EGERTON  UNIVERSITY

TEGEMEO INSTITUTE OF AGRICULTURAL POLICY AND DEVELOPMENT

WPS 30/2008

RURAL INCOMES, INEQUALITY AND POVERTY DYNAMICS IN KENYA

Tavneet Suri, David Tschirley, Charity Irungu, Raphael Gitau, Daniel Kariuki

Tegemeo Institute of Agricultural Policy and Development
P.O Box 20498, 00200, Nairobi, Kenya
Tel: +254 20 2717818/76; Fax: +254 20 2717819
E-mail: Egerton@tegemeo.org

Tegemeo Institute

Tegemeo Institute of Agricultural Policy and Development is a Policy Research Institute under Egerton University with a mandate to undertake empirical research and analysis on contemporary economic and agricultural policy issues in Kenya. The institute is widely recognized as a centre of excellence in policy analysis on the topical agricultural issues of the day, and in its wide dissemination of findings to government and other key stakeholders with a view to influencing policy direction and the decision making process. Tegemeo's consistently good quality empirically-based analytical work, and its objective stance in reporting and disseminating findings has over the past decade won the acceptance of government, the private sector, civil society, academia and others interested in the performance of Kenya's agricultural sector.

Published 2009

Kindaruma Lane, off Ngong Road
P.O Box 20498, 00200, Nairobi, Kenya
Tel: +254 20 2717818/76; Fax: +254 20 2717819
E-mail: egerton@tegemeo.org
URL: http://www.tegemeo.org

Tegemeo Institute acknowledges the resources support for its research programmes from key partners including the United States Agency for International Development (USAID), Michigan State University (MSU), and Egerton University, Njoro Kenya. Others include the World Bank, European Union, Department for International Development (DFID), Food and Agriculture Organization of the United Nations (FAO).

Abstract

Trends in rural incomes, poverty, and inequality are analyzed using Tegemeo Institute's four period panel data set spanning 10 years, 1997 to 2007. Households are classified into five groups by their income and poverty paths over the period, providing substantial insight into the heterogeneity of the rural population and the drivers of these dynamic income paths. We find that poverty has fallen substantially and broadly across the country, with those exiting poverty exceeding those falling into poverty by a factor of nearly three. Inequality was analyzed based on income and various assets; it too has fallen substantially and broadly, with every region seeing reduced income inequality and most seeing more equal distributions of land and agricultural assets. Reduced inequality is a key reason that poverty fell in the country even as real average per capita incomes also fell over the period; incomes for the richest 20% fell while those for the bottom 30% rose. Key drivers reducing the likelihood of ever being poor include having more than a primary education, cultivating more land and applying fertilizer on it, and having off-farm income, especially salaries. Key factors making it more likely that you will be poor at some point include having an older head of household, being poor in the past, and working farm kibarua. We also find a strong spatial dimension to poverty levels and some evidence for a spatial dimension to poverty mobility. Policy implications focus on continuing to promote primary and secondary education, creating a better investment environment to promote remunerative off-farm employment, and the potential role of safety nets in avoiding poverty traps. Further research should be done to establish more definitively any spatial dimension to poverty mobility.

Table of Contents

Abstract ii
List of Tables iv
List of Figures v
1.0 Introduction 1
2.0 Poverty and Inequality in Kenya: Background 3
3.0 Data 5
4.0 Poverty and Inequality: Measurement 6
4.1 Poverty 6
4.2 Transient and Chronic Poverty 7
4.3 Inequality 7
5.0 Poverty, Inequality and Transitions, 1997 to 2007 8
5.1 Income Sources, Trends and Growth in Income 9
5.2 Trends in Poverty 11
5.3 Income Transitions and Household Characteristics 15
5.4 Trends in Inequality 18
6.0 Econometric Analysis 21
7.0 Conclusion and Policy Implications 31
References 35

List of Tables

Table 1: Real annual income across the region by zone, 1997 to 2007 10
Table 2: Income and poverty trends in Kenya, 1997 to 2007 12
Table 3: Comparison of subjective and absolute poverty, 2000 to 2007 13
Table 4: The spatial distribution of households by income path in Kenya, 2000 to 2007 (%) 15
Table 5: Selected characteristics of households by poverty transition, 1997 and 2007 17
Table 6: Fraction of income from various sources in Kenya, 2000 to 2007 18
Table 7: Trends in access to markets, infrastructure, credit in Kenya, 1997 to 2007 18
Table 8: Inequality in income, owned land and agricultural assets, 1997 to 2007 19
Table 9: Income inequality by zone in Kenya, 1997 to 2007 20
Table 10: Land inequality by zone, 1997 to 2007[1] 20
Table 11: Inequality in agricultural assets by zone, 1997 to 2007 21
Table 12: Descriptive statistics 23
Table 13: Linear probability models of poverty 24
Table 14: Probit models of exit and descent 26
Table 15: Multinomial Logit Models of Transitions (Marginal Effects) 29

List of Figures

Figure 1: Trends in the average sources of income between 1997 and 2007 10
Figure 2: Growth in real rural household income in Kenya, 1997 - 2007 11
Figure 3: Poverty transitions, 1997-2007 13
Figure 4: Transitions across income Quintiles, 1997-2007 14
Figure 5: Rural income transitions and persistence in Kenya, top and bottom Quintiles, 2000-2007 14
Figure 6: Income per capita, by income Decile 19

1.0 Introduction

Alleviating poverty remains one of the key challenges in many developing economies. In Kenya, a recent nation-wide survey, the 2006 Kenya Integrated Household and Budget Survey, (KIHBS) finds that 46% of the total Kenyan population is absolutely poor, i.e. below the poverty line, whereas 49% of the rural population is absolutely poor (Kenya National Bureau of Statistics, 2007). The 1997 Welfare Monitoring Survey showed a poverty rate of 57% overall and 60% in the rural population. There has, therefore, been some reduction in poverty across the country and across rural areas over the last decade.

Poverty is not a static concept. People often move in and out of poverty from year to year. This is unsurprising in Sub-Saharan Africa, given that these economies mainly depend on agriculture and are dominated by seasonality and highly variable weather conditions. Changes in poverty status can be due to economic cycles and shocks, such as poor weather, loss of employment, or loss of a major income earner through death, injury, or long illness. Adding to this, institutions for income and consumption smoothing in these economies are either inadequate or are absent altogether. Some households do manage to escape poverty, while others remain in poverty for extended periods of time. Understanding what factors drive household movements in and out of poverty is extremely important for the design of poverty reduction strategies, and is still an open area of research.

Addressing these issues requires panel data. The absence of such data has in the past limited the scope of poverty studies to looking at point-in-time behaviour across households to explain differences in consumption (or incomes). However, a large amount of household level panel data has become available in recent years in various developing economies, allowing broader and more authoritative studies on poverty. These studies have generated a better understanding of the movement of households in and out of poverty over time, and have shown that those below the poverty line are a heterogeneous group, both across time and across households. The poor consist of those who are poor a large part of the time (chronic poor), and those whose who move in and out of poverty (transient poor). Alleviating chronic and transient poverty may require different policy responses. For example, chronic poverty may require long-term policies that build poor households' asset base, such as investment in human capital and land reform; transient poverty may be reduced by appropriate short-term

measures focusing on consumption smoothing, such as insurance, targeted income transfers, food stamps, and subsidies.

This paper studies trends and dynamics in poverty and inequality in rural Kenya at the aggregate and household levels over the decade 1997 to 2007. Kenya has been described as highly unequal, ranking among the top ten most unequal countries in the world and fifth in Africa (SID, 2004). Inequality is worse in rural areas: the richest 20% of the rural and urban populations earn 62% and 51% of incomes, respectively (SID, 2004), while the bottom 20% earns 3.5 % of rural income and 5.4% of urban income (World Socialist Website, 2008). The literature on inequality has documented the positive and negative effects it can have on growth, a relationship that has been shown to be extremely non-linear and the causality of which has been greatly debated (see Forbes, 2000 and Duflo and Banerjee, 2003). We will not address the effects of inequality on growth, but will document the trends and changes in rural incomes and inequality to broaden our description of the relative poor and better understand the distributional characteristics of the rural Kenyan economy. In addition to documenting these trends and changes, we analyze the correlates of poverty and the drivers of transitions in and out of poverty over this period.

The rest of the paper is organized as follows. Section two gives brief background on poverty and inequality in Kenya and discusses some of the previous literature on the topic. Section three describes the data we use. Section four discusses how we measure poverty and inequality and .also discusses the concept of poverty transitions. Section five describes trends in rural income, poverty and inequality in Kenya from 1997 to 2007 and trends in the accompanying characteristics of the households and the rural economy in general. It describes the differences across households that correlate with the poverty status of these households. Section six then presents econometric evidence on the drivers of poverty status and of the changes in that status over time. Finally, Section seven presents conclusions and policy recommendations drawn from the study.

2.0 Poverty and Inequality in Kenya: Background

After 45 years of Independence, Kenya remains a dual economy with wide disparities in economic, social and infra-structural development across regions[1]. The late 1990s and early 2000s saw the development of the National Poverty Eradication Plan (NPEP) and the Poverty Reduction Strategy Paper (PRSP), both of which were produced under the umbrella of the United Nations' Millennium Development Goals. Though the PRSP resulted in a better understanding of poverty in Kenya, due to broad-based consultation among key stakeholders, it was not implemented in full due in part to reluctance to change by those in governance. In particular, the national budget was not changed to accommodate the poverty reduction plans, and key political and economic governance measures such as fighting corruption were also not implemented as anticipated.

When the National Rainbow Coalition government came to power, it drew up the five year Economic Recovery Strategy for Wealth Creation (ERS) 2003-2008. The ERS was anchored in four pillars, namely the restoration of economic growth, strengthening the institutions of governance, the restoration and expansion of physical infra-structure, and investment in human capital for the poor. Among the successes of the ERS were free primary education and the constituency development fund (CDF), which is a tool for redistribution and decentralisation of national resources through the constituencies. Upon the conclusion of the ERS, a long-term vision for sustained economic and social development, "Kenya Vision 2030", was formulated. It aims to make Kenya a globally competitive and prosperous nation with high standards of living within the next 25 years.

After little or no progress fighting poverty during the 1980s and 1990s, the most recent national study shows that national poverty is on a downward trend, falling from 56% in 2000

[1] The government has in the past attempted to solve the problems of poverty and inequality through development plans and strategies. One important attempt was the Sessional Paper No.10 of 1965 on African socialism and its application to planning. It advocated the development of a dual economy through unbalanced investment, with more investment in areas expected to yield the largest net output. Thus areas having abundant natural resources, favourable climate, developed infra-structure and people more receptive to, and active in development were favoured (Gitau, 2005). Other major measures included the adoption of the 'Basic Needs Approach' in the 1970s and the Sessional Paper No. 1 of 1986 on economic management for renewed growth. The former involved heavy investments in education and health as a tacit way of dealing with disparities, but suffered from poor implementation, resulting in little impact. Starting in the early 1990s, the country adopted much of the market liberalization and structural adjustment reforms that swept the world, with less explicit attention paid to poverty than in the past.

to 46% in 2006[2]. There have been a number of papers looking at poverty in Kenya. Some use the same data set as in this paper, including Gamba and Mghenyi (2004), Muyanga et al. (2007), Burke et al. (2007, 2008), Mathenge and Tschirley (2008), and Burke and Jayne (2008). Other studies include Place et al. (2003) and Mango et al. (2007).

Burke et al. (2007, 2008) explore poverty movements using an asset-based measure of poverty. Mathenge and Tshirley (2008) analyse household income growth and mobility with an emphasis on education's contribution and poverty persistence. Burke and Jayne (2008) explore spatial dimensions of poverty and find strong evidence for spatially differentiated poverty rates but no compelling evidence for spatial differences in households' movement in and out of poverty.

The few studies on inequality in Kenya show that it is manifested in various forms including: income, lack of equal access to productive assets, social and political exclusion, and inability of certain groups of the society to access key social services. Distribution of high potential land in the country is highly skewed, favouring Western, Rift Valley and Central provinces. The proportion of landless rural poor households differs widely across the country with the highest being in Central Province (15.8%) and the lowest in Western Province (6%). Access to education is also skewed with an attendance ratio in primary schools of 86% for the rich and 61% for the poor. Central Province had the highest gross enrolment rate in primary and secondary schools at 106% and 38% in 2000 as compared to 18% and 4.5% in North Eastern Province according to SID (2004).

