Kagera Region has been performing badly with respect to poverty, relative to other regions of Tanzania (Mkenda *et al.*, 2004). The chapter focuses on issues at household level that need to be explored further. Whereas some studies (e.g., Mkenda *et al.* 2004) analyzed poverty mainly in a static context, poverty is however a dynamic phenomenon. For example, people are at any time fall into poverty, others move out of poverty, and in other cases, some individuals or households remain firmly stuck in poverty. The capability to move out of poverty or lack of it depends on the individual or household characteristics and the nature of shocks facing a particular household (Hoogeveen *et al*., 2005)).

From Tanganyika's independence in 1961 to the late 1970s, the region of Kagera was among a few well performing regions in the country in terms of many socioeconomic indicators such as education and health. As noted earlier, after the late 1970s, the region became highly vulnerable to external and internal shocks, which have pushed it down as to fall into the category of poorly performing regions in the country. The factors that probably highly affected the region's economy and its productive capacity include the

Kagera war, a high rate of HIV/AIDS spread, a fall in the price of coffee, the main cash crop, and a decline in banana production[28], the main staple and cash crop. These negative effects on households made many families vulnerable to poverty, with some deciding to migrate to other places. However, the duration that the shocks take to translate into poverty is not documented in the literature on Kagera and Tanzania in general. Thus, this study explores the duration for a household to fall into or move out of poverty.

The literature on poverty in recent years has been marked by a growing interest in the dynamics of poverty, and it is still continuing to attract a great deal of attention. Despite this interest, for Tanzania the duration effects of poverty have not been fully explored, particularly in Kagera Region, for reasons that have already been explained. Understanding the issues related to poverty trajectories and life-history is crucial for poverty reduction initiatives. For instance, the time it takes people or households to fall into and move out poverty and the reasons behind these poverty dynamics are issues that will shed light and enable policy makers to come with appropriate policy instruments, particularly for rural poverty interventions.

The rest of the chapter is organized as follows: Section 5.2 provides concepts and empirical issues. Section 5.3 provides methodological issues and section 5.4 presents the estimation results and discussion of duration . Section 5.4 comprises the summary of the chapter.

[28] As noted in Chapter One, this was due to fall in land fertility and emergency of several crop diseases.

5.2 Concepts and Empirical Issues in Poverty Dynamics Analysis

5.2.1 Concepts in Poverty Dynamics

Recent literature on poverty analysis focuses on the long-run level of poverty among households, and through it several poverty concepts are explained. Yaqub (2000) posits that poverty is dynamic and continuous in that the poor are poor most of the time. This contention is supported by studies that focus on specific households over time, which have established that some households experience movement into or out of poverty, whereas some households experience persistent poverty over a reasonably long period of time (Alderman *et al.,* 1985). Poverty dynamics focus on inter-temporal changes in poverty of specific households. According to Alderman *et al.* (1985), the dynamic studies can provide poverty perspectives based on the mobility patterns of households from one income class to another over time and the underlying causal nexus behind such income mobility. Such dynamic studies have been facilitated by the availability of household longitudinal data. Prior to that, most of the studies on poverty were focusing on poverty trends. However, poverty trends narrowly address inter-temporal changes in aggregate poverty. In analyzing poverty dynamics, the literature has established the following three states of households:

5.2.1.1 Chronic Poor Households

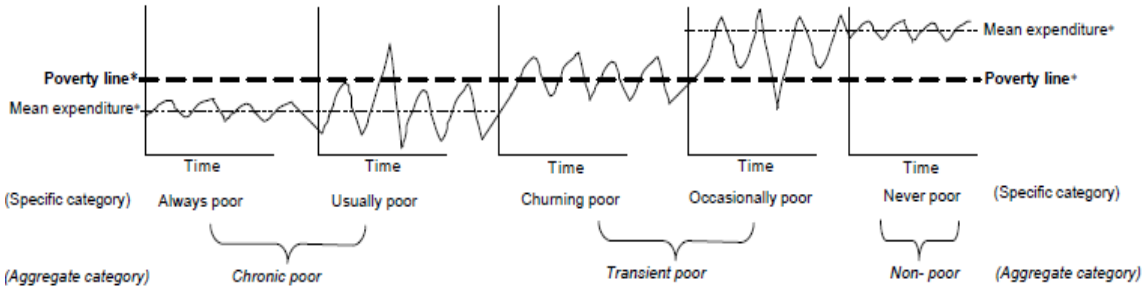
Chronic poverty is defined as the poverty that remains when inter-temporal variability in consumption has been smoothed out (Jalan and Ravallion, 2000). This type of poverty is defined by McCulloch and Calandrino (2003) as: (i) mean consumption across time

being below the poverty line; (ii) a high frequency of being in poverty over some time period (or a high probability of being poor) (iii) a high degree of persistence in poverty (or a high probability of being poor if one was poor in the previous period). These three definitions provide a framework of categorization by Hulme *et al.* (2001), whereby chronic poverty is further categorized as: (i) always poor; that is, the expenditure or income or consumption levels in each period is below a poverty line; (ii) Usually poor - that is; mean expenditures over all periods are less than the poverty line but not poor in every period.

5.2.1.2 Transient Poor Households

The second category of poverty dynamics is the transient poverty. Hulme *et al.* (2001) group transient poverty in two categories: (i) The Churning Poor - that is, mean expenditure over all periods close to the poverty line, but sometimes poor and sometimes non-poor in different periods; (ii) Occasionally Poor - that is, mean expenditure over all periods is above the poverty line, but at least one period is below the poverty line. The categorization of households into their poverty status over time is shown in Figure 5.1.

Figure 5.1: Poverty Categorization



*Depending on data availability poverty could be assessed in terms of household expenditure, income, consumption, a nutritional measure, a poverty index, a poverty score or a assessment of assets/capitals.

Source: Hulme *et al.* (2001) as quoted by Jalan and Ravallion (2000)

5.2.2 Poverty Dynamics: Summary of the Underlying Correlates

The correlates of poverty that has mostly been used in the literature on poverty dynamics are to a large extent determined by characteristics that define the endowments and potentials of households and communities, which include as well the controls for seasonality and other unobserved effects. In the literature, these characteristics and correlates are proxied differently, depending on availability of data and settings of the study area. The correlates are grouped as follows:

5.2.2.1 Household/ Demographic characteristics

The main assumption under the households' characteristics relates to the contribution of different groups and their characteristics to the stake of the household and economies of scale. The selected proxies in this regard are the following;

a) Household size (Haddad and Ahmed, 2003; McKay and Lawson, 2003; and Krishna, 2004),

b) Age distribution and dependency ratio,

i. Number of individuals below age of 15 (Okrasa, 1999; Bigsten *et al.*, 2003; Haddad and Ahmed, 2003; and Du *et al.,* 2005).

ii. Number of male or female adults (Jalan and Ravallion, 2000; Dercon and Shapiro, 2007).

iii. Age of household head (Haddad and Ahmed, 2003; McDonough *et al*., 2005; Kirimi and Sindi, 2006; Litchfield and McGregor, 2008; Krishna and Sharrif, 2011; and Glauben *et al.,* 2012).

iv. Mean age of household members (Okrasa, 1999; Bigsten *et al.*, 2003).

v. Sex of household head (Okrasa, 1999; Bigsten *et al.*, 2003; Haddad and Ahmed, 2003; Litchifield and McGregor, 2008; Salehi-Isfahani and Majbouri, 2013).

vi. Various age structures (Glewwe *et al.*, 2000; Jalan and Ravallion, 2000).

5.2.2.2 Human Capital

The main assumption under human capital relates to the contribution of different levels of education to productivity and constructive decision-making processes. Moreover the capacity of a household to smooth their life time consumption can be correlated with the level of human capital of the household. Various education levels have been used as proxies for human capital. (see Okrasa, 1999; Glewwe *et al.,* 2000; Smith *et al.,* 2001; McCulloch and Calandrino, 2003; McKay and Lawson, 2003; Haddad and Ahmed,

2003; Bigsten *et al*., 2003; McDonough *et al.*, 2005; Du *et al.,* 2005; Musick and Mare, 2005; Dercon and Shapiro, 2007; Macours and Swinnen, 2008; Beegle *at al.,* 2008; Litchfield and McGregor, 2008; Glauben *et al.,* 2012; Salehi-Isfahani and Majbouri, 2013).

5.2.2.3 Physical Capital

The main assumption under physical capital relates to the contribution of various assets to production capacity of the household and the possibility of hedging against short and long-term shocks that may face the household. Households that are well endowed are assumed to be in a good position of moving out of transitory poverty because of their capacity to use their assets as collateral, especially in an environment where the borrowing constraints are not much. Various types of assets have been used as proxies for physical capital, a few of which are mentioned below:

i. Land ownership and area cultivated by household (Ferreira, 1996; Jalan and Ravallion, 2000; Bigsten *et al.,* 2003; Haddad and Ahmed, 2003; Kessy, 2005; Kirimi and Sindi, 2006; Litchifield and McGregor 2008; Imai *et al.,* 2010; Krishna and Sharrif, 2011; Glauben *et al.,* 2012);

ii. The value of livestock (Ferreira, 1996; Haddad and Ahmed, 2003; Dercon and Shapiro, 2007);

iii. Irrigation facility (Krishna, 2004); and

iv. Types of agriculture system applied (Smith *et al.*, 2001; Bigsten *et al.*, 2003; Sarris *et al.*, 2006; Dercon and Shapiro, 2007).

5.2.2.4 Occupation and Certain Types of Jobs

Occupation reflects the capacity and possibilities of households to escape from poverty through consumption smoothing, which results from stable incomes earned by household members from different occupations. The incomes obtained from jobs differ depending on the nature of work. Certain types of jobs facilitate escape from poverty better than others and provide proper ways for consumption smoothing over time. Studies that have used various occupations as variables include Okrasa (1999), Haddad and Ahmed (2003), Bigsten *et al.(*2003), Krishna (2004), Kirimi and Sindi (2006), and Kristjanson *et al.* (2010).

5.2.2.5 Community Characteristics

Some of the characteristics are generalized across community and these may determine the possibility of certain households to manage to move out of poverty. These characteristics are infrastructure, presence of various social services and proximity to the markets (Smith *et al.*, 2001; Bigsten *et al.*, 2003; Haddad and Ahmed, 2003; Krishna, 2004; Dercon and Shapiro, 2007; Litchifield and McGregor, 2008).

5.2.2.6 Shocks

Shocks are believed to have negative effects on poverty reduction processes. Such shocks include the following:

i. Health, which may have a permanent effect on the income process, thereafter affecting consumption due to loss of income earning ability (Glewwe *et al.*, 2000; Krishna, 2004; Green and Hulme, 2005; De Weerdt and Dercon, 2006; Dercon and Shapiro, 2007; Beegle *at al.*, 2008; Kristjanson *et al.*, 2010);

ii. Death (Krishna, 2004; Kirimi and Sindi, 2006; Beegle *at al.*, 2008);

iii. Drought/Rainfall (Jalan and Ravallion, 2000; Dercon and Shapiro, 2007; Litchifield and McGregor, 2008; Kristjanson *et al.*, 2010).

5.2.2.7 Other Correlates

Other correlates that do not fall in the above categorization but have widely been used in studies on poverty and consumption dynamics include the following:

a) Migrations (Du *et al.*, 2005; Beegle *et al.*, 2008; Beegle *et al.*, 2011; Christiaensen *et al.* 2013);

b) Remittances (Ferreira, 1996; Kessy, 2005; Kirimi and Sindi, 2006; Macours and Swinnen, 2008; Kristjanson *et al.*, 2010);

c) Laziness and drunkenness (Krishna, 2004; Kessy, 2005; Kessy and Tarmo, 2013);

d) Witchcraft (Kessy, 2005; Kessy and Tarmo, 2013);

e) Pre-condition characteristics (Smith *et al.*, 2001; Krishna and Sharrif, 2011);

f) Percentage change in producer real price (Dercon and Shapiro, 2007);

g) Availability of schemes (Jalan and Ravallion, 2000; Dercon and De Weerdt, 2002; McCulloch and Calandrino, 2003; Kirimi and Sindi, 2006; Santos and Barret, 2011); and,

h) Exposure (Krishna and Sharrif, 2011).

On Kagera Region poverty dynamics have been documented in a number of studies (as pointed out earlier in Litchfield and McGregor, 2008; Ikegami, 2008; and De Weerdt, 2010; Beegle *et al.*, 2011). However, no study on Tanzania has attempted to establish econometrically the link between the poverty status and the duration it takes for a household or an individual to move out or fall back into poverty. Understanding the duration in poverty assists policy makers to distinguish between chronic and transient poverty, as well as assists during policy making in accounting for the effects of time on households' wealth, income sources, decisions and strategies (Kirimi and Sindi, 2006).

The shocks and other problems faced by the region are perceived to have been discriminatory in terms of influence on the economic profile of households and people in the region. Thus some households (individuals) may manage to move out of poverty faster, whereas others fail completely to move out of poverty while others fell into poverty.

5.3 Poverty Dynamics and Duration Analysis: Methodological Issues

The study uses the approach by Bigsten and Shimeles (2008)[29] to analyze the durations of poverty, as their study area was characterized by many aspects that relate to what has been witnessed in Kagera Region in the period studied[30]. The approach of their study focuses on the prospects of exiting poverty for households that started with a poverty spell and correspondingly of re-entering poverty for those that started with a spell out of poverty.

For poverty dynamics, three sets of approaches are mainly used in the literature. First, the spells approach, which focuses on the probabilities of ending poverty or a non-poverty spell; second, statistical methods that model income or consumption with complex lag structure of the error terms; and third, approaches that separate the chronic component from the transient component of poverty. Among these, the spell approach has an advantage of being powerful at examining the persistence of poverty (Bigsten and Shimeles, 2008). Hence this advantage adds to the reasons for choosing the spells approach to analyze poverty dynamics in Kagera Region.

The poverty spells and their determinants are analyzed by computing the probabilities of exiting and re-entering poverty, given certain states and other characteristics of the households. In this study, the Kaplan-Meier non-parametric approach and semi-parametric methods are used. The spell approach uses survival analysis, based on

[29] The study area of this work is Ethiopia

[30] These characteristics include movement from favorable conditions to war effects (Kagera War), price shock (fall in the price of coffee), HIV/AIDS spread, among others.

duration data of poverty spells to provide estimates for such questions as; what is the fraction of the population that remain poor after ‘‘*t*’’ periods (a measure of poverty persistence)? Of those that remain poor in each period, what percentage escapes poverty (exit or hazard rate)? How can multiple events or spells be taken into account?

As for most of the econometric approaches, the spell approach despite being powerful is characterized by several methodological challenges. These include inadequacy of information on poverty or non-poverty spells for each household since in most cases during the data collection period, a poverty spell might have already begun for a household long before it came under observation for the first time (left-censoring), or some households may end a poverty spell after the last observation period (right-censoring). Moreover, in some cases interval censoring can arise in a situation where the precise time a household escaped or re-entered poverty cannot be observed[31].

The Kaplan-Meier non-parametric methods do not assume any functional form on the distribution of the spells. Two hazard rates are estimated in this study, one for the probability of exiting poverty at successive durations of the poverty spell and another for the probability of re-entering poverty at successive durations of the non-poverty spell. According to Bigsten and Shimeles (2008), the exit rates relate to a cohort of households that have just started a spell of poverty and thus are ‘‘at risk’’ of exit thereafter. Thus a poverty spell begins at period t for those households who were observed to be non-poor

[31] These difficulties make most of the studies to ignore the interval and left-censored spells.

up until $t-1$.[32] Similarly, re-entry rates refer to the cohort of households that have just started a non-poverty spell at period t, having been poor until $t-1$ and are ‘‘at risk’’ of re-entering poverty. The above hazards imply that the observations that are relevant for estimating the exit and re-entry rates are spells that occur in wave 2 or later, due to the exclusion of left-censored observations.