This paper makes contributes to the existing literature on poverty dynamics and inequality in Kenya by extending the debate on drivers of exit from and descent into poverty and by analysing inequality trends. Studying households that escaped or descended into poverty against covariant and idiosyncratic risks is important for recommending the most versatile policy options to reduce poverty.

[2] See Annex Table A1. For a detailed review of anti-poverty policies and initiatives in Kenya, see Kulundu (2007).

3.0 Data

We use a four period panel data from Tegemeo Institute (Egerton University) with 1275 households interviewed during 1997, 2000, 2004 and 2007. Stratified sampling was used in 1997 to generate a sample of 1500 households taking into account all eight agro-regional zones in the country, excluding the pastoral areas. The existing districts were clustered into eight agro-regional zones within which 24 districts were selected. Using standard proportional random sampling, aided with data from Central Bureau of Statistics, households were randomly sampled for interviews. Due to attrition, the number of households fell to 1428 in 2000 (93%), 1324 in 2004 (86%) and 1275 in 2007 (83%). According to Burke et al. (2007), the attrition for the first three cycles is low compared to other developing countries. Some of this attrition is accounted for by two districts being dropped from the sample.

The survey data collected in each of these years was quite broad, covering a number of aspects of household livelihoods. Detailed information on the crops grown and harvested, inputs used (seed, fertilizer, labour and land preparation costs), outputs and prices was collected at the plot level for each household. Information on livestock and livestock products was also covered. The survey also collected demographic, health and education data on each individual household member in all rounds (with more detailed health data in a subset of the rounds). Detailed household income was collected by regarding all sources of income of all members of the household: crop income (from revenues and net of input costs), livestock income, salaried income, remittances, business income, and any other sources of casual or informal income. Nominal household incomes were deflated using GDP deflators. To account for differences in the size of households, we used an adult equivalents (AE) categorization as used by the World Bank. Nominal rural poverty lines for 1997, 2000, 2004 and 2007 were computed by linear extrapolation of the CBS rural poverty lines for 1997 and 2006, which were Kshs 1239/month and Kshs 1562/month respectively. The resulting nominal poverty lines were Ksh 1239/month in 1997, Ksh 1347/month in 2000, Ksh 1490/month in 2004, and Ksh 1598/month in 2007

4.0 Poverty and Inequality: Measurement

The literature on poverty and inequality includes many different approaches to their measurement. In this section we briefly discuss the approach used in this paper.

4.1 Poverty

Poverty is a multi-dimensional phenomenon, defined and measured in a multitude of ways. In many cases, poverty has been defined and measured in economic welfare terms such as income or consumption. An individual is poor if he/she falls below a predetermined level of economic welfare deemed to constitute a reasonable minimum in some absolute level or by the standards of a specific society (Lipton and Ravallion, 1995). Though most poverty assessments, including this analysis, have been done using this approach, there exist other facets and measurements of poverty, for example, the UNDP's Human Development Index (HDI) and qualitative measures, particularly Participatory Poverty Assessments and subjective assessments.

Income and poverty studies could use either income or consumption to determine levels of poverty. The use of consumption is often justified as better than income as an indicator of long-term welfare, and is often believed to be easier to collect and thus to generate less measurement error. However, some analyses using both income and consumption do not find consumption to be clearly superior to income as an indicator of long-term economic welfare (see Deaton, 1997 and Field, 2003), due to limited ability to smooth consumption in the face of shocks. Also, analyses done in Kenya using expenditure data from the Central Bureau of Statistics and income data from the Tegemeo data set do not differ much (Tschirley and Mathenge, 2003). Additionally, the very detailed manner in which income data were collected in the Tegemeo surveys, and the continuity in approach and even personnel involved over the life of the panel, helped protect against under-reporting and errors in recall. For these reasons, and because the Tegemeo surveys did not collect complete consumption data, we use household income in this paper. Using the poverty lines above, households were categorized as poor in a given year if their income (per adult equivalent) was below the

poverty line and non-poor if their income was above the poverty line. The percent classified poor in this way is referred to as the headcount measure of poverty.

4.2 Transient and Chronic Poverty

We use each household's poverty status over time to understand two separate concepts: transient poverty and chronic poverty. There are two methods of categorizing the poor into chronic poor and transient categories: the spells method (Baulch and McCouth, 1998) and the inter-temporal average measure as developed by Jalan and Ravallion (1998). In the spells method, a household is defined as transiently poor if it falls into poverty during at least one but not all of the considered spells, and chronic poor if it remains in poverty in all spells. As Haddad and Ahmed (2002) point out, the weakness of the spells approach comes when more than two spells are involved. If, for example, there are four observations like in the panel data used in this study, would it be valid to label a household falling into poverty during only one spell the same as one that did so in three spells?

In this paper, we opt for a combination of these two conceptual approaches to describe the poverty transition of a household. A household is considered to be transiently poor when it falls below the poverty line in some but not all of the spells, chronically poor if it falls below the poverty line in every spell, and non-poor if it never falls below the poverty line. We then break the transiently poor into three separate categories: those that exited from poverty between 2000 and 2007, those that descended into poverty, and those that oscillated in and out of poverty. Those that exited poverty are households that started off with an income below the poverty line in 2000, were above the poverty line in 2007, and whose mean income over the three periods was greater than the average of the three poverty lines. Households that descended into poverty are those that started off non-poor in 2000, were poor in 2007, and whose mean income over the three spells was below the average of the four poverty lines. The rest are considered to be oscillators in and out of poverty.

4.3 Inequality

Inequality is also a measure of the welfare of a society. Unlike poverty, however, it describes the disparity in *relative* standards of living across a whole population (for more see Gitau, 2005 and SID, 2004). Inequality describes the differences between individuals or households in terms of opportunities and outcomes. In addition to the income gap between the rich and

the poor, inequality entails differences in access to education, health, land use, land ownership, and other welfare enhancing assets and services. Inequality is an important issue in economic development as it can hinder economic growth, and it can result in social instability. To examine inequality within a given distribution, we use the Gini coefficient and quintile ratios.

The Gini coefficient varies from a value of zero, indicating perfect equality (i.e., that all households had the same income), to a value of 1, indicating perfect inequality (i.e, one household holds all income in the society). Most countries in Africa have ginis ranging from about 0.40 to 0.50, while most developed countries fall between 0.20 and 0.30; many countries in Latin America have ginis above 0.50. These figures indicate that developed countries typically have less inequality than countries in Africa, while Africa is typically less unequal than Latin America.

The quintile ratio is the mean value of the chosen indicator for the top quintile divided by the mean for the bottom quintile. For example, the quintile ratio of income inequality would divide the mean income among the top 20% of the income distribution by the mean income among the bottom 20%. Thus, the quintile ratio is an explicit measure of distance between the top and bottom 20% of the population. The quintile ratio and the gini should be considered complements in assessing inequality.

5.0 Poverty, Inequality and Transitions, 1997 to 2007

The livelihoods approach (Ellis, 2000) helps capture the key issues in poverty dynamics (movements in and out poverty). It distinguishes five types of assets: natural (land, water, forests), physical (infra-structure, agricultural tools, housing), financial (savings, wages, remittances, assets and other forms of wealth), social (features of social organization) and human (skills, knowledge and health)[3]. A household operates in external environmental settings that vary between the local, regional, and national levels. Furthermore, a household operates in a vulnerability context, exposed to natural and man-made shocks (covariant or idiosyncratic), seasonality, trends and changes (such as climate change, technological change) and existing inequalities. In this section, we therefore examine how trends in income,

[3] See also Baulch and Hoddinott (2000) and Sen (2003).

poverty and inequality over the decade 1997 to 2007 correlate with household characteristics. We also look at how these characteristics correlate with the different income transitions (as defined in Section 4.2), focusing on households that descended into poverty and those that exited poverty.

5.1 Income Sources, Trends and Growth in Income

Total household income comes from four sources: net crop income, net livestock income and non-farm business income, and salary/remittances, as shown in Figure 1. Looking across all years, on average 45% of total income was from crop production, 17% from livestock production, 17% from business and 21% from salaries/remittances. Thus, 62% of income was farm-based while 38% was from non-farm sources, including remittances. Decomposing income by sources across agro-ecological zones (Table 1), the proportion of farm-based income (as a share of total income) ranged between 68% and 70% in the Western Transitional, Central Highlands, Western Highlands, and High Potential Maize Zone. In Western Lowlands, Marginal Rain Shadow and Eastern Lowlands, farm-based income accounted for 55%, 50% and 48% of income, respectively[4].

Overall, annual real income increased between 1997 and 2000 and then gradually declined from 2004 to 2007 (Table 1, final row). Across zones, there was no definitive trend in the Eastern Lowlands, but in the Western Lowlands, income increased from 1997 to 2004 and then declined in 2007. In the Western Transitional Zone, the High Potential Maize Zone, Western Highlands and Central Highlands, the trends were similar to the national trend. The High Potential Maize Zone had the highest income, the Western Lowlands the lowest.

[4] Looking at the decomposition of income by source (crops, livestock, business and salary) across agro-ecological zones between 1997 and 2007 (see Annex Table A2), the share of crop income initially increased and then declined, except in the Marginal Rain Shadow where there was a gradual increase in the share of crop income. The livestock share of income declined in the Eastern Lowlands, the Western Lowlands and the Western Transitional Zone. The share of livestock income increased in the High Potential Maize Zone. The trend was mixed in the Central Highlands. The share of business income increased between 1997 and 2007 across all the zones, while the trend in the share of salary income was more varied.

Figure 1: Trends in the average sources of income between 1997 and 2007

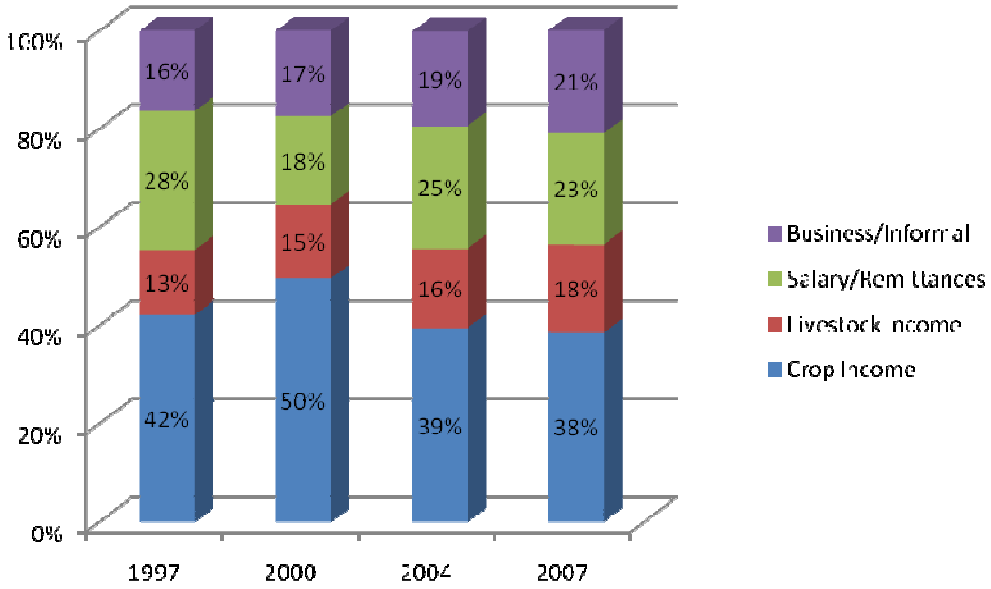
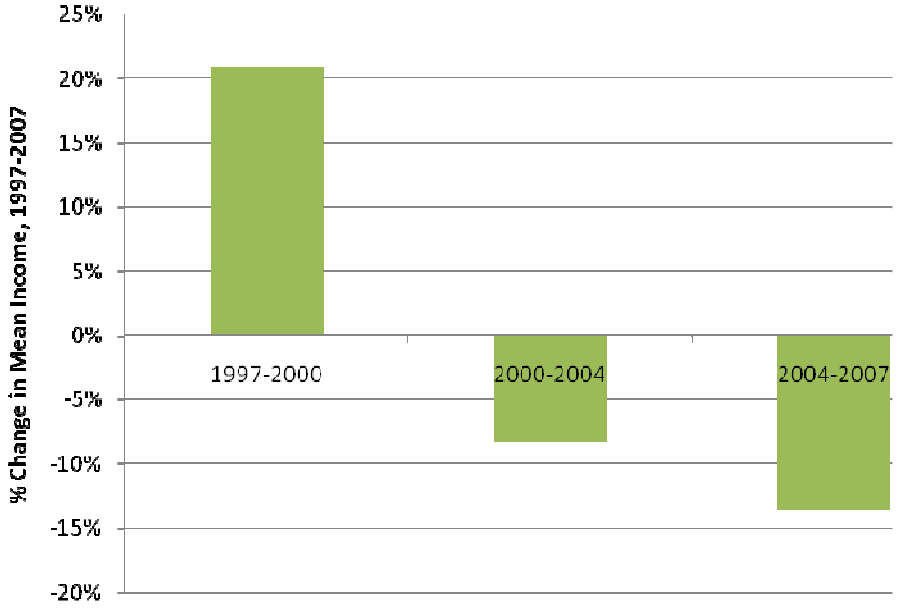