For a non-parametric approach where the Kaplan–Meier Method is used, the survival function S(t) is defined as the probability of survival past time t (or equivalently the probability of failing after *t*). Suppose the observation is generated within a discrete-time interval $t_1,.....,t_k$, then the number of distinct failure times observed in the data (or the product limit estimate) is given by:

$$(5.1)\quad \hat{s}(t)=\prod_{j/t_j\le t}\left(\frac{n_j-d_j}{n_j}\right),$$

where n_j is the number of individuals at risk at time j, and d_j is the number of failures at time t_j.

The product is the overall observed failure times, which is less than or equal to *t* ($\le$ t). The right-censored observations are readily accommodated by the Kaplan–Meier estimator through n_j, since the households that failed to end a poverty or non-poverty

[32] Those that fail to escape poverty create a right-censored observation, as the spell would continue at the year of the last observation.

spell in each period contribute to it. The standard error of Equation 5.1 can be approximated by:

$$(5.2)\quad SD\left(\hat{S}(t)\right) = \hat{s}(t)^2 \sum_{t_i,t} \frac{d_i}{n_i(n_i - d_i)},$$

The hazard rate, *h(t)*, for ending a poverty or non-poverty spell at period *t* can be computed from Equation 5.1 as:

$$(5.3)\quad h(t) = \begin{cases} 1 - \hat{S}(t) & if\ t = 1 \\ \dfrac{\hat{S}(t) - \hat{S}(t-1)}{\hat{S}(t)} & if\ t \succ 1 \end{cases}$$

Equation 5.3 is the basis for computing exit and re-entry rates in a non-parametric approach.

The parametric method, on the other hand, models the distribution of spell durations via the probabilities of ending a spell. If the intention is to model the duration of poverty for household *i* which entered at t_0, then a dummy $\delta_i = 1$ can be defined to distinguish households which completed the spell (exited out of poverty) from those that remained in the poverty spell, $\delta_i = 0$ at the end of the period (months, years or rounds).

The percentage that completed a spell is the event-rate (or ‘‘hazard rate’’) for that period and corresponds to a ‘‘survivor-rate,’’ which indicates the percentage continuing in poverty at that point. This study uses the discrete data approach, which formally, its discrete-time hazard rate h_{it} can be defined as:

(5.4) $h_i(t) = pr(T_i = t / T_i \geq t; X_{it})$,

where T_i is the time when the poverty spell ended, and X_{it} refers to a vector of household characteristics and other variables. The overall probability of ending a spell at $T_i = t$ is given by the product of the probabilities that the spell has not ended from $t = t_0$ until $t-1$ and that it has ended at time t. Similarly, the probability of ending the spell at $T_i > t$ is given by the joint probability that poverty has not ended up to *t*, that is,

(5.5) $prob(T_i = t) = h_{it} \prod_{k=1}^{t-1} 1 - h_{ik}$,

(5.6) $prob(T_i > t) = h_{it} \prod_{k=1}^{t} 1 - h_{ik}$,

We use the proportional hazard model given by:

(5.7) $h(t / x_{ij}) = h_0 \exp(x_{ij} \beta_x)$,

where h_0 is the baseline exit (or re-entry) rate and X_{ij} is the vector of variables believed to influence the hazard. It is possible to control for unobserved household heterogeneity by adding a multiplicative random error term to Equation 5.7 so that the instantaneous hazard rate becomes:

(5.8) $h(t / x_j) = h_0 \varepsilon_j \exp(x_j \beta_x) = h_0 \exp(x_j \beta + \log(\varepsilon_j))$

The underlying log-likelihood function for Equation 5.8 is a generalized linear model of the binomial family with complementary log–log link. One of the features of the proportional hazard models is that individual hazard rates depend on the covariates, with the baseline hazard function remaining the same for all (Bigsten and Shimeles, 2008).

The reported results are based on the proportional hazard model with and without controlling for the effects of unobserved household characteristics, which play an important role in creating biases on the role spell duration plays on the probability of exit (re-entry) from (into) poverty. Proportionality assumptions were not tested due to the fact that we used discrete-time models in our analysis. Discrete-time models have the strength that they can easily accommodate time-varying covariates and they also do not require a hazard-related proportionality assumption that is commonly used in continuous-time survival analysis, e.g., the Cox proportional hazards model (Muthen and Masyn, 2005).

5.3.1 Data

As for the previous chapters, the Kagera Health and Development Survey (KHDS) data set is used in analyzing the correlates for falling into or moving out of poverty, and for non-parametric analysis. The information contained in the data sets is enough for conducting all the analysis required in this chapter. As for Chapter Four the associated data sets on distance and rainfall are used along the main dataset. In this Chapter we also use only the four waves out of the sixth with reasons provided in Chapter Three. The

details of the data set are provided in Chapter Three and in World Bank (2004) and De Weerdt *et al.* (2010).

5.4 Estimation Results and Discussion of Poverty Dynamics

When tracing households overtime, the same household may experience poverty, non-poverty or both spells. A poverty spell is preceded by a non-poverty status, and vice versa for non-poverty spell. The exit of poverty may be experienced by a household experiencing a poverty spell, and entering poverty can be experienced by a household experiencing non-poverty spell. The description of variables used in this chapter, their scale and the descriptive statistics with respect to these variables are reported in Table 5.1.

Table 5.1: Description of the Variables and their Descriptive Statistics

Variable Name	Variable Label	Value Label	Mean (Standard Deviation-Overall)*
headage	Age of household head	Years	51.5 (17.2)
econactage	Number of household members in economically active age	Number	2.1 (1.5)
hsize	Household size	Number	5.8 (3.2)
grd	Head's highest grade of schooling	Number/Years	4.3 (3.4)
hsec	Head's highest grade is secondary school	Number	0.06 (0.24)
hprimary	Head's highest grade is primary school	Number	0.66 (0.47)
hmjoother	Household member job is the others	1=Yes 0=No	0.32 (0.47)
lrddist_rw	Log of road distance to Rwanda border	Number	5.66 (0.64)
lrddist_bu	Log of road distance to Burundi border	Number	5.65 (0.85)
lrddist_ug	Log of road dist. to Uganda border	Number	4.65 (0.91)
hsex	Head's sex	1=Male 0=Female	0.7 (0.5)
bldown	Owning building	1=Yes 0=No	0.9 (0.3)
coffee	Main crop coffee	1=Yes 0=No	0.3 (0.44)

Variable Name	Variable Label	Value Label	Mean (Standard Deviation-Overall)*
cotton	Main crop cotton	1=Yes 0=No	0.003 (0.05)
cbanana	Main crop banana	1=Yes 0=No	0.3 (0.5)
fmmigrate	Household member migrated	1=Yes 0=No	0.5 (0.5)
hmjoconstr	Household member job construction	1=Yes 0=No	0.02 (0.14)
hmjofarm	Household member job farming	1=Yes 0=No	0.6 (0.5)
fmchron	Household member had chronic illness	1=Yes 0=No	0.49 (0.50)
hmjomerchant	Household member job merchant	1=Yes 0=No	0.04 (0.2)
shambano	Number of plots owned by household	Number	3.6 (2.5)
hhdied	Household head died	1=Yes 0=No	0.04 (0.20)
lrainfall	Log of rainfall	Number (mm)	7.1 (0.13)
fmdied	Household member died	1=Yes 0=No	0.16 (0.36)
bbamboo	House wall made of bamboo	1=Yes 0=No	0.23 (0.42)
deathwife	Husband's wife died	1=Yes 0=No	0.05 (0.21)
childad	Number of children below 15 and adults above 64	Number	3.1 (2.31)
faalive	Head's father still alive	1=Yes 0=No	0.15 (0.36)
mahere	Head's mother still alive and living in the same household	1=Yes 0=No	0.07 (0.25
highgrade	Highest grade attained by any member of household-The one with highest education within the household will reflect household's highest grade	Number	6.54 (3.17)
hinjured	Whether the head got injured	1=Yes 0=No	0.02 (0.13)
fmill	Whether any of the family members has fallen ill	1=Yes 0=No	0.8 (0.40)
yrsdead	Years since any family member died	Number	0.67 (2.05)
hmigrate	Household's head migrated	1=Yes 0=No	0.24 (0.43)
hrefuneral	Household head received remittance for funeral purpose	1=Yes 0=No	0.05 (0.23)
hremitance	Household head received remittance	1=Yes 0=No	0.57 (0.49)
hsubsit	Household head received remittance for subsistence purpose	1=Yes 0=No	0.19 (0.40)
reneighbour	Household head received remittance from the neighbour	1=Yes 0=No	0.09 (0.28)
reothernonrel	Household head received remittance from other non-relative	1=Yes 0=No	0.10 (0.30)
reotherrel	Household head received remittance from other relative	1=Yes 0=No	0.11 (0.31)
reparent	Household head received remittance from parents	1=Yes 0=No	0.01 (0.11)
resibling	Household head received remittance from siblings	1=Yes 0=No	0.04 (0.20)
kid1	Number of children in the household below 16 years of age	Number	2.59 (2.14)