Table 1: Real annual income across the region by zone, 1997 to 2007

Zones	1997	2000	2004	2007
Coastal Lowlands	152,812	106,816	121,089	112,892
Eastern Lowlands	115,982	120,966	130,480	102,865
Western Lowlands	45,862	48,928	65,577	54,106
Western Transitional	82,479	145,379	99,019	87,758
High Potential Maize Zone	145,531	162,764	154,689	133,412
Western Highlands	49,265	94,090	79,921	71,573
Central Highlands	131,084	170,984	135,436	122,263
Marginal Rain Shadow	71,408	100,731	117,468	99,445
National	**108,687**	**131,853**	**120,504**	**104,556**

Figure 2 shows growth in household income over the entire sample (Figure A1 in the appendix shows the growth rates in income by province). Income per household grew dramatically between 1997 and 2000. This was not maintained and declined to negative growth rates between 2000 and 2004 and between 2004 and 2007.

Figure 2: Growth in real rural household income in Kenya, 1997 - 2007



5.2 Trends in Poverty

Despite the decline in real incomes, there has been a decline in overall poverty with regards to the head count, depth and severity over the last ten years (Table 2). Real mean and median income per AE increased between 1997 and 2000, before taking a downward trend till 2007 (see Table 2). The poverty headcount declined from 50% in 1997 to 37.6% 2007. Poverty depth (defined as the poverty gap, i.e. how far away from the poverty line households are) also declined from 0.296 in 1997 to 0.152 in 2007, and the same trend was observed with severity of poverty (the squared poverty gap).

This may seem to be a counterintuitive result: poverty rates are falling in the face of falling real mean and median incomes. This pattern stems from two sources. First, over this period, inequality also fell, with incomes among the poorest households rising while those at the very top of the income distribution fell substantially (see section 5.4 for more detail). So, it is possible for mean incomes to fall alongside declining poverty rates. A second reason is that Kenya's poverty line has risen substantially less in nominal terms than has the price level (inflation). Between 1997 and 2007, the nominal poverty line rose 29% (from Ksh 1,239 to Ksh 1,598 per AE), while the price level as measured by the GDP deflator rose 77%. Measured by the CPI, the general price level rose even more, by 118%. Of course, how much

the nominal poverty line grows over time depends on the prices of the components of the poverty line itself. For example, if the price of maize is a major determinant of the nominal poverty line, then the pattern we observe may be reasonable, since the rise in maize prices has been much less than the increase in the general price level over this period (Jayne and Chapoto, 2006). In any case, all this suggests that research is needed on how the GDP deflator, CPI, and poverty lines are calculated, and on whether this pattern – of poverty lines rising more slowly than apparent inflation – is also found in other countries.

Table 2: Income and poverty trends in Kenya, 1997 to 2007

Indicators	1997	2000	2004	2007
Real median income per adult equivalent (Ksh/mth)	1114	1296	1269	1175
Real mean income per adult equivalent (Ksh/mth)	1733	1909	1901	1739
Poverty Headcount	53.6	42.3	41.7	37.6
Poverty Depth	0.296	0.199	0.192	0.152
Poverty Severity	0.206	0.122	0.117	0.081

The data collected also allow us to look at subjective measures of poverty, since households were asked whether they considered themselves better off, worse off, or about the same as their neighbors. These subjective perceptions mirror the quantitative results (Table 3). First, the non-poor were more likely to consider themselves better off and the poor were more likely to consider themselves worse off[5]. Second, substantially lower percentages of poor households considered themselves "worse-off" in 2007 than in 2000 and 2004.

Before using the criteria discussed in Section 4 to describe the poverty transitions, we look at some standard descriptions of poverty transitions over the period. Figure 3 shows the fraction of the sample in each of four possible poverty paths over the decade (ignoring the data for 2000 and 2004). Among those households that changed their poverty status, over twice as many moved from being poor to being non-poor (27%) as moved from being non-poor to being poor (11%).

[5] Annex Figure A3 shows another measure of welfare – the average number of months households depend on purchased staples for consumption.

Table 3: Comparison of subjective and absolute poverty, 2000 to 2007

HH self perception relative to neighbors	2000		2004		2007	
	Non-Poor	Poor	Non-Poor	Poor	Non-Poor	Poor
Better off	17.7	8.2	31.3	8.3	22.9	7.5
Worse off	14.7	34.5	15.2	35.2	9.2	20.9
About the same	67.4	57.3	53.5	56.5	68	71.6

Figure 3: Poverty transitions, 1997-2007

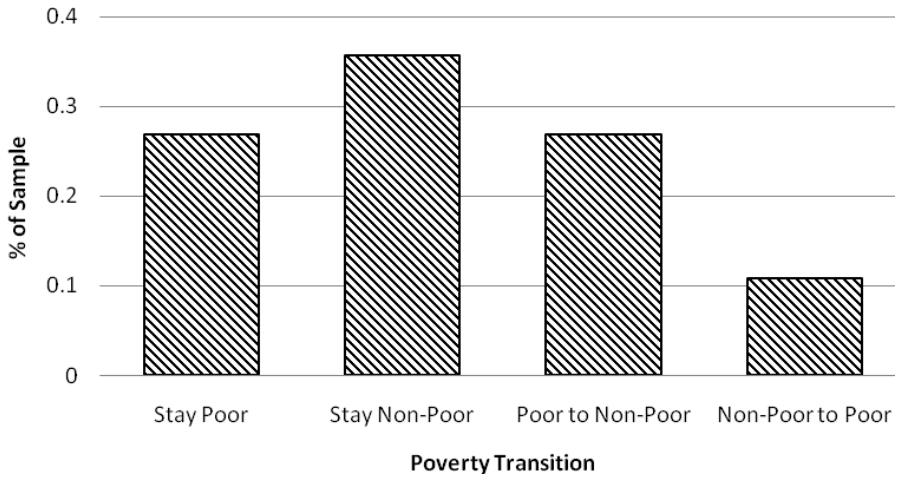


Figure 4 shows the transition of households across income quintiles over the decade, again using only the data for 1997 and 2007. Each cluster of bars includes all households in one income quintile in 1997 (the left most cluster includes only those in the lowest quintile in 1997, while the right-most cluster has only those in the top quintile in 1997), and shows their quintile classification in 2007. The graph thus shows how many households in each income quintile stayed in that income quintile in each period, and how many households transitioned to other income quintiles. It clearly shows that very few households transitioned from the bottom (or top) income quintile in 1997 to the highest (or lowest) income quintile by 2007.

Figure 5 builds on this finding and shows that about 10% of households remained in either the poorest or the richest quintiles over the decade; put differently, nearly half of those in the top and bottom 20% of the income distribution in 1997 remained there in 2007. On the other hand, less than 1% of households moved from either the top quintile to the bottom or vice versa; this means that fewer than 1 in 20 of those households in the top and bottom 20% of

the income distribution in 1997 moved to the other extreme of the distribution by 2007. Such transitions that span from one end of the income distribution to the other are extremely rare, and there is still significant persistence across the top and bottom quintiles.

Figure 4: Transitions across income Quintiles, 1997-2007

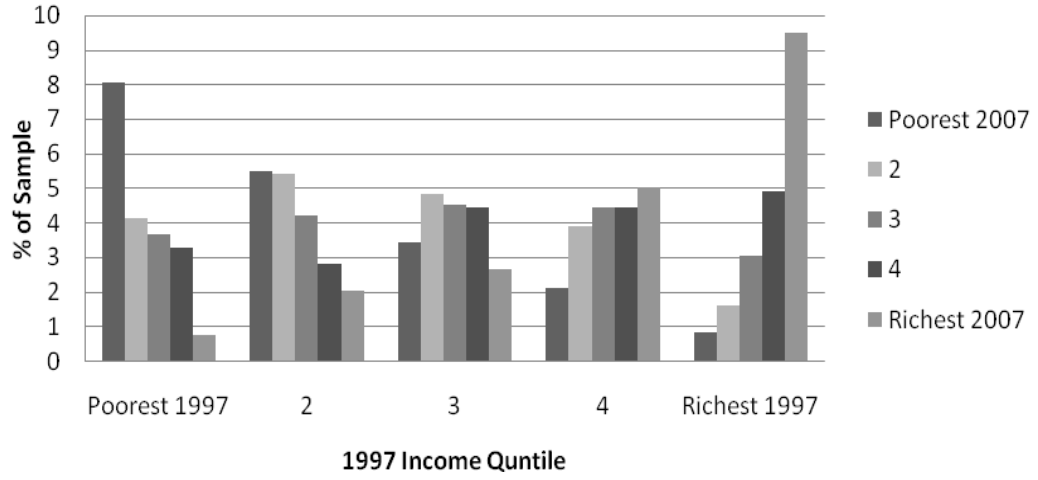


Figure 5: Rural income transitions and persistence in Kenya, top and bottom Quintiles, 2000-2007

We now use the criteria discussed in Section 4 to describe household poverty transitions between 2000 and 2007. We focus on the 2000 to 2007 period (as we did in Figure 5 above) because the data collected in 1997 was not as comprehensive as that in later years. The econometric analysis in Section six uses the 2000, 2004 and 2007 data. So, to keep the definitions of exit from and descent into poverty consistent, we focus on 2000 to 2007.

A total of 20% of households in the sample exited poverty, while only 7% descended into poverty (Table 4). During the same period, 26.6 % of households were consistently non-poor, while 14.4 % were chronically poor (i.e. poor in every period). A significant fraction of households moved in and out of poverty with no clear direction of change, households that we refer to as oscillators (32% of the households). This finding is comparable to Burke and Jayne (2008) who use asset based poverty measures and find that 12.9% of households were chronically poor while 16.2% were consistently non-poor.

Table 4 also shows household poverty transitions by zone. The Central Highlands had the highest fraction of households that were non-poor (57%), while the Western Lowlands had the lowest fraction (6%). In the Western Lowlands, 33% were chronically poor, but in the Central Highlands, this fraction was only 4%. Over the period, 23% of households in the Coastal Lowlands descended into poverty, while only 3% did so in the Central Highlands; 27% in the Marginal Rain Shadow exited poverty, 26.4% in the Western Transitional Zone and 25.6 % in the Western Highlands.

Table 4: The spatial distribution of households by income path in Kenya, 2000 to 2007 (%)

	Non-poor	Chronic poor	Exited	Descended	Oscillated
	---------- % of households ----------				
Coastal Lowlands	13	28	12	5	41
Eastern Lowlands	34	12	14	3	37
Western Lowlands	7	39	16	8	30
Western Transitional	25	16	7	7	45
High Potential Maize	41	17	12	5	24
Western Highlands	17	32	12	8	32
Central Highlands	70	6	8	1	15
Marginal Rain Shadow	41	8	19	3	30
Overall	**36**	**19**	**12**	**5**	**29**

5.3 Income Transitions and Household Characteristics

In this section, we look at households that started off poor in 2000 and exited by 2007, comparing them to those that started off non-poor but descended into poverty over the same period. We compare their levels (in 2000) and changes in human and physical capital assets,

their sources of income (and hence diversification) and their access to agricultural output markets and credit.