Variable Name	Variable Label	Value Label	Mean (Standard Deviation-Overall)*
maalive	Head's mother still alive	1=Yes 0=No	0.34 (0.47)
shamsize	Total size of plots owned by household	Number (Acres)	5.4 (6.6)
fresubsit	Household member received remittance for subsistence purpose	1=Yes 0=No	0.31 (0.46)
hmedicare	Household head received remittance for medical care purpose	1=Yes 0=No	0.04 (0.19)
hmnoland	Household member migrate for land scarcity reasons	1=Yes 0=No	0.06 (0.24)
rururb	Whether the household is located in rural or urban area	1=Urban 0=Rural	0.19 (0.39)
karagwe	Whether the household is located in Karagwe	1=Yes 0=No	0.13 (0.33)
ngara	Whether the household is located in Ngara	1=Yes 0=No	0.11 (0.32)
bkrural	Whether the household is located in Bukoba Rural	1=Yes 0=No	0.34 (0.47)
muleba	Whether the household is located in Muleba	1=Yes 0=No	0.15 (0.36)
bkurban	Whether the household is located in Bukoba-Urban	1=Yes 0=No	0.19 (0.39)
biharamulo	Whether the household is located in Biharamulo	1=Yes 0=No	0.08 (0.27)
fremitance	Household member receive remittance	1=Yes 0=No	0.57 (0.50)
dependencymod	A ratio of total number of children 14 years and below and adults 65 years and above to household size	Number	0.5 (0.25)
deathhus	Wife's husband died	1=Yes 0=No	0.21 (0.40)
*** Reported is the Overall Standard Deviation (S.D), the Within and Between S.D not reported**			

5.4.1 Non-Parametric approach (Survival Functions)

The estimates of the survival functions, exit and re-entry rates were computed using the Kaplan–Meir approach for Kagera Rural, Kagera Urban and for the whole region. These results are reported respectively in Table 5.2, Table 5.2 and Table 5.3, with the households partitioned as all households, male-headed households and female-headed households.

For rural Kagera households (Table 5.2), the results show the re-entry rates to be increasing over time in all partitioning—all households, male headed households and

female headed households, which implies that the longer a household stays out of poverty, the more likely it is for that household to re-enter into poverty. Similarly, for the exit rates, the longer a household stays in poverty, the easier it is for it to exit the poverty spell. Hence, these results indicate that most of the households are exhibiting *"transitory poverty"* trends.

Table 5.2: Kagera Rural Survival Function, Poverty Re-entry and Exit Rates using the Kaplan-Meier Estimator for All, Male-headed and Female-headed Households

Number of rounds since start of poverty spell	**All Households**		**Male-Headed**		**Female-Headed**	
	Survival Function	Re-entry rates	Survival Function	Re-entry rates	Survival Function	Re-entry rates
1	1(.)	.(.)	1(.)	.(.)	1(.)	.(.)
2	0.6892 (0.0176)	0.3108 (0.0176)	0.7068 (0.0197)	0.2932 (0.0197)	0.6319 (0.0378)	0.3681 (0.2993)
3	0.1649 (0.0121)	0.8351 (0.0121)	0.1635 (0.0138)	0.8365 (0.0138)	0.1682 (0.0247)	0.8318 (0.0247)
4	0.0347 (0.0037)	0.9653 (0.0037)	0.0350 (0.0044)	0.9650 (0.0044)	0.0336 (0.0071)	0.9664 (0.0071)

Number of rounds since start of poverty spell	Survival Function	Exit rates	Survival Function	Exit rates	Survival Function	Exit rates
1	1(.)	.(.)	1(.)	.(.)	1(.)	.(.)
2	0.3827(0.0184)	0.3108(0.0176)	0.3684(0.0209)	0.6316(0.0209)	0.4294(0.0388)	0.5706(0.0388)
3	0.2985(0.0156)	0.8351(0.0121)	0.2895(0.0177)	0.7105(0.0177)	0.3263(0.0330)	0.6737(0.0330)
4	0.2358(0.0133)	0.9653(0.0037)	0.2275(0.0150)	0.7725(0.0150)	0.2610(0.0282)	0.7390(0.0282)

Source: Authors' computations.

Terms in brackets are standard errors.

The data used show that for wave 1(round 1) and wave 3 (round 2) the poverty line is below the mean consumption[33]. Hence, many of the households may end up being either non-poor or characterized as occasionally poor. For wave 5 (round 3) and wave 6 (round 4), the mean consumption is below the poverty line. Therefore, the households have the churning poverty characteristics[34]. Thus, the relationship between the mean consumption and the poverty line over time generally categorize the households as experiencing transitory poverty, which concurs with the results of the Kaplan-Meier survival functions.

The transitory nature of household poverty could be a result of well-established social networks within the region, the evidence of which is given in Narayan *et al.* (2009) and De Weerdt and Dercon (2006). Moreover, De Weerdt and Dercon (2006) and Dercon *et al.* (2006) show that there is partial insurance of consumption in the region via networks. To quote De Weerdt and Dercon (2006: 338):

> "Some households may form more or less formalized groups (burial societies, women's groups, labour sharing groups, etc.). Some (but certainly not all) of these groups may have an insurance element in them"

Among rural Kagera households, the likelihood of a household falling back into poverty over time is not much different in all sample partitioning (all households, male-headed and female-headed households). As for exiting poverty, the probability in round two was 31 percent for all Kagera Region households, 63 percent for male-headed households,

[33] The mean consumption and poverty line respectively for the different waves are: wave 1 (TZS 432,435.9; TZS. 106,789.969); wave 3 (TZS 354,787.3; TZS. 219,090.65); wave 5 (TZS 416,547; TZS. 476,176.425) ; wave 6 (TZS 622,956; TZS. 664,366.926).
[34] See Figure 5.1

and 57 percent for female-headed households. However, in round four, the probability for exiting poverty for all households category triples, in contrast to an increase of just 0.82 and 0.78 times the round two likelihood for male-headed and female-headed households, respectively. The results imply that although all households have almost similar risk of falling into poverty, male-headed households have a higher likelihood of exiting poverty than female-headed households. This higher likelihood may be accounted by the lopsided nature of resource distribution and allocation between the sexes in most African settings. For instance, Narayan et al. (2009: 60) report that:

> "A 42 year old woman in a village in Kagera, Tanzania, got nothing after she separated from her husband. Because traditional laws exclude women from inheriting land, houses and livestock after their father's death; she could rely only on her brothers after separation".

For urban Kagera Region households (Table 5.3), the chances for re-entering into poverty over time are not as big as for rural Kagera Region households, for all sample partitioning[35] . The likelihood for exiting poverty is higher in urban areas than the rural areas. Considering households for the whole region (Table 5.4), the results are closer to those of rural Kagera Region households.

[35] Gender differences does not matter.