Looking at human and physical capital assets, the households that escaped poverty exhibited higher endowments than those that descended (Table 5). For example, households that were poor in 2000 but escaped poverty started off with higher education, more cultivated land, and more assets in 2000. These households were more likely to have access to credit in 2000 and for access to credit to improve over time (compared to those that descended into poverty). The households that exited poverty had a rapid increase over the decade in the fraction of their adult members that earned income from off-farm sources, especially business but also salaries, while most other groups saw this fraction remain steady or decrease; those descending into poverty had an especially sharp drop in the share of adults earning income from a business. It is also noteworthy that the share of households with an adult involved in salaried work varies much more across groups than does the same indicator for business: non-poor and those exiting poverty are much more likely than other households to have salary income, while all groups are likely to have business income. These patterns give some suggestion of the importance of salaried work to get out of and stay out of poverty. Finally, the increase in share of households using fertilizers was higher for households that escaped poverty as compared to those that descended into poverty.

Table 5 suggested the importance of off-farm income, especially salaries, for a household's income level and movement over time. Table 6 reinforces this idea. During each year since 2000, non-poor households had substantially higher shares of income from salaries and comparable or lower shares from informal business than did poor households**.** Business incomes for poor households often come from small-scale businesses that are more a survival strategy than a going commercial concern.

Looking at access to markets, distance to the closest fertilizer outlet and distance to the closest motorable road have improved for both poor and non-poor households (see Table 7). Even more positive, the improvements have been greater for the poor households, compared to the non-poor.

Table 5: Selected characteristics of households by poverty transition, 1997 and 2007

	Non-poor		Poor		Exited		Descended		Oscillated	
	2000	**2007**	**2000**	**2007**	**2000**	**2007**	**2000**	**2007**	**2000**	**2007**
% Female-headed	8	17	19	37	12	19	12	27	12	24
% of adult HH members with no education	10	9	18	16	14	14	20	17	17	15
% of adult HH members with primary education	46	48	66	67	56	55	54	61	56	59
% of adult HH members with more than primary education	44	43	16	18	29	32	25	22	26	27
Median household size	7	6	8	8	8	6	7	7	7	7
Median cultivated land	3.1	2.7	1.4	1.1	3.3	2.0	1.7	1.1	2.0	1.7
% using fertilizer	87	90	49	54	61	74	66	69	66	74
% with credit	60	43	36	38	47	47	47	40	43	50
% with at least one adult in Kibarua	9	7	30	30	15	13	15	23	19	15
% receiving remittances	27	33	27	37	35	46	35	29	36	36
% with at least one adult in a salaried activity	46	42	27	17	35	39	39	8	32	30
% with at least one adult in a business	57	59	49	57	56	68	53	52	63	62
Livestock assets (Ksh)	49,943	49,634	17,160	14,452	33,847	48,965	19,416	15,242	30,408	22,619
Other assets (Ksh)	28,779	25,364	18,148	16,906	26,747	21,526	16,528	13,636	17,676	16,677
Age of HH head (yrs)	52	58	55	59	54	59	54	59	54	59
% of HH with coop/group members	89	83	67	63	80	77	77	63	71	74

Table 6: Fraction of income from various sources in Kenya, 2000 to 2007

		2000	2004	2007
Salary and Remittances	Non-Poor	0.195	0.234	0.206
	Poor	0.133	0.170	0.145
Informal	Non-Poor	0.154	0.160	0.188
	Poor	-0.072	0.185	0.257
Crop	Non-Poor	0.486	0.423	0.418
	Poor	0.885	0.515	0.474

Similar trends hold for access to credit, with greater proportional increases in access for the poor, though their access remains somewhat below that of the non-poor. The fraction of households receiving credit increased steadily for all households over the decade (except for what seems to be a macro shock in 2004 that affected all households on the credit front).

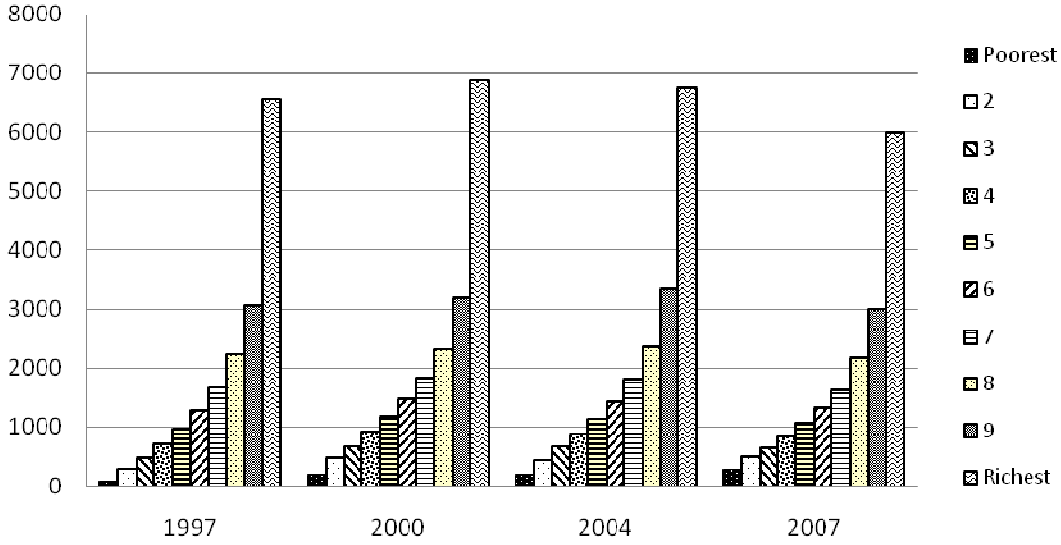
Table 7: Trends in access to markets, infrastructure, credit in Kenya, 1997 to 2007

		1997	2000	2004	2007
Distance to fertilizer (Kms)	Non-Poor	7.74	4.61	3.40	3.38
	Poor	8.53	7.29	5.09	3.33
Distance to motorable road (Kms)	Non-Poor	0.88	1.37	1.03	0.53
	Poor	1.29	1.14	1.10	0.53
Received credit (%)	Non-Poor	51	56	38	57
	Poor	33	38	24	42

5.4 Trends in Inequality

As mentioned earlier, the income distribution has changed over the decade in Kenya. Figure 6 shows average income per capita across the income deciles for each period. It is clear that average income per capita in the bottom three deciles (the poorest 30% of the population) grew between 1997 and 2007, while income in the top two deciles (the richest 20%) fell. This pattern highlights how mean income could have fallen while poverty also fell.

Figure 6: Income per capita, by income Decile



Our two complementary measures of inequality both show significant reductions in inequality in Kenya (Table 8). Inequality in income, owned land, and agricultural assets have all declined as measured by the Gini coefficient, while the quintile ratio shows declining inequality in all four indicators: income, livestock, owned land, and agricultural assets.

Table 8: Inequality in income, owned land and agricultural assets, 1997 to 2007

	Gini				Quintile Ratio			
Indicator	**1997**	**2000**	**2004**	**2007**	**1997**	**2000**	**2004**	**2007**
Income	0.53	0.49	0.49	0.47	25.2	15.1	15.7	11.8
Livestock	0.61	0.63	0.63	0.60	77.1	249.0	79.2	59.8
Owned Land	0.59	-	0.54	0.54	34.5	--	18.9	18.6
Agricultural Assets	0.70	0.68	0.68	0.64	98.6	54.4	53.5	36.7

Income inequality decreased by both measures across nearly all agro-ecological zones, with the possible exception of Coastal Lowlands, where the Gini coefficient remained steady while the quintile ratio fell (Table 9)[6]. Especially large drops in inequality, as measured by the Gini and the quintile ratio, were seen in Western Lowlands, Western Transitional, and High Potential Maize zone.

[6] For the zonal inequality analysis we recalculated quintiles within each zone. This resulted in low numbers of observations in each quintile in Coastal Lowlands (15 in each, 75 in total) and Marginal Rain Shadow (7 or 8 in each, 37 in total). We therefore do not report quintile ratios for those two zones.

Table 9: Income inequality by zone in Kenya, 1997 to 2007

	Gini Coefficient				Quintile Ratio			
Zones	**1997**	**2000**	**2004**	**2007**	**1997**	**2000**	**2004**	**2007**
Coastal Lowlands	0.47	0.46	0.55	0.47	----	----	----	----
Eastern Lowlands	0.46	0.42	0.40	0.44	15.4	8.8	8.3	10.1
Western Lowlands	0.54	0.53	0.57	0.45	41.7	22.3	23.5	10.1
Western Transition	0.54	0.42	0.47	0.41	32.4	10.9	14.0	9.1
High Potential Maize	0.56	0.48	0.49	0.48	25.7	13.1	15.9	13.2
Western Highlands	0.48	0.46	0.49	0.44	14.8	11.5	12.5	9.7
Central Highlands	0.42	0.43	0.40	0.40	11.1	9.4	8.0	7.6
Marginal Rain Shadow	0.45	0.51	0.39	0.40	----	----	----	----

Note: The number of observations per quintile in Coastal Lowlands and Marginal Rain Shadow is too low to justify this measure

The two measures also show similar patterns regarding inequality in land holdings (Table 10). Only in Western Highlands and Central Highlands was inequality stable or slightly rising; in all other zones, inequality clearly decreased. Both the Western Highlands and Central Highlands are densely populated, and rising inequality may be attributed to land sale or further subdivision of land.

Table 10: Land inequality by zone, 1997 to 2007[1]

	Gini Coefficient			Quintile Ratio		
Zone	**1997**	**2004**	**2007**	**1997**	**2004**	**2007**
Coastal Lowlands[2]	0.63	0.54	0.44	----	----	----
Eastern Lowlands	0.50	0.35	0.44	15.3	5.8	11.2
Western Lowlands	0.41	0.42	0.33	7.8	6.7	5.7
Western Transition	0.54	0.45	0.42	----[3]	9.6	9.7
High Potential Maize	0.60	0.55	0.56	56.8	20.6	23.8
Western Highlands	0.36	0.37	0.36	6.9	6.7	6.4
Central Highlands	0.44	0.42	0.46	11.0	9.1	10.8
Marginal Rain Shadow[2]	0.49	0.42	0.38	----	----	----

Note: [1] Data on land owned was not collected in 2000. [2] The number of observations per quintile in Coastal Lowlands and Marginal Rain Shadow is too low to justify this measure. [3] The bottom quintile of land holders in Western Transitional zone in 1997 reported no land holdings.

Table 11 shows inequality in agricultural assets across zones. Gini coefficients for these assets are substantially higher than they are for land or for overall income, and the evidence

for reductions in inequality is much more mixed. By the Gini, High Potential Maize Zone and Coastal Lowlands are the most unequal with respect to agricultural assets, and inequality in these assets rose in Eastern Lowlands, Western Lowlands, Western Transitional, and Central Highlands while holding steady in Western Highlands. The quintile ratio, however, suggests that inequality in agricultural asset holdings fell in every zone except for Central Highlands. Thus, the evidence for increased inequality in Central Highlands appears to be strong, and echoes that found in land.

Table 11: Inequality in agricultural assets by zone, 1997 to 2007

Zone	Gini Coefficient				Quintile Ratio			
	1997	2000	2004	2007	1997	2000	2004	2007
Coastal Lowlands	0.80	0.59	0.63	0.67	----	----	----	----
Eastern Lowlands	0.54	0.65	0.66	0.59	27.6	43.5	43.2	31.1
Western Lowlands	0.62	0.70	0.68	0.64	88.9	49.49	49.3	28.5
Western Transition	0.57	0.59	0.58	0.63	60.4	29.2	35.3	25.6
High Potential Maize	0.72	0.74	0.69	0.67	103.0	81.0	63.9	45.0
Western Highlands	0.49	0.60	0.59	0.49	35.4	27.2	21.1	13.0
Central Highlands	0.49	0.56	0.59	0.54	14.1	26.6	36.7	19.4
Marginal Rain Shadow	0.62	0.40	0.55	0.55	----	----	----	----

Note: The number of observations per quintile in Coastal Lowlands and Marginal Rain Shadow is too low to justify this measure.

6.0 Econometric Analysis

In this section, we try to better understand the correlates of poverty over 2000 to 2007 in Kenya, as well as the household level transitions across states of poverty. Past research has shown that the determinants of poverty in Kenya include location, household composition, human capital, household wealth, and occupation of the household head among others (Geda et al, 2001, Kabubo-Mariara, 2007; Burke et al, 2008; Mathenge and Tschirley, 2008). We look at a variety of human and physical capital factors, as well as access to markets and infrastructure. Summary statistics for the variables we use to understand the correlates of poverty are described in Table 12.[7]

[7] Note that we speak in this analysis of correlates of poverty rather than determinants of poverty, because likely endogeneity of some independent variables makes causal attribution problematic. Rather than excluding those variables, we decided to include them in order to provide a fuller picture of the correlates and potential drivers of poverty reduction.

We specify two sets of models. First, we look at the simple correlates of poverty in each period in a linear probability model (LPM; probit results are very similar). Coefficients from the LPM are directly interpretable as the marginal effect of the variable on the probability of being poor. We look at simple OLS regressions and household fixed effects (FE) regressions. The latter describe how changes in the covariates correlate with changes in the poverty status of households, and provide better controls for characteristics of households that we were unable to measure in our surveys. In all specifications, we control for zone and year with dummy variables (the results are very similar if we control for province dummies instead). These results are presented in Table 13.The first key result is that being poor in the previous period, even controlling for other characteristics of the household, makes it much more likely (16%) that the household will be poor in the following period. Additional key factors significantly associated with a higher probability of being poor include having an older household head, having anyone in the household other than adults age 40 and above, and having anyone in the household involved in farm kibarua (working on neighbouring smallholder farms as a casual worker for a spot wage). All of these results are consistent with other empirical results assessing poverty in Africa. Being close to a motorable road also appears to be associated with higher probabilities of being poor, which is a counterintuitive result. Factors associated with lower probabilities of being poor include having adults with more than a primary school education, cultivating more land, having off-farm income other than kibarua, being a member of a cooperative, pursuing access to credit, and using fertilizer. All these results are as expected. Note also that our results on education – no significant effect of a primary school education but a large and significant effect of having more than a primary education – reinforce the same finding in Mathenge and Tschirley (2008). As expected, higher asset values and ownership of radios also correlate with less poverty. Somewhat surprisingly, being female headed and having an adult death in your household over the previous 12 months do not appear to have any statistically significant effect on the current probability of being poor.

Table 12: Descriptive statistics

Explanatory variable	2000		2007		Change in Means
	Mean	Std Dev.	Mean	Std Dev	(2007-2000)
Age of household head	53.7	13.6	58.7	13.3	5.0
Gender dummy: (1 = female, 0 Otherwise)	0.120	0.320	0.240	0.420	0.120
Fraction of males<=6yrs in hh	0.050	0.088	0.042	0.079	-0.009
Fraction of females<6yrs in hh	0.049	0.091	0.040	0.078	-0.009
Fraction of males ages 7 to 16 yrs	0.161	0.148	0.130	0.144	-0.031
Fraction of females ages 7 to 16 yrs	0.149	0.146	0.121	0.142	-0.028
Fraction of males ages17 to 39 yrs	0.174	0.152	0.188	0.173	0.014
Fraction of females ages 17 to 39 yrs	0.166	0.123	0.155	0.140	-0.011
Fraction of males 40 yrs and above	0.125	0.118	0.142	0.141	0.017
Fraction of adult HH members with no education	0.146	0.227	0.127	0.232	-0.019
Fraction of adult HH members with primary education	0.544	0.310	0.560	0.306	0.016
Fraction of adult HH members with more than primary education	0.310	0.303	0.312	0.299	0.002
Main season rainfall (mm)	582	263	592	197	9
Cultivated land per capita (acres)	2.425	6.584	1.926	2.761	-0.500
Fertilizer use (Dummy)	0.698	0.459	0.759	0.428	0.061
Credit access (Dummy)	0.529	0.499	0.527	0.499	-0.002
Membership in groups (Dummy)	0.780	0.414	0.750	0.433	-0.030
Dummy for being close to motorable road	0.440	0.497	0.645	0.479	0.205
Dummy for a member of the HH receiving remittances	0.312	0.464	0.358	0.480	-0.046
Dummy for a member of the HH involved in kibarua	0.169	0.375	0.152	0.359	0.017
Dummy for a member of the HH involved in business	0.369	0.483	0.319	0.466	0.050
Dummy for a member of the HH involved in salaried activity	0.568	0.496	0.599	0.490	-0.031
Assets – Radio	1.13	0.84	1.36	0.91	0.22
Assets – Total	142,964	356,191	223,505	400,562	80,542

Table 13: Linear probability models of poverty

	With Zone Dummies		With HH Fixed Effects	
Variable	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**
Lagged poverty status	0.165***	[0.015]	-	-
Age of the HH head	0.003***	[0.001]	0.003*	[0.001]
Dummy for female headed HH	0.027	[0.023]	0.004	[0.040]
Fraction of males in HH, aged 0-6	0.293***	[0.097]	0.262*	[0.139]
Fraction of females in HH, aged 0-6	0.386***	[0.096]	0.392***	[0.136]
Fraction of males in Household, aged 7-16	0.443***	[0.068]	0.327***	[0.115]
Fraction of females in HH, aged 7-16	0.418***	[0.069]	0.412***	[0.109]
Fraction of males in HH, aged 17-39	0.370***	[0.070]	0.475***	[0.110]
Fraction of females in HH, aged 17-39	0.437***	[0.071]	0.515***	[0.107]
Fraction of males in HH, aged 40 and above	0.045	[0.089]	0.109	[0.143]
Fraction of adult HH with primary education	0.048	[0.038]	0.051	[0.058]
Fraction of adult HH with more than primary	-0.146***	[0.043]	-0.048	[0.072]
Main season rainfall	-0.00004	[0.00004]	-0.00001	[0.00005]
Dummy for whether HH tried to get credit	-0.038**	[0.015]	0.010	[0.019]
Acres cultivated in the main season	-0.004***	[0.002]	0.002	[0.002]
Distance to closest fertilizer stockist	-0.001	[0.001]	0.002	[0.002]
Dummy for being close to motorable road	0.030**	[0.014]	0.033*	[0.018]
Distance to piped water	-0.001	[0.001]	0.0003	[0.001]
Dummy for any HH member receiving remittances	-0.004	[0.016]	-0.007	[0.020]
Dummy for any HH member involved in kibarua	0.115***	[0.021]	0.046*	[0.026]
Dummy for any HH member involved in business	-0.081***	[0.015]	-0.079***	[0.018]
Dummy for any HH member involved in salary	-0.112***	[0.016]	-0.131***	[0.021]
Dummy for group/cooperative membership	-0.071***	[0.018]	-0.054**	[0.022]
Dummy for fertilizer use	-0.160***	[0.022]	-0.111***	[0.032]
Number of radios owned	-0.036***	[0.008]	-0.026***	[0.010]
Total value of assets owned	-0.076***	[0.020]	-0.057*	[0.034]
Dummy for an adult death in the past 12 months	0.002	[0.037]	-0.035	[0.042]
Dummy for Eastern Lowlands Zone	-0.078*	[0.041]	-	-
Dummy for Western Lowlands Zone	0.090**	[0.042]	-	-
Dummy for Western Transitional Zone	-0.003	[0.050]	-	-
Dummy for High Potential Maize Zone	-0.034	[0.043]	-	-
Dummy for Western Highlands Zone	0.127**	[0.053]	-	-
Dummy for Central Highlands Zone	-0.149***	[0.045]	-	-
Dummy for Marginal Rain Shadow Zone	-0.171***	[0.055]	-	-
Constant	0.227***	[0.081]	0.159	[0.131]
Observations	3760		3760	
R-squared	0.286		0.058	

Notes: *** p<0.01, ** p<0.05, * p<0.1. Year dummies controlled for but not reported.

The omitted demographic group is females 40 and above. The omitted education group is no education.

The omitted zone is the Coastal Lowlands.

Our FE model shows very similar results for age of head of household, household composition variables, and economic activity variables (including group membership and using fertilizer). The effect of more than a primary education maintains its sign (making it less likely that a household will be in poverty) but loses its statistical significance. Given other findings on the role of education (Mathenge and Tschirley 2008) and other results in this paper, we attribute this result to insufficient variability in this independent variable in the FE model[8].

Table 14 presents marginal effects from probit models of exit and descent into poverty. This turns our attention from understanding a household's level of income to understanding how households move decidedly into or out of poverty; we do not examine what might cause a household to fluctuate both in and out of poverty, with no decided movement in either direction[9]. The exit regression was run only on households classified as poor in 2000, while the descend regression was run only on those classified as nonpoor in 2000. The values of all independent variables are from 2000, reducing problems of endogeneity in the regressions. Results are consistent with those of the poverty LPMs, but offer additional insights.

Households with older heads are substantially less likely to exit poverty once they become poor; a household with a 60 year old head is nearly 20% less likely to exit poverty than one with a 30 year old head. These households with older heads may also be more likely to descend into poverty if they are nonpoor (though the coefficient in descend is not quite significant). Other demographic variables are comparable to the poverty regression in Table 13, with additional younger members decreasing the probability of exit. The importance of going past primary education also comes through clearly in these regressions, increasing the probably of exit and decreasing that of descent. Main season rainfall has the expected sign and is significant in the exit regression, emphasizing the fact that Kenya's rural households remain dependent on good agricultural outcomes to maintain their standard of living. Interestingly, acres cultivated decrease the probability of descending into poverty but do not appear to help in exiting poverty. This result is consistent with descriptive findings based on income accounting methods that show changes in non-farm income being much more important than farm income in the escape from poverty.

[8] The FE approach does difference regressor from their respective (time) means. This means that these estimates are only identified from changes in variables over time. As such, if these variables do not change much over time, the FE approach may not be as informative.

[9] This is the oscillator group.

Table 14: Probit models of exit and descent

	Exit		Descent	
Variable	**dy/dx**	**Std. Err.**	**dy/dx**	**Std. Err.**
Age of the HH head	-0.00625***	0.00205	0.000368	0.00031
Dummy for female headed HH	-0.06661	0.06651	-0.00693	0.00879
Fraction of males in HH, aged 0-6	-0.35547	0.29844	0.030237	0.04494
Fraction of females in HH, aged 0-6	-0.83961***	0.31025	0.044428	0.04546
Fraction of males in Household, aged 7-16	-0.54777**	0.23507	0.0335	0.03829
Fraction of females in HH, aged 7-16	-0.55203**	0.24967	-0.00215	0.03532
Fraction of males in HH, aged 17-39	0.129086	0.2466	-0.05231	0.04677
Fraction of females in HH, aged 17-39	0.023227	0.23707	0.075747*	0.04458
Fraction of males in HH, aged 40 and above	0.476359	0.33469	-0.01369	0.04699
Fraction of adult HH with primary education	0.069867	0.12067	-0.02119	0.01815
Fraction of adult HH with more than primary	0.281567**	0.13139	-0.03823*	0.02312
Main season rainfall	0.000334*	0.00019	-2.94E-07	0.00003
Dummy for whether HH tried to get credit	0.087035*	0.04458	-0.0015	0.00679
Acres cultivated in the main season	0.019566	0.01604	-0.00514**	0.00259
Distance to closest fertilizer stockist	-0.00211	0.00366	-0.0004	0.0008
Dummy for being close to motorable road	-0.02613	0.04358	0.002904	0.00685
Distance to piped water	-0.00055	0.00284	-0.00068	0.0005
Dummy for any HH receiving remittances	-0.01995	0.04832	0.00451	0.00869
Dummy for any HH member in kibarua	-0.1428***	0.04205	0.005416	0.01263
Dummy for any HH member in business	0.030985	0.04434	-0.00509	0.00754
Dummy for any HH member in salary	0.034795	0.04798	-0.0014	0.00701
Dummy for group/cooperative membership	0.072415	0.04585	0.000088	0.00861
Dummy for fertilizer use	0.038159	0.06044	-0.01714	0.01916
Number of radios owned	0.053891*	0.02861	-0.00013	0.00438
Total value of assets owned	0.094422	0.1816	-0.1251***	0.03722
Dummy for an adult death in the past 12 months	-0.19921***	0.04989	0.039401	0.04009
Dummy for Eastern Lowlands Zone	-0.0315	0.11347	-0.01478	0.01103
Dummy for Western Lowlands Zone	-0.22384***	0.08563	0.037877	0.06588
Dummy for Western Transitional Zone	-0.24098***	0.06643	-0.00534	0.02236
Dummy for High Potential Maize Zone	-0.11993	0.11255	0.004188	0.02758
Dummy for Western Highlands Zone	-0.26548***	0.06549	0.008267	0.04264
Dummy for Central Highlands Zone	-0.05492	0.12601	-0.03341**	0.01916
Dummy for Marginal Rain Shadow Zone	0.020222	0.15894	-0.01105	0.01153
Observations	536		732	

Notes: *** p<0.01, ** p<0.05, * p<0.1. Year dummies controlled for but not reported.
The omitted demographic group is females 40 and above. The omitted education group is no education.
The omitted zone is the Coastal Lowlands.