Table 5.3: Kagera Urban Survival Function, Poverty Re-entry and Exit Rates using the Kaplan-Meier estimator for All, Male-headed and Female-headed Households

Number of rounds since start of poverty spell	**All Households**		**Male-Headed**		**Female-Headed**	
	Survival Function	Re-entry rates	Survival Function	Re-entry rates	Survival Function	Re-entry rates
1	1(.)	.(.)	1(.)	.(.)	1(.)	.(.)
2	0.8305 (0.0282)	0.1695 (0.0282)	0.8718 (0.0309)	0.1282 (0.0309)	0.7500 (0.0559)	0.2500 (0.0559)
3	0.4207 (0.0366)	0.5793 (0.0366)	0.4057 (0.0456)	0.5943 (0.0456)	0.4412 (0.0613)	0.5588 (0.0613)
4	0.2000 (0.0258)	0.8000 (0.0258)	0.1945 (0.0323)	0.8055 (0.0323)	0.2071 (0.0426)	0.7929 (0.0426)
Number of rounds since start of poverty spell	Survival Function	Exit rates	Survival Function	Exit rates	Survival Function	Exit rates
1	1(.)	.(.)	1(.)	.(.)	1(.)	.(.)
2	0.2712(0.0334)	0.7288(0.0334)	0.2393(0.0394)	0.7607(0.0394)	0.3333(0.0609)	0.6667(0.0609)
3	0.1445(0.0209)	0.8555(0.0209)	0.1351(0.0252)	0.8649 (0.0252)	0.1569(0.0369)	0.8431(0.0369)
4	0.0758(0.0128)	0.9242(0.0128)	0.0703(0.0153)	0.9297(0.0153)	0.0832(0.0226)	0.9168(0.0226)

Source: Authors' computations.

Terms in brackets are standard errors.

Table 5.4: Overall Kagera Region Survival Function, Poverty Re-entry and Exit rates Using the Kaplan-Meier Estimator for All, Male-headed and Female-headed Households

Number of rounds since start of poverty spell	**All Households**		**Male-Headed**		**Female-Headed**	
	Survival Function	Re-entry rates	Survival Function	Re-entry rates	Survival Function	Re-entry rates
1	1(.)	.(.)	1(.)	.(.)	1(.)	.(.)
2	0.7179 (0.0152)	0.2821 (0.0152)	0.7365 (0.0173)	0.2635 (0.0173)	0.6637 (0.0316)	0.3363 (0.0316)
3	0.2070 (0.0121)	0.7930 (0.0121)	0.1983 (0.0139)	0.8017 (0.0139)	0.2299 (0.0246)	0.7701 (0.0246)
4	0.0527 (0.0045)	0.9473 (0.0045)	0.0501 (0.0052)	0.9499 (0.0052)	0.0595 (0.0093)	0.9405 (0.0093)
Number of rounds since start of poverty spell	Survival Function	Exit rates	Survival Function	Exit rates	Survival Function	Exit rates
1	1(.)	.(.)	1(.)	.(.)	1(.)	.(.)
2	0.3601(0.0163)	0.6399(0.0163)	0.3451(0.0187)	0.6549(0.0187)	0.4036(0.0329)	0.5964(0.0329)
3	0.2645(0.0132)	0.7355(0.0132)	0.2589(0.0152)	0.7411(0.0152)	0.2776(0.0261)	0.7224(0.0261)
4	0.1972(0.0107)	0.8028(0.0107)	0.1935(0.0124)	0.8065(0.0124)	0.2057(0.0210)	0.7943(0.0210)

Source: Authors' computations.

Terms in brackets are standard errors.

5.4.2 Kagera Region Correlates of Poverty Exit and Poverty Re-entry

This section presents the results of the estimates of the proportional hazard models, with and without unobserved heterogeneity for both the hazard rate of exiting and re-entering poverty following a discrete time model analysis. In their simpler form, the hazard models assume that spells in two alternating states for the same individual are uncorrelated, which allows for the separation of the exit and re-entry estimates. Longitudinal data set is used, which is designed in such a way that the observations occur on periodic basis, such that it is difficult to precisely pinpoint the date and time that the event occurred. According to Heeringa *et al.* (2010), there are several ways to parameterize the effects of time in a discrete time model. In this, a set of indicator variables for each time period is created, in which the conditional log-log is estimated without the overall intercept term. Heeringa *et al.* (2010) mentions two advantages of using the "time indicator" parameterization, which this study uses:

a. No functional relationship is imposed on the relationship between the hazard and time;

b. If time periods are not of equal length or must be collapsed (if time event are space, as is the case for the panel used in this study[36]), the individual time period intercepts will adjust for the variability in the size of time units and the regression parameters, since the covariates will not be biased.

The estimates of the proportional hazard model without unobserved household

[36] The KHDS panel data used in this study have time periods between waves that are not of equal length, and are sometimes very sparse.

heterogeneity are reported in Table 5.5, whereas those that incorporate household heterogeneity are reported in Table 5.6. The likelihood ratio test is statistically significant for poverty re-entry estimation, both for all households in the region and for rural households, which indicates that it is necessary to control for unobserved household specific factors. However, for the estimates of exiting poverty - for all households in the region and rural households - the difference is not statistically significant.

The inconclusive results for exiting models on the importance of unobserved household specific factors are in line with what Narayan *et al.* (2009: 27) find on Kagera and concluded thus:

> "…..in general, our study in Kagera, Tanzania, demonstrates, existing economic models are better at predicting falling than at predicting movement out of poverty…."

A number of covariates for re-entering poverty spell for all Kagera Region households indicate to have a statistically significant role in making a household to re-enter poverty (Table 5.5). These include age of the head of household, head's highest grade of education being primary school, household's main occupation for members being farming, growing coffee as main crop, whether family member died, and location. As discussed earlier, the coffee prices continued to fall during the studied period and as a result, households in the region did not consider it as a viable option for exiting poverty. Thus, any household which continues to rely on coffee growing as the main cash crop is more likely to fall back into poverty.

Table 5.5: Covariates for Re-entering Poverty Spell for All Kagera Region Households

	Proportional hazards		Proportional hazards with heterogeneity	
	Coefficient	Standard error	Coefficient	Standard error
Demographics				
Headage	0.0065	0.0026*	0.0186	0.0074*
Econactage	0.0795	0.0428	0.1651	0.1118
Hprimary	0.2306	0.0955*	0.8768	0.2775**
Hsec	0.2402	0.2227	0.5360	0.5941
Hsize	-0.0248	0.0224	-0.0161	0.0562
Occupations				
Hmjoconstr	-0.2731	0.3901	-1.5076	0.9524
Hmjofarm	-0.3946	0.0929***	-0.7857	0.2351***
hmjomerchant	0.0177	0.2143	-0.2177	0.5740
Wealth indicators				
Cbanana	0.1306	0.0883	0.3790	0.2212
Coffee	0.3617	0.0964***	0.6025	0.2532*
Cotton	0.8935	0.4824	1.5338	1.5551
Shambano	-0.0054	0.0205	-0.0443	0.0489
Shocks				
Fmchron	0.0842	0.0853	0.0089	0.2109
Hhdied	-0.8931	0.4745	-1.4586	1.0876
Fmdied	0.2095	0.0960*	0.5838	0.2380*
Location				
Rururb	0.3621	0.1163**	1.0407	0.3418**
Durations				
dur1	-3.0457	0.2257***	-7.7378	0.7097***
dur2	-2.0562	0.2134***	-4.6381	0.6153***
dur3	0.7938	0.2262***	6.9207	0.8767***
dur4	-0.9634	0.2066***	-0.0759	0.5733
N	2480		2480	
Ll	-1117.61***		-1073.50***	
Likelihood ratio test of suitability of models (p-level)			0.0000	

Note(i) Standard errors in third and fifth column (ii)For variable labels refer to Table 5.1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Authors' computations

In general, over time households in Kagera Region have worked to diversify with respect to the type of crops they grow. For example, by engaging in the farming of high value non-traditional crops, namely, horticulture and vanilla, and uprooting coffee and other lowly productive crops (De Weerdt, 2010; and Kristjanson *et al.*, 2010). This response may explain why for all Kagera Region households, engaged in farming activities have largely succeeded to salvage households from re-entering poverty, particularly in absence of productive resources such as good education and capital, to allow them to shift to other occupations. With these results, it is tempting to draw the implication that during the studied period in Kagera Region, perhaps there was no population pressure in the agricultural sector. This pressure would have given rise to the opposite effects, as were the findings by Adelman *et al.* (1985) for India.