Among the variables on sources of income, all have the expected sign, but farm kibarua is the only one that is significant; it is strongly associated with an inability to exit poverty, which is fully expected given that this type of work is typically done at the expense of one's own farm work and in response to need for cash income for household necessities. An adult death in the family over the past 12 months has a strong negative effect on a household's ability to exit poverty; it has the expected positive sign but is not significant in the descent regression. Finally, these results provide some support for a spatial dimension to poverty mobility, with households in Central Highlands less likely than those in Coastal Lowlands (the excluded

zone) to descend into poverty, and households in three other zones less likely to exit poverty than those in the Coastal Lowlands.

Our final econometric model uses the same set of variables (based on year 2000 values) to explain the full range of poverty transitions that a household could make from 2000 to 2007, as explained earlier in the paper (Table 15). We present marginal effects from a multinomial logit model of the transitions, where a household's transition path is one of five: stay poor, stay non-poor, exit poverty, descend into poverty, and oscillate. We then test whether the coefficients on all the covariates are the same across each pair of transitions and are able to reject this hypothesis for each pair of transitions (the p-values are always less than 1%). This suggests that households in the different transition paths tend to be significantly different from each other.

The excluded path is households that oscillated in and out of poverty, meaning that all results need to be interpreted with reference to that group. With this in mind, households that were never in poverty during the period tended to have younger heads, fewer household members under 40 years of age, more adults with primary or post-primary education, more acres cultivated, better main season rainfall, more assets, and were more likely to use fertilizer (all compared to households that oscillated in and out of poverty). They may also have been less likely to have an adult death over the past 12 months, though this result was not statistically significant. All these results are as expected. Distance variables appear to play little if any role, except that the nonpoor live further from a motorable road. This result continues an unexpected pattern from the earlier regressions; it may be a reflection of more degraded soils in areas closer to roads, but requires further investigation.

The general pattern for chronically poor households is that marginal effects that were significant in the nonpoor transition are significant and with opposite sign for the chronically poor. Key exceptions are that primary education, while appearing to enhance the probability of being nonpoor[10], does not have the same effect on preventing a household from being chronically poor; while this result should perhaps not be interpreted too literally, it provides further evidence of the importance of education beyond the primary years. Business and

[10] Recall that our nonpoor transition implies never being poor during any of the four interview periods.

remittance income also appear to reduce the probability of being chronically poor without making it more likely that you will be non-poor.

Households exiting and descending are not terribly different from those that oscillated, as reflected by the small number of significant variables. This result is intuitive, since each group spent at least one period in both the poor and nonpoor categories, as did the oscillators; unlike the latter, exiters and descenders appear to have made more definitive moves in one direction. A key factor distinguishing oscillators from those that descended into poverty is that the latter have fewer adults with primary and post-primary education. Descenders may also have been more likely to have an adult death over the past year, though this variable is not quite significant. As in the probit results (Table 14), adult death is strongly predictive of exit from poverty: having a death over the past 12 months makes a household 11% less likely to exit from poverty. Cultivated land is also positively associated with escape from poverty.

These regressions provide strong evidence of a spatial dimension to poverty levels, echoing the LPM results above on poverty status and Burke et al (2008). Unlike Burke et al but similar to the probit results, these results also provide some evidence of a spatial dimension to poverty mobility, with households in Eastern Lowlands, Marginal Rain Shadow, and Central Highlands less likely to descend into poverty than those in the Coastal Lowlands.

Table 15: Multinomial Logit Models of Transitions (Marginal Effects)

	Non-Poor		Poor		Exit		Descend	
Variable	**dy/dx**	**Std. Err.**	**dy/dx**	**Std. Err.**	**dy/dx**	**Std. Err.**	**dy/dx**	**Std. Err.**
Age of the HH head	-0.00605***	0.00161	0.003148***	0.00079	-0.00076	0.0011	0.000261	0.00037
Dummy for female headed HH	-0.02069	0.06378	0.062822	0.04143	-0.0231	0.04112	-0.00252	0.01434
Fraction of males in HH, aged 0-6	-0.32333	0.24156	0.256032**	0.12141	-0.03657	0.17258	0.038884	0.05263
Fraction of females in HH, aged 0-6	-0.70538***	0.2464	0.313508***	0.12162	-0.12003	0.17595	0.069125	0.05309
Fraction of males in household, aged 7-16	-0.71588***	0.19702	0.345523***	0.09683	-0.0647	0.13153	0.030071	0.04304
Fraction of females in HH, aged 7-16	-0.42376**	0.18981	0.242386**	0.09516	-0.15246	0.13282	0.008054	0.04275
Fraction of males in HH, aged 17-39	-0.3059	0.20275	0.002383	0.10484	0.141066	0.13494	-0.08435	0.05227
Fraction of females in HH, aged 17-39	-0.43641**	0.19969	0.123425	0.09836	0.145397	0.1352	0.056097	0.04593
Fraction of males in HH, aged 40 and above	0.034498	0.26652	-0.13906	0.1397	0.111057	0.16497	0.008926	0.05245
Fraction of adult HH with primary education	0.166329	0.10198	0.040143	0.04692	0.011225	0.06721	-0.03785*	0.02177
Fraction of adult HH with more than primary	0.464352***	0.11	-0.11994**	0.05633	-0.06073	0.0762	-0.04508*	0.02566
Main season rainfall	0.000314***	0.00012	-0.00019**	0.00008	0.000032	0.00009	9.39E-06	0.00004
Dummy for whether HH tried to get credit	0.105963***	0.03485	-0.03337*	0.01913	0.015741	0.02526	0.003932	0.00852
Acres cultivated in the main season	0.029851***	0.00698	-0.02585***	0.0062	0.014344***	0.00338	-0.00299	0.00284
Distance to closest fertilizer stockist	0.001838	0.00327	0.001499	0.00153	-0.00234	0.00216	-0.00093	0.00087
Dummy for being close to motorable road	0.059437*	0.03474	0.013813	0.01858	-0.00959	0.02488	0.001134	0.00864
Distance to piped water	0.002542	0.00206	-0.00021	0.00113	-0.00268*	0.0015	-0.00053	0.00063
Dummy for receiving remittances	-0.01995	0.0409	-0.04232**	0.01884	-0.00154	0.02863	0.007335	0.0106
Dummy for HH member involved in kibarua	-0.16059***	0.04	0.11434***	0.03452	-0.01838	0.0321	-0.00094	0.01178
Dummy for HH member involved in business	-0.0008	0.03521	-0.04985**	0.02018	-0.01978	0.02572	-0.00398	0.009
Dummy for HH member involved in salary	0.054743	0.03739	-0.01686	0.01923	-0.02286	0.02615	0.008105	0.00993
Dummy for group/cooperative membership	0.102237**	0.04269	-0.02039	0.02298	0.027179*	0.02965	-0.00062	0.01068
Dummy for fertilizer use	0.108907**	0.05339	-0.08336**	0.03453	-0.10414**	0.04594	0.003433	0.01251
Number of radios owned	0.00713	0.02185	-0.02875**	0.01361	-0.01097	0.01619	0.008817*	0.00519
Total value of assets owned	0.420871***	0.10445	-0.11785	0.0877	0.161211***	0.05665	-0.13451***	0.05154
Dummy for adult death in past 12 months	-0.09569	0.0894	0.074048	0.0558	-0.11082***	0.03832	0.055834	0.03886
Dummy for Eastern Lowlands Zone	0.154214	0.13479	-0.05489	0.03768	-0.02552	0.06891	-0.02435*	0.01362

	Non-Poor		Poor		Exit		Descend	
Variable	**dy/dx**	**Std. Err.**	**dy/dx**	**Std. Err.**	**dy/dx**	**Std. Err.**	**dy/dx**	**Std. Err.**
Dummy for Western Lowlands Zone	-0.22663***	0.08846	0.187077*	0.10716	0.008072	0.08246	0.001175	0.02839
Dummy for Western Transitional Zone	-0.09792	0.13201	0.105013	0.11868	-0.09432	0.06017	-0.01624	0.02203
Dummy for High Potential Maize Zone	0.123308	0.13583	0.050092	0.06946	-0.02009	0.07626	-0.01248	0.02425
Dummy for Western Highlands Zone	-0.23428**	0.09642	0.321845*	0.17714	-0.03655	0.08813	-0.01695	0.02117
Dummy for Central Highlands Zone	0.448129***	0.1192	-0.08479**	0.03591	-0.07956	0.06037	-0.04304***	0.01474
Dummy for Marginal Rain Shadow Zone	0.329094**	0.1408	-0.10325***	0.01814	-0.01809	0.0866	-0.0237*	0.0127

7.0 Conclusion and Policy Implications

This paper has analysed the trend of incomes, inequality, and poverty dynamics over the period 1997 to 2007. We find that poverty declined over the decade despite a period of negative growth. This result is driven by reduced inequality and also by the fact that the nominal poverty line rose much less than measured inflation over the period. Reductions in inequality were very broad both spatially and across indicators (income, land, agricultural assets, and livestock). Changes in income by decile confirm the finding of decreased income inequality, showing that falling mean incomes were mostly due to incomes in the top deciles falling, while those in the bottom three deciles rose over the decade. Thus these results suggest that the livelihoods of at least the poorest sections of the rural economy have improved over the years.

We then conducted three sets of econometric analyses to identify in more rigorous fashion the correlates of poverty: LPMs of the likelihood of being in poverty, probits of the likelihood of exiting from or descending into poverty, and a multinomial logit on all five possible transitions that a household could have made during the period. Key themes that emerge robustly across these analyses include:

- Being in poverty once makes it much more likely that you will continue to be in poverty, independent of other characteristics of your households, suggesting that elements of a poverty trap are at work in which spells in poverty reduce human and physical assets enough that climbing out of poverty becomes difficult;
- Households with older heads are at great risk of poverty;
- Female headed households may be at greater risk of poverty due to the lesser number of adults above the age of 40 in the household; female headedness *per se* is never quite significant in these regressions;
- Larger households with more young dependents are at great risk of poverty;
- Households whose main source of cash income is farm kibarua are especially prone to poverty, suggesting the need for more remunerative off-farm employment activities;

- Primary education of household heads is not always enough to protect a household from poverty; education beyond the primary level has a much more robust effect on keeping a household out of poverty;
- Cultivating more land, using fertilizer on it, belonging to a producer group, and having access to credit remain important protections against poverty,
- Poverty status is very strongly related to where a household lives, and
- Poverty mobility may also have some relation to where a household lives; independent of their specific characteristics, households living in some areas may be more able to descend into or climb out of poverty than households in other areas.

Perhaps the most noteworthy results are the importance of secondary education, the possibility that poverty mobility, and not just poverty status, is related to where a household lives, and the fact that past poverty has a lasting effect on a household's likelihood of being poor now. The finding on post-primary education is of interest because it is very concrete (thus useful for policy makers) and echoes earlier results in Mathenge and Tschirley (2008). The result on poverty persistence also echoes Mathenge and Tschirley (2003) and suggests that safety net programs that prevent households from falling into poverty have value beyond their immediate effects, allowing households to sustain themselves more fully in future years. The result on spatial dimensions of poverty mobility contrasts with that of Burke et al (2008); because these latter authors used different methods and a different measure of poverty (relative asset levels rather than income relative to a poverty line); the two sets of results are not necessarily contradictory, but do suggest the need for further research.

The results provide fairly specific policy guidance for government. Clearly there is a need for continued investment in education to keep achieving reductions in poverty. Already the free primary education, the bursaries through constituency development funds (CDF), and loans to poor students from the higher education loans board (HELB) seem to be bearing fruit. There is need to strengthen these policies; the recent policy on free secondary education is strongly supported by these and other results

Employment off farm is also another area that needs to be looked into. It is imperative for those graduating from the education system to find gainful employment. The government's recent reduction of business licenses is a move in the right direction as it creates a more conducive environment for the development of business. This will encourage more investment that will in turn offer jobs to the youth. Access to productive capital by rural entrepreneurs would lead to start up of income generating activities in the rural areas that would have benefits in provision of services and employment. This move is also likely to reduce the pressure on land and its subsequent sub-division.