Table 5.6: Covariates for Re-entering Poverty Spell for Kagera Region Rural Households

	Proportional Hazards		Proportional Hazards with Heterogeneity	
	Coefficient	Standard Error	Coefficient	Standard Error
Demographics				
Headage	0.0044	0.0029	0.0122	0.0078
dependencymod	0.1416	0.2007	0.2270	0.4795
Hsize	0.0022	0.0173	0.0157	0.0428
Hprimary	0.1947	0.1012	0.6814	0.2869*
Occupations				
Hmjofarm	-0.3607	0.0958***	-0.7928	0.2303***
Wealth indicators				
Bbamboo	-0.4076	0.1463**	-0.6372	0.3265
Cbanana	0.1237	0.0973	0.2870	0.2362
Coffee	0.3072	0.0996**	0.4357	0.2563
Cotton	0.8401	0.4824	1.3021	1.4005
Shamsize	0.0071	0.0056	0.0033	0.0145
Shocks				
Deathhus	0.1795	0.1131	0.2608	0.2961
Deathwife	0.4222	0.3037	0.6008	0.7979
Fmchron	0.0656	0.0932	-0.0094	0.2200
Hhdied	-0.8109	0.4806	-0.9633	1.0687
Durations				
dur1	-2.8945	0.2512***	-6.6336	0.8441***
dur2	-2.0345	0.2411***	-3.9891	0.6756***
dur3	0.8514	0.2464***	6.6984	1.0158***
dur4	-0.8803	0.2299***	0.2455	0.6049
N	2087		2087	
Ll	-931.91***		-902.09***	
Likelihood ratio test of suitability of models (p-level)			0.0000	

Note(i) Standard errors in third and fifth column (ii)For variable labels refer to Table 5.1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Authors' computations

The results show that aging and lower levels of education of the head of the household tend to make it hard for a household to move out of poverty. Given the rural nature of the region, such results would be expected, which lends support to findings by Dercon *et al.* (2012) on Ethiopia. The results are the same even with control for unobserved

household heterogeneity, although the significance level differed slightly. The results imply that poverty reduction intervention programmes such as those implemented by the Tanzania Social Action Fund (TASAF) need to focus on households with aged and uneducated members if they need to be successful in the reduction of poverty.

Considering only Kagera rural households (Table 5.6), the results with respect to being a farmer and coffee being the major crop shows the same effect as for all households in the region. Bigsten *et al.* (2003) find a positive effect for those growing *teff* in Ethiopia, where *teff* is considered a high value crop in Ethiopia. The results with respect to the demographic and shock indicators are statistically insignificant. Insignificant influence of shock indicators, especially death and chronic illnesses, on re-entering poverty for rural Kagera households, a region which was highly affected by HIV/AIDS, may be due to the possibility that an ill-person or the dying head was no longer a major income earner for the household's livelihood[37].

Moreover, shocks are more hurting if they are idiosyncratic and unpredictable, which is not always the case for death and chronic illness caused by HIV/AIDS, a common cause of chronic illness in Kagera Region. The HIV/AIDS death shocks and chronic illness are predictable, which reduces their effects. As Morduch (1995) argues, if income shock can be predicted beforehand, then a household may have side stepped the problem by engaging in costly ex-ante smoothing strategies (for example diversifying crops, plots

[37] In rural areas especially in most parts of Kagera Region where farming activities are mainly for perennial crops, production entails collective household activities. Hence, the death of one household member may not largely affect the production capacity of a household as a whole.

and activities). Additionally, Beegle *et al.* (2011) argue that it may be the case that the per capita income standing of surviving households could theoretically rise through increases in labour scarcity, which increases the value of time. Young (2005) (as referred to in Beegle *et al*. (2011)) find that the HIV/AIDS epidemic resulted in higher per capita consumption in the South Africa economy. Beegle *et al.* (2011) also find that households strongly recovered five years after experiencing a shock. Also, as already explained earlier, Kagera Region has well established informal social networks, whereby the self-help receipts from the community may be channeled mainly into welfare improvements.

For all Kagera Region households, the results with respect to the covariates for exiting poverty are reported in Table 5.7. For these households, the statistically significant covariates for exiting poverty include the following: living with the mother of the head of household, the highest grade reached by household members, household size, family member falling ill, death of family member, extent of rainfall, head migrating, head receiving remittance for subsistence, network-related variables and location. Duration variables have a significant positive effect for exiting poverty, with their trend showing the likelihood for exiting poverty increasing as the duration increases. The death of a family member (not the head's death) and rainfall act as hindrance to exiting poverty. The implication with respect to the influence of the death of the household member is due to partial loss in the household's income, which is earned through collective actions. Hence, the loss of a household member translates to the loss of the labour force for the household and, consequently, labour income.

Table 5.7: Covariates for Exiting Poverty Spell for All Kagera Region Households

	Proportional hazards		Proportional hazards with heterogeneity	
	Coefficients	Standard Errors	Coefficients	Standard Errors
Demographics				
Childad	-0.0663	0.0351	-0.0663	0.0351
Faalive	0.0731	0.0968	0.0731	0.0968
Mahere	0.3015	0.1466*	0.3015	0.1466*
Highgrade	-0.0870	0.0136***	-0.0870	0.0136***
Hsize	0.0646	0.0263*	0.0646	0.0263*
Shocks				
Fmill	0.2179	0.1029*	0.2179	0.1029*
Hinjured	0.3809	0.3196	0.3809	0.3196
Fmdied	-0.7997	0.2450**	-0.7997	0.2450**
Yrsdead	0.0197	0.0515	0.0197	0.0515
Fmchron	0.0635	0.0786	0.0635	0.0786
Lrainfall	-4.1060	0.6301***	-4.1060	0.6301***
Social Networks and Coping mechanism				
Hmigrate	0.3890	0.0824***	0.3890	0.0824***
Hrefuneral	0.2446	0.1501	0.2446	0.1501
hremitance	-0.1428	0.1035	-0.1428	0.1035
Hsubsit	-0.3559	0.1133**	-0.3559	0.1133**
reneighbour	0.3070	0.1722	0.3070	0.1722
reothernonrel	0.4869	0.1393***	0.4869	0.1393***
Reotherrel	0.3348	0.1469*	0.3348	0.1469*
Reparent	0.7961	0.3148*	0.7961	0.3148*
Resibling	0.5521	0.1898**	0.5521	0.1898**
Location and proximity to regional markets				
Muleba	1.2028	0.2303***	1.2028	0.2303***
Bkrural	1.4515	0.2179***	1.4515	0.2179***
Bkurban	0.7638	0.2146***	0.7638	0.2146***
biharamulo	-0.6467	0.3151*	-0.6467	0.3151*
Ngara	-1.0329	0.9971	-1.0329	0.9971
Karagwe	1.0003	0.2348***	1.0003	0.2348***
lrddist_bu	0.0739	0.4333	0.0740	0.4333
lrddist_rw	-1.2074	0.5141*	-1.2075	0.5141*
lrddist_ug	0.0897	0.0574	0.0897	0.0574
Durations				
dur1	34.1994	5.4176***	34.1996	5.4176***
dur2	32.7881	5.4306***	32.7882	5.4306***
dur3	33.2276	5.4252***	33.2278	5.4252***
dur4	34.3397	5.4287***	34.3399	5.4287***
N	1784		1784	
Ll	-889.79***		-889.79***	
Likelihood ratio test of suitability of models (p-level)		0.495		

Note(i) Standard errors in third and fifth column (ii) For variable labels refer to Table 5.1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. **Source:** Authors' computations

Living with a mother is a positive influence for poverty reduction, especially in a rural area setting. This is presumably because in most cases, mothers are very respected among family members and can easily influence production or livelihood direction of the household. Thus, if a mother is developmental minded, the likelihood is high that the family she is living with will also be, which would contribute to moving out of poverty. The results with respect to location are not definitive. While living in Ngara and Biharamulo show a negative effect for moving out of poverty, for the remaining districts the effect is positive. The two districts (i.e., Biharamulo and Ngara) have unique characteristics[38].