Safety nets emerge as important elements with potentially lasting effects in combating poverty. While they should not be prioritized at the expense of investments in basic infrastructure and productivity growth, they do need to be considered along with these activities in a balanced approach to fostering growth and reducing poverty.

The sharp regional differences in poverty levels (and perhaps poverty mobility) suggest that geographical targeting of anti-poverty measures may have some merit, especially if it is able to reduce the cost of targeting compared to more data intensive approaches. At the same time, robust findings from other work in Africa (including Kenya; Jayne et al, 2006) show that variations in poverty within geographical units are typically larger than variations across units. Thus, geographic targeting on its own will never be a sufficient mechanism to reach Kenya's poor.

Other policy guidance also emerges from these results. There is need for improvement in access to, and adoption of improved agricultural technologies, such as fertilizer. Fertilizer market liberalization has gone a long way towards making this input more available to a broad array of farmers, yet the recent surge in fertilizer prices threatens to reduce access to fertilizers for poor households. As government grapples with how to deal with the situation, it is imperative that any programs it develops be done in collaboration with the private sector and strengthens it, rather than undermining it.

In addition, while there have been improvements in infrastructure, with the gap between the rich and the poor in terms of access to infrastructure being reduced over the last decade, it is important that such improvements continue as they have extremely high returns. Such improvements not only affect living conditions and welfare, but also allow farmers better access to markets.

Belonging to a farmer group was also a driver of exiting poverty, and is closely linked to credit access. The government youth and women funds, and other forms of credit, should be accessed though groups as this would ensure prompt payment through peer pressure. Bulking of agricultural produce for better bargaining power and de-bulking of inputs to take advantage of economies of scale are some of the benefits of collective action, not to mention the peer pressure in adopting new technologies and learning of new ideas.

References

Bhatta S.D, and Sharma S.K, 2006. The Determinants and Consequences of Chronic and Transient Poverty in Nepal. Working paper, 2006, CPRC.

Bird K, Hulme D, Moore, K, and Shepherd A, 2002. Chronic Poverty and Remote Rural Areas. CPRC Working Paper 13, Institute of Development Policy and Management, University of Manchester.

Burke W.J, and Jayne T.S, 2008. Spatial Disadvantages or Spatial Poverty Traps: Household Evidence From Rural Kenya. Working Paper, Overseas Development Institute and Food Security Group Department of Agriculture, Food and Resources Economics MSU.

Burke W.J, Jayne T.S, Ade Freeman H, and Krisjanson P, 2007. Factors Associated With Farm Households Movement into and Out of Poverty in Kenya: The Rising Importance of Livestock. Working Paper No. 90, 2007, MSU International Development.

Clark D.A, and Hulme D, 2005. Towards an Integrated Framework for Understanding the Breadth, Depth and Duration of Poverty. GPRG Working Paper 20, Universities of Manchester and Oxford.

Carter M, and May J, 2001. One Kind of Freedom: Poverty Dynamics in Post-apartheid South Africa. *World Development*, 29(12), 1987–2006.

Gamba P, and Mghenyi E, 2004. Rural Poverty Dynamics, Agricultural Productivity and Access to Resources. Working Paper No 21, Tegemeo Institute of Agricultural Policy and Development, Egerton University.

Geda A, de Jong N, Mwambu G, and Kimenyi M. S, 2001. Determinants of Poverty in Kenya: Household-level Analysis. KIPPRA Discussion Paper No.9, Nairobi: Kenya Institute for Public Policy Research and Analysis.

Gitau M. J, 2005. How to Understand Inequality in Kenya 2005; Partner News Vol. 8 No 1

Government of Kenya, 2003, Geographical Dimensions of Well-being in Kenya. Where are the Poor? From Districts to Locations: Volume 1, Central Bureau of Statistics, Ministry of Planning and National Development, Nairobi.

Government of Kenya, 1998. The First Report on Poverty in Kenya: Incidence and Depth of Poverty, Vol 1: Nairobi: Central Bureau of Statistics, Ministry of Finance and Planning.

Government of Kenya, 2000. Second Report on Poverty in Kenya: Volume II- Poverty and Social Indicators, Nairobi: Central Bureau of Statistics, Ministry of Finance and Planning.

Government of Kenya, 2003. Economic Recovery Strategy for Wealth and Employment Creation, 2003-2007. Government of Kenya.

Government of Kenya, 2005. Strategy for Revitalizing Agriculture, 2004-2014. Ministries of Agriculture, Livestock and Fisheries Development and Cooperative Development and Marketing.

Greer J, and Thorbecke E, 1986. A Methodology of Measuring Food Poverty Applied to Kenya. *Journal of Development Economics,* 24(1): 59-74.

Haan A, and Lipton M, 1998. Poverty in Emerging Asia: Progress, Setbacks and Log-jams. *Asian Development Review*, 16(2): 135-176.

Howe G, and McKay 2005. Combining Quantitative and Qualitative Methods in Assessing Chronic Poverty: The Case of Rwanda. *World Development*

Irungu C, 2002. Outreach Performance of non Governmental Development Organizations in Eastern Kenya, *Socio-economic Studies on Rural Development Vol. 131*, Kiel, Wissenschaftsverlag Vauk Kiel KG.

Jalan J, and Ravallion M, 2000. Is Transient Poverty Different? *Journal of Development Studies* 36 (6): 82–99.

Jalan J, and Martin R, 1998(a). Determinants of Transient and Chronic Poverty. Evidence from Rural China. World Bank Policy Research Working Paper Series no 1936. Washington D.C.

Jalan J, and Martin R, 1998(b). Transient Poverty in Post Reform Rural China. *Journal of Comparative Economics* 26(2): 338-57.

Jayne T.S, Takashi Y, Michael T.W, Tschirley D, Rui B, Chapoto A, and Zulu B, 2006. Smallholder Income and Land Distribution in Africa: Implications for Poverty Reduction Strategies. Food Policy. V. 28, # 3, June 2003, Pages 253-275.

Jayne T.S, and Chapoto A, 2006. Emerging Structural Maize Deficits in Eastern and Southern Africa: Implications for National Agricultural Strategies. Policy Synthesis 16, Food Security Research Project–Zambia.

Kennedy E, and Haddad L, 1994. Are Preschoolers From Female Headed Households Less Malnourished? A Comparative Analysis of Results from Ghana and Kenya, *Journal of Development Studies* 30 (3): 680 – 695.

Kenya National Bureau of Statistics, 2007. Basic Report on Well-being Based on the Kenya Integrated Household Budget Survey – 2005/06. Ministry of Planning and National Development, Nairobi.

Kikula I, Kipokola J, Shivji S, and Tarimo B, 2005. Researching Poverty in Tanzania: Problems, Policies and Perspectives. Selected Papers From Research Funded and Published by Research on Poverty Alleviation (REPOA) during 1994 – 2004. Mkuki na Nyota Publishers, Dar es Salaam.

Kiringai J, 2006. Public spending in Kenya: An Inequality Perspective: Readings on Inequality in Kenya, Sectoral Dynamics and Perspectives, SID, 2006 pp11-58.

Klasen S, 2000. Measuring Poverty and Deprivation in South Africa, *Review of Income and Wealth* 46:33-58.

Lipton M, and Ravallion M, 1995. Poverty and Policy in Behrman, J., Srinivasan, T.N., (Eds.), *Handbook of Development Economics, Vol 3,* North-Holland, Amsterdam.

Luc J.C, and Kalanidhi S, 2005. Towards an Understanding of Household Vulnerability in rural Kenya. *Journal of African Economics,* 14(4): 520-558.

Mango N, Cheng'ole J, Kariuki G, and Ongadi W, 2004. Social Aspects of Dynamic Poverty Traps: Cases from, Vihiga, Baringo and Marsabit Districts, Kenya. Paper presented at KIPPRA-Cornell SAGA Workshop on Qualitative and Quantitative Methods for Poverty Analysis. 11 March 2004. Nairobi.

Marenya P, Oluoch-Kosura W, Place F, and Barret C, 2003. Education, Nonfarm Income, and Farm Investment in Land-Scarce Western Kenya. Broadening Access and Strengthening Input Market Systems.

Mathenge M, and Tschirley D, 2008. Income Growth and Mobility of Rural Households in Kenya: Role of Education and Historical Patterns in Poverty Reduction. Paper presented at the 2008 CSAE conference. Cambridge.

McColluch N, and Baulch B, 2000. Simulating the Impact of Policy upon Chronic and Transient Poverty in Rural Pakistan. *Journal of Development Studies*, 36 (6): 00-130.

Muyanga M, Ayieko M., and Bundi, M, 2007. Transient and Chronic Rural Household Poverty: Evidence from Kenya. PMMA Working Paper.

Nyoro J, 2002. Agriculture and Rural Growth in Kenya. Tegemeo Institute of Agricultural Policy and Development.

Omiti J, 2002. Poverty Reduction Efforts in Kenya, Institutions, Capacity and Poverty. Discussion Paper No. 033/2002, IPAR.

PAPPA Team, 2000. Policy Analysis for Participatory Poverty Alleviation. Paper 1.PAPPA National Conference held at Mbagathi KCCT.

Place F, Hebinck P, and Omosa M, 2003. Chronic Poverty in Rural Western Kenya: Its Identification and Implications for Agricultural Development. World Agroforestry Centre, Mimeo. Nairobi.
http://www.worldagroforestry.org/downloads/publications/PDFS/pp03225.pdf

Poverty Inequality and Disease in Kenya, 1999. World Socialist web site. http://www.wsws.org/articles/1999/oct1999/ken2-o06.shtml

Quisumbing A. R, Haddad, L, and Pena C, 2001. Are women overrepresented among the poor? An Analysis of Poverty in 10 Developing Countries. *Journal of Development Economics* Vol. 66 (2001): 225-269.

Ravallion M, and Gaurav D, 1999. Why has Economic Growth Been More Pro-poor in Some States of India than Others*? Journal of Development Economics*.

Sen B, 2003. Drivers of Escape and Descent: Changing Household Fortunes in Rural Bangladesh. World Development Vol. 31, No. 3 pp. 513-534, Elsevier Science Ltd, UK.

SID, 2004. Pulling Apart: Facts and Figures on Equality in Kenya.

Tschirley D, and Mathenge M, 2003. Developing Income Proxy Models for Use by the USAID Mission in Kenya: A Technical Report. Working Paper 7, Tegemeo Institute of Agricultural Policy and Development, Egerton University.

Ulimwengu J.M, and Kraybill D. S, 2004. Poverty Over Time and Location: An Examination of Metro-Nonmetro Differences, *Agricultural Journal of Agricultural Economics,* 86(5).

UNDP, 2001. Human Development Report, Oxford University Press, Oxford.

Zeller M, Sharma M, Henry C, and Lapenu C, 2006. An Operational Method for Assessing the Poverty Outreach Performance of Development Policies and Projects, Results of Case Studies in Africa, Asia, Latin America, in World Development*,* 34(3): 446-464.

Annexes

Table A1: Summary of poverty estimates in Kenya

Author	Reference Year	Source	Poverty Line	Poverty Incidence
FAO (1977)	1972	Food Balance Sheet (1972-74)	2,137 calories per day per AE	30% of the population
Crawford and Thornbeck (1980)	1974/5	Integrated Rural Survey 1,1974/75 (IRS I)	Kshs.2,200 for small holder farmers	38.5% of all households
Collier & Lal (1980)	1974/5	IRS 1,1974/75 Small holder farmers	Kshs.2, 200 per household	29% of population 34.2% of small holders
World Bank (1991)	1991	1981/82 Rural Household Budget survey and complementary statistics	Kshs.3,167 for small children	22%
Government of Kenya Consultant (Mukui, J., (1994)	1992	Welfare Monitoring Survey (WMS1)	Kshs 485 per month per AE, Rural Kshs Kshs 1,010 per month AE, Urban	44.3% Rural 29.3% urban 44.8% total
Ministry of Planning and National Development	1994	WMS II 1994	Kshs. 987.27 Rural Kshs.1,489.63 Urban	46.6% Rural 29 % Urban
Ministry of Planning and National Development	1997	WMS III 1997	Kshs.1238.86 Rural Kshs.2648.04 Urban	52.93% Rural 49.20% Urban
The Kenya Institute of Public Policy Research and Analysis	2000	Data from 1997 WMSIII 1997, and WMSII 1994		56.78% National 59.56% Rural 51.48% Urban
Ministry of Planning and National Development	2007	KIHDS 2005/6	Kshs. 1,562 Rural Kshs. 2,930 Urban	45.9 % National 49.1 % Rural 33.7 % Urban

Source: GoK, 1998; KNBS, 2007; KIPPRA,WP/6/2002;

Figure A1: Income and growth by Province

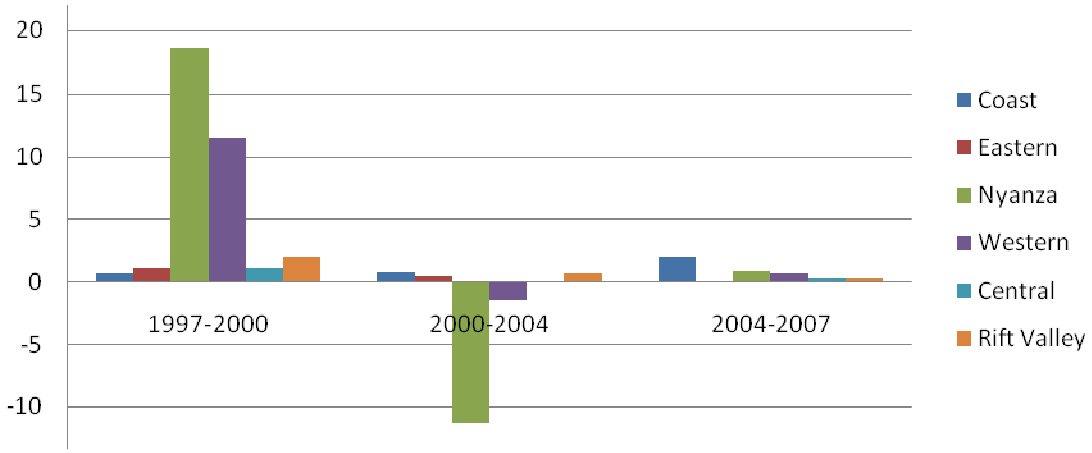


Figure A2: Poverty trends by Province

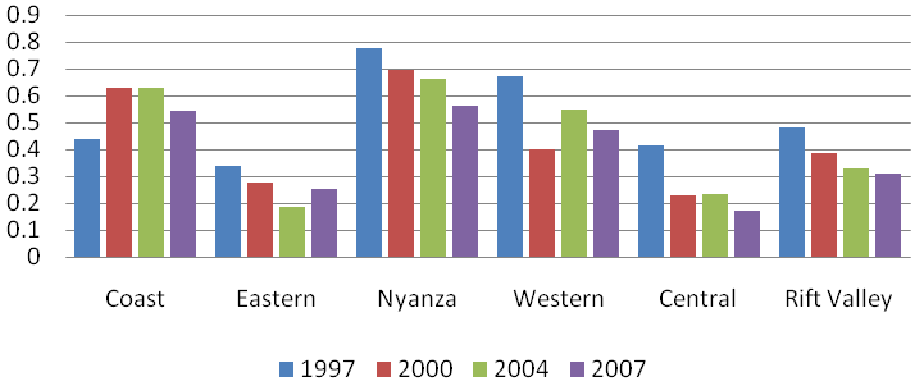


Figure A3: Average number of months household relied on purchased staples, 2007

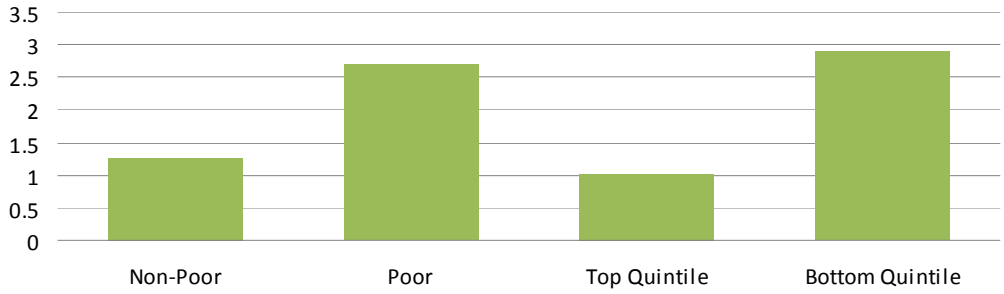
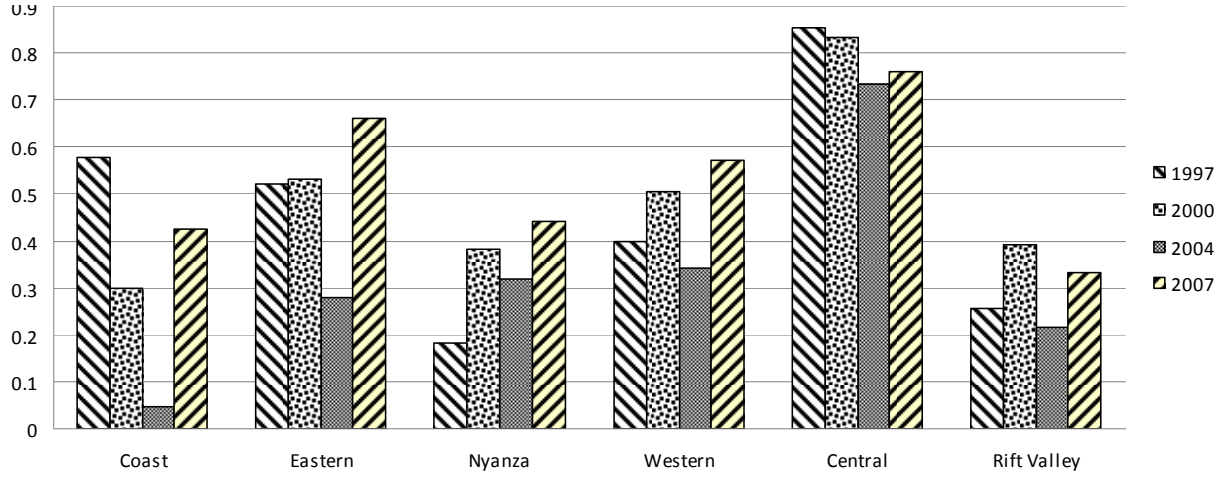
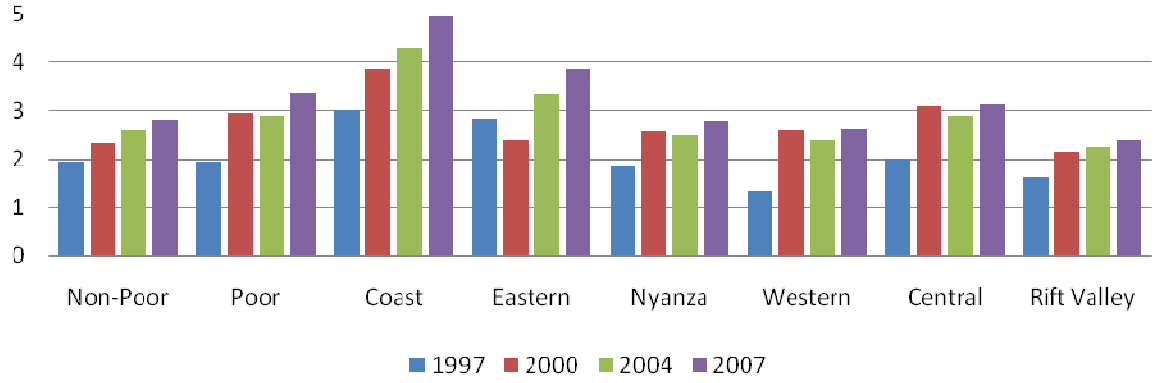


Figure A4: Household characteristics

(i) Credit by Province



(ii) Number of crops per field (main season)



(iii)Infrastructure improvements, top and bottom Quintiles

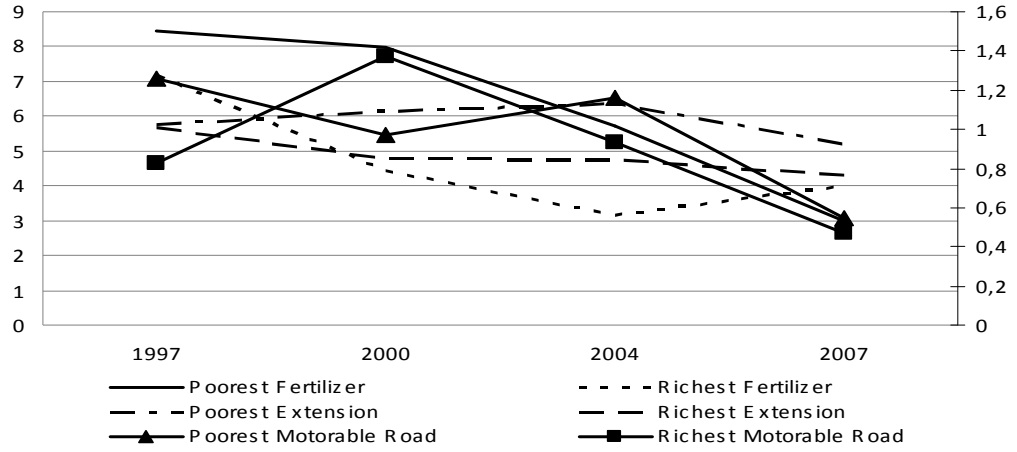
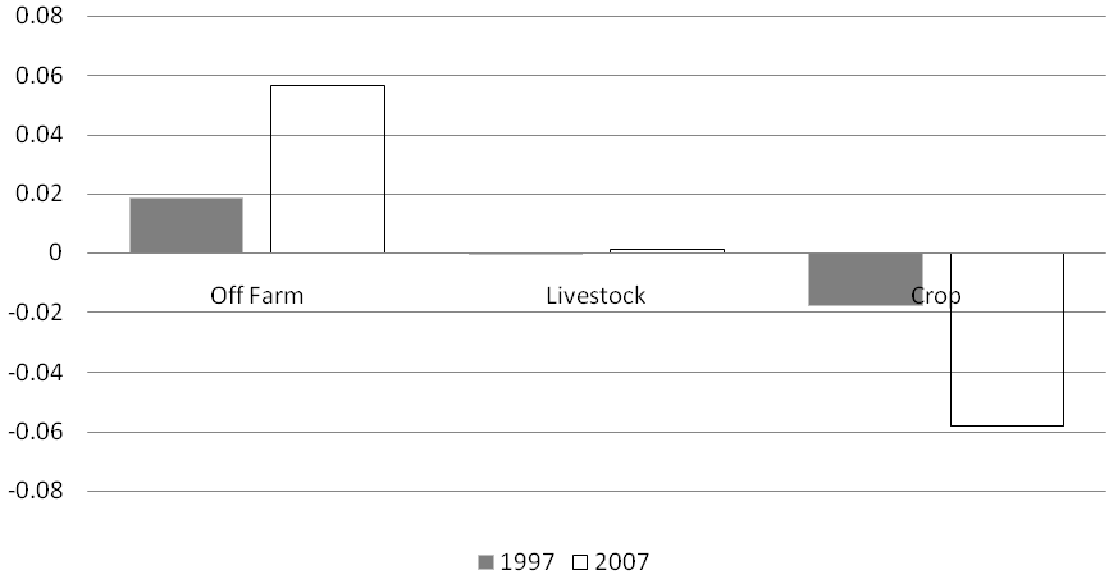


Figure A5: Inequality decompositions

Marginal Effects of income by source on the Gini, 1997 and 2007



This figure shows the marginal effects of various sources of income on the income Gini. Interestingly, the disequalising effect of off-farm income increases over the decade, implying that rising off farm income would tend to be associated with worsening inequality, whereas other sources of income tend to offset inequality. For 2000 onwards, we can split off-farm income into salaries (and remittances), versus informal business activities and we see that salary and remittances have a large disequalising marginal effect (0.0487 in 2007), informal income a

much lower positive effect (0.0088) and livestock and crop income similar to earlier (-0.0006 and -0.0570, respectively). However, these figures should not be given a causal interpretation.