The negative sign on the coefficients for Ngara and Biharamulo may be explained by the following; first, the weather in Biharamulo is different from that of other districts, although it is closely related to that of Ngara. Most of the crops grown in these districts are the traditional annual crops, which may be easily affected by any short term climatic changes. Secondly, Ngara and Biharamulo are neighbouring Rwanda, and hence near the border has negative statistically significant effects. In addition, these two districts, particularly Ngara but also probably Biharamulo, were affected more by the refugee crisis, following the Rwanda Genocide in 1994 and Burundi's civil wars of 1993 to 2005.

Migration has positive effects for exiting poverty. These effects are as expected, which also are similar to findings by Beegle *et al.* (2011) and De Weerdt (2010). The social

[38] Some of these characteristics are explained in Chapter Two.

networks variables are statistically significant with a positive sign, which signifies the role of networks, especially in addressing short term consumption and poverty dynamics.

For rural Kagera Region households, the results with respect to the covariates for exiting poverty are reported in Table 5.8. The statistically significant covariates for exiting poverty for these households are the following: number of children, having a living mother, grade of the household head, household size, sex of the head of household, extent of rainfall, receiving support for funeral, migrating, receiving remittance especially for medical care and being a farmer. However, the results with respect to remittances is two-pronged. On the one hand, receiving remittances by the head of the household is negatively related to exiting poverty, whereas on the other hand, the receipt of remittance by other family members has positive effects for exiting poverty. These opposed results may have emanated from the behavioral nature of household's heads as compared to other members of the households in rural households, whereby remittances received by heads of household are more likely to be diverged to non-family use, such as buying alcohol, a problem noted also by Kessy (2005).

Table 5.8: Covariates for Exiting Poverty Spell for Kagera Region Rural Households

	Proportional hazards		Proportional hazards with heterogeneity	
	Coefficients	Standard Errors	Coefficients	Standard Errors
Demographics				
kid1	0.1202	0.0417**	0.1202	0.0417**
Maalive	0.2393	0.0958*	0.2393	0.0958*
Grd	-0.0684	0.0143***	-0.0684	0.0143***
Hsize	-0.0724	0.0284*	-0.0724	0.0284*
Hsex	0.4105	0.1147***	0.4105	0.1147***
Wealth indicators				
Bldown	0.3323	0.1726	0.3323	0.1726
Shambano	-0.0278	0.0218	-0.0278	0.0218
Shocks				
Hinjured	0.4384	0.4419	0.4384	0.4419
Lrainfall	-1.6834	0.4916***	-1.6833	0.4916***
Social Networks and Coping mechanism				
Hrefuneral	0.4852	0.1640**	0.4851	0.1640**
Fmmigrate	0.9541	0.1082***	0.9540	0.1082***
Fremitance	0.3626	0.1505*	0.3626	0.1505*
Fresubsit	-0.0758	0.1105	-0.0758	0.1105
Hmedicare	0.5821	0.2367*	0.5821	0.2367*
Hmnoland	0.0688	0.1345	0.0688	0.1345
hremitance	-0.3380	0.1318*	-0.3380	0.1318*
Occupations				
Hmjofarm	0.7308	0.2279**	0.7307	0.2279**
hmjomerchant	-0.0689	0.3193	-0.0689	0.3193
Hmjoother	0.0497	0.2329	0.0497	0.2329
Location and proximity to regional markets				
lrddist_rw	-0.1225	0.0926	-0.1225	0.0926
lrddist_ug	0.0479	0.0489	0.0479	0.0489
Durations				
dur1	10.9113	3.5399**	10.9109	3.5399**
dur2	9.6017	3.5540**	9.6013	3.5541**
dur3	9.6341	3.5408**	9.6337	3.5408**
dur4	11.0193	3.5435**	11.0189	3.5436**
N	1297		1297	
Ll	-603.99***		-603.99***	
Likelihood ratio test of suitability of models (p-level)			0.496	

Note(i) Standard errors in third and fifth column (ii)For variable labels refer to Table 5.1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Authors' computations

5.5 Summary

In this chapter the poverty dynamics using the spell approach, by utilizing the Kaplan-Meier non-parametric methods have been examined. Moreover, the study estimated the proportional hazard model, by controlling and in turn not controlling for the unobserved household heterogeneity. The conditional log-log approach was used for the discrete data settings, and for each setting, duration was parameterized through setting some specific "time indicators". The non-parametric approach involved partitioning the data into rural and urban settings and by categorizing households into all households, and then separating them between female and male-headed households. Finally, the proportional hazard models involved partitioning the data as all Kagera Region households or alternatively as rural Kagera Region households.

For the non-parametric Kaplan-Meier approach, the results show that the longer a household stays in poverty, the easier it is for it to move out of poverty, and the longer a household stays out of poverty, the easier it is for it to fall into poverty. These results are indicative of the transitory nature of poverty in Kagera Region. The results also show that although all households had almost similar risk of falling into poverty, male-headed households had higher likelihood of exiting poverty than female-headed households. This could be accounted by resource distribution and allocation between sexes in the African settings. Additionally, the chances for re-entering poverty over time for urban households are found to be not as big as they are for Rural Kagera Region households.

For the proportional hazard models, the unobserved household heterogeneity effects are statistically significant for the case of re-entering poverty, and are rejected for the case of exiting poverty. Growing coffee is found to negatively affecting exiting poverty and vice versa with respect to poverty re-entry. The death of the head of household is not statistically significant, which signifies the collective nature of farming activities in the region, as is evidenced by findings with respect to family member shocks. Location, age and level of education of head of household are shown to be statistically significant correlates of poverty re-entry and exit.

Several policy implications follow from the findings: (i) In view of the findings that diversification of the farming activities is poverty reducing, policy may need to be geared at promoting farming of high value non-traditional crops in Kagera, which salvaged the farmers from falling into poverty: (ii) The transitory nature of poverty implies that most of the household's mean consumption is very close to poverty lines, thus any small change in income may be due to a negative or positive shock, which could cause households to either fall into or moving out of poverty. Thus, a policy response in this regard may need to be put into enhancing the social networks as a means of income smoothing and providing better safety nets, and thereafter expanding and strengthening the asset base of the poor households, as they are a positive avenue for poverty exiting.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

6.1 Introduction

This chapter provides a summary of the study and concluding remarks, in relation to estimations, findings and analysis on poverty dynamics in Kagera Region. The findings lead to policy implications that may be invoked in formulating policies. The chapter is concluded with elaborations on areas for further research.

The dynamics of poverty in Kagera region for the period 1991 to 2010 are examined from a decomposition of poverty over time into growth, inequality and migration effects; analysis of the consumption dynamics is guided by the life cycle/permanent income hypothesis and the extent of vulnerability; and analysis of the probability that people of certain attributes, if poor, takes less or more duration than other people to move into or out of poverty. The study uses the Kagera Health and Demographic Survey (KHDS), a six wave data set collected between 1991 and 2010 for a sample of Kagera Region households with a view to examining the effects of HIV/AIDS to human development in the region.

The study has used various approaches developed to handle panel data, including: firstly, the decomposition of poverty, following the Son (2003) approach; secondly, the consumption dynamics analyzed using fixed effects models, and then the consumption persistence, analyzed using two of the Arellano-Bond dynamic panel data estimators,

specifically difference Generalized Method of Moments (GMM) and the system GMM; thirdly, analysis of vulnerability follows Ravallion's (1988) approach which filters out poverty due to current consumption and poverty due to stabilized income or consumption; and lastly, the duration was analyzed using the spell approaches, namely the Kaplan-Meier non-parametric survival function approach and the semi-parametric proportional hazard models, taking into account the household's heterogeneity effect. The used data was partitioned into either all households, rural or urban households or by districts.

The conditional log-log approach was used for the discrete data settings, and in each setting, duration was parameterized through setting specific "time indicators". The non-parametric Kaplan-Meier approach involved partitioning the data in terms of rural and urban settings and by considering all households and separated between female and male headed households.

6.2 Main findings and policy implications

The study had three objectives, namely decomposing the poverty index, examining the determinants of consumption and analyzing the duration effects. For the decomposition of poverty, the results are mixed, depending on the type of partitioning being addressed. However, migration is shown to be pro-poor in most cases, with some exceptions for some years especially when considering the gap from those years to the base-line. These findings are similar to those found by other researchers in other settings, for example, Du *et al*. (2005) who find that the overall impact of migration on poverty might even be

modest. For most of the studies that conclude that migration is pro-poor, they either use a regression or the life history approach, which assumes the same path from the baseline year to the last year of observation, whereas with the adopted decomposition approach, the poverty behavior between two data-points are compared, taking other data points as given. These results imply that the population shift effects seem to have contained the effect of increased poverty in Kagera region. With increased poverty, a viable policy response is to increase farmers' productivity. However, by filtering and decomposing poverty in its urban-rural effects and in its district effects, the appropriate policy response calls for pro-poor based skills training and employment creation, particularly in the urban areas.

As for the determinants of consumptions, the results show that the demographic factors are significant determinants of mean consumption with respect to both rural and all Kagera region households. The Permanent Income Hypothesis (PIH) failed in all partitioning. The results also show that in both rural and all Kagera region, households recover from shocks, hence the consumption path is stable. Depending on the poverty line used, the risk of increasing the number of poor people varies, and it increases when the 2010 poverty line is considered, and declines when the 1991 poverty line is considered. From the analysis of the determinants of consumption, several implications emerge, namely, (i) migrating from one's original location has a positive effect on final consumption, since in a new location, they manage to have more opportunities such as more land with diversified agriculture, which may require that the policy embraces pro-poor farming approaches, (ii) wealth indicators are not among the main determinants of

consumption, and are inadequate in terms of covering households from transitory shocks, unless they be associated with wealth creation systems, such as vibrant markets for the agricultural produce, and (iii) on account of vulnerability analysis, current income stabilization strategies lead to increased incidence of poverty. Thus, consumption stabilization strategies should be carefully scrutinized, in view of the finding that they could turn previous occasionally poor households into chronic poor ones.

On analysis of duration effects, the results from the non-parametric Kaplan-Meier approach show that the longer a household stays in poverty, the easier it is for it to move out of poverty, and the longer the household stays out of poverty, the easier it is for it to fall into poverty, which indicates the transitory nature of poverty in Kagera . The results also show that although all households have almost a similar risk of falling into poverty, male-headed households have a higher likelihood of exiting poverty than female-headed households, which may be attributed to resource distribution and allocation between sexes in the African setting. Moreover, the chances for re-entering poverty over time for urban households are not as big as they are for rural Kagera region households.

For the proportional hazard models, the unobserved household heterogeneity effects are statistically significant for the case of re-entering poverty and are rejected for the case of exiting poverty. Growing coffee is negatively affects exiting poverty and vice versa for poverty re-entry. The death of head of household is not statistically significant, signifying the collective nature of farming activities in the region. Location, head's age

and level of education are statistically significant correlates of poverty re-entry and exit. The policy implications that emanate from the analysis of the correlates and poverty exit and re-entry and the duration effects are the following: (i) given a need for diversification of the farming activities, policy response entails promoting farming of high value non-traditional crops, (ii) to increase the probability of female-headed households to move out of poverty, policies should continue focusing on improving the balance in resource distribution and allocation between sexes, and (iii) the transitory nature of poverty implies that most of the household's mean consumption is very close to poverty lines. Hence any small change in income due to negative or positive shocks may result into either falling in or moving out of poverty. Thus, the appropriate policy responses should focus on enhancing the social network as a means of income smoothing and provision of better safety nets, and thereafter expanding and strengthening the asset base of the poor households.

6.3 Limitations of the study and possible areas for further research

This study is specifically on Kagera Region, which although there was some attempt to partition the data in rural-urban setting, the information for the urban sector is scanty, particularly because the whole region can even be seen as a rural-based region. Moreover, all of the six waves could not be used due to time limitations for undertaking the study. Therefore, one of the areas for further study would be to first try to fully use the available information from the six waves. In addition, because Tanzania has currently managed to collect the national panel data, a related study using the national

panel data may assist in assessing the robustness of the obtained results with the national representative sample.

Future research may also consider a decomposition of the poverty gap indices and extending the analysis by using the national poverty line and the relative poverty line. Additionally, given the longevity of the data-set, some of the households may break and new households formed. Thus, an analysis using all households rather than filtering out only the original households can be of an added value. In the same vein, further research may involve tracing out intergenerational poverty transmission.

Finally, in analyzing poverty durations, this study confined itself to the spells approach. However, future research may attempt to use other methods of analyzing poverty exit and re-entry and examine whether the correlates will remain the same or not. Such studies may include examining different measures of vulnerability to poverty.

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APPENDIX

Appendix 1: Hausman Specification Test between Fixed and Random effects for Kagera Region Households

Variable Name	KAGERA RURAL HOUSEHOLDS				ALL KAGERA HOUSEHOLDS			
	Coefficients		Difference	S.E	Coefficients		Difference	S.E
	FIXED EFFECTS (b)	R'NDOM EFFECTS (B)	(b-B)	Sqrt (diag (V_b - V_B)	FIXED EFFECTS (b)	R'NDOM EFFECTS (B)	(b-B)	Sqrt (diag (V_b - V_B)
aduwork	0.0573	0.0647	-0.0134	0.0046	0.0485	0.0658	-0.0173	0.0040
headage	0.0160	0.0174	-0.0014	0.0027	0.0138	0.0159	-0.0021	0.0023
headage2	-0.0001	-0.0001	1.53e-06	0.0000	-0.0001	-0.0001	0.579e-06	0.0002
hsize	-0.0787	-0.0687	-0.0100	0.0046	-0.0771	-0.6978	-0.0074	0.0039
sizeed	-0.0035	-0.0034	-0.0001	0.0075	-0.0035	-0.0031	-0.0004	0.0006
sizeland	0.0018	0.0013	0.0005	0.0026	O.0018	0.0012	0.0006	0.0002
grd	0.0217	0.0446	-0.0229	0.0061	0.0315	0.0466	-0.0151	0.0049
lrddist_rw	0.1324	0.1199	0.0126	0.4225	0.0041	0.1326	-0.1286	0.3086
lrddist_ug	0.4211	-0.0328	1.4539	0.6606	0.6390	-0.0327	0.6717	0.4280
hsex	0.1478	0.0747	0.0731	0.0272	0.1536	0.0640	0.0896	0.0244
bldown	-0.2462	-0.3048	0.0586	0.0297	-0.1190	-0.2105	0.0916	0.0253
coffee	0.0505	-0.1263	0.0075	0.0127	0.0431	0.0289	0.0142	0.0114
cotton	-0.2126	0.0418	-0.0864	0.0945	-0.1965	-0.1190	-0.0775	0.0969
cbanana	0.0813	0.0816	0.0395	0.0114	0.0733	0.0362	0.0371	0.0103
fmmigrate	0.0583	-0.1989	-0.0234	0.0083	0.0723	0.0848	-0.0125	0.0073
hmjoclerica					-0.4159	-0.1948	-0.2210	0.9075

l								
hmjoconstr					0.1789	0.0940	0.0849	0.0424
hmjofarm	-0.1269	0.0617	0.0721	0.0129	-0.1709	-0.2320	0.0611	0.0115
hmjofishing	0.0900	0.1253	0.0284	0.0529	0.5626	0.0183	0.0376	0.0478
hmjomerchant	-0.0064	0.1253	-0.1317	0.0348	-0.0701	0.0557	-0.1258	0.0285
shambano	-0.0321	--0.0297	-0.0024	0.0028	-0.033	-0.0303	-0.0029	0.0025
shamsize	-0.0072	0.0009	-0.0081	0.0025	-0.0070	0.0017	-0.0087	0.0022
lrainfall	-0.2602	-0.3390	0.0787	0.0273	-0.2476	-0.3535	0.1059	0.2484
	$Chi^2(19)=132.69$				$chi^2(21)= 163.40$			
	$Prob>chi^2=0.0000$				$Prob>chi^2 =0.0000$			