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The Dynamics of Poverty, Inequality and Economic Well Being in Uasin Gishu County, Kenya

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Abstract
It is hard to imagine an issue in development economics that is of greater importance to humankind than the effects of economic growth on poverty and economic well being. Hence this study is stimulated by the desire to have an in depth knowledge of the key factors that determine regional poverty, inequality and economic well being. This then helps analysts and policy makers to design effective targeting indicators. The major objective of this study is to investigate the profile of income inequality and poverty among identified socio-economic groups. The data used are based on the 1994 Welfare Monitoring Survey (Government of Kenya 1998, 2000). These data were collected for the whole county and covered nearly 272 households. The existing sub counties were clustered into six agro-regional zones. Using standard proportional random sampling, aided with data from Central Bureau of Statistics, households were randomly sampled for interviews. The fundamental rationale behind the choice of a household as a unit of analysis is the assumption of sharing of resources among households. The results of this study showed that male headed households are less likely to be poor. Similarly, the likelihood of being poor is smaller in urban areas than in rural areas. Probably to some extent related to this, people living in households mainly engaged in agricultural activities are more likely to be poor, compared to households in manufacturing activities. In all models the most important determinant of poverty status is the level of education.
Keywords: Poverty, Dynamics and Welfare

1.0 Introduction

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 (House, 1981). 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. According to the World Bank, more than one billion people today live on less than $1 per day. About 70% of those people are women, and almost half of the population of sub-Saharan Africa survives at that income level. We know that every 3.5 seconds, a child dies in the developing world from poverty-related circumstances. But what is poverty really? While on the surface poverty is often defined as a lack of income or assets, in the day-to-day lives of the very poor, poverty becomes a network of disadvantages, each one exacerbating the others. The result is generation after generation of people who lack access to education, health care, adequate housing, proper sanitation and good nutrition. They are the most vulnerable to disasters, armed conflict and systems of political and economic oppression and they are powerless to improve their circumstances. These conditions often carry with them dysfunctional family and societal relationships, paralyzing low self-esteem, and spiritual darkness (Manda et *al.,* 2001). Poverty is a lack of hope. It's clear that handouts and traditional aid are not enough to solve the problem of poverty and its many entanglements. EndPoverty.org seeks to equip the poor to free themselves from poverty in a holistic way.

Studies by Bisgten (2009) 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. After 45 years of independence, Kenya remains a dual economy with wide disparities in economic, social and infrastructural development across regions. 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. This paper makes contributes to the existing literature on poverty dynamics and inequality in Uasin

Gishu County, Kenya by extending the debate on drivers of exit from and descent into poverty and by analyzing 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.

2.0 Previous Studies on Poverty in Kenya

Analytical work on determinants of poverty in Kenya is at best scanty. Most of the available studies are descriptive and focus mainly on measurement issues. Earlier poverty studies have focused on a discussion of inequality and welfare based on limited household level data (see Bigsten 1981, Hazlewood 1981, House and Killick 1981).

One recent comprehensive study on the subject is that of Mwabu *et al.,* (2000), which deals with measurement, profile and determinants of poverty. The study employs a household welfare function, approximated by household expenditure per adult equivalent. The authors run two categories of regressions, using *overall* expenditures and *food* expenditures as dependent variables. In each of the two cases, three equations are estimated which differ by type of dependent variable. These dependent variables are: total household expenditure, total household expenditure gap (the difference between the absolute poverty line and the actual expenditure) and the square of the latter. A similar set of dependent variables is used for food expenditure, with the explanatory variables being identical in all cases.

Mwabu *et al.,* (2000) justified their choice of this approach (compared to a logit/probit model) as follows. First, the two approaches (discrete and continuous choice-based regressions) yield basically similar results (see below, however); second, the logit/probit model involves unnecessary loss of information in transforming household expenditure into binary variables. Although their specification is simple and easy to follow, it has certain inherent weaknesses. One obvious weakness is that, unlike the logit/probit model, the levels regression does not directly yield a probabilistic statement about poverty. Second, the major assumption of the welfare function approach is that consumption expenditures are negatively associated with absolute poverty at all expenditure levels. Thus, factors that increase consumption expenditure reduce poverty. However, this basic assumption needs to be taken cautiously. For instance, though increasing welfare, raising the level of consumption expenditure of households that are already above the poverty line does not affect the poverty level (as for example measured by the headcount ratio). Notwithstanding such weaknesses, the approach is widely used and the Mwabu *et al.,* (2000) study identified the following as important determinants of poverty: unobserved region-specific factors, mean age, size of household, place of residence (rural versus urban), level of schooling, livestock holding and sanitary conditions. The importance of these variables does not change whether the total expenditure, the expenditure gap or the square of the gap is taken as the dependent variable. The only noticeable change is that the sizes of the estimated coefficients are enormously reduced in the expenditure gap and in the square of the expenditure gap specifications. Moreover, except for minor changes in the relative importance of some of the variables, the pattern of coefficients again fundamentally remains unchanged when the regressions are run with food expenditure as dependent variable.

Another recent study on the determinants of poverty in Kenya is Oyugi (2000), which is an extension to earlier work by Greer and Thorbecke (1986a,b). The latter study used household calorie consumption as the dependent variable and a limited number of household characteristics as explanatory variables. Oyugi (2000) uses both discrete and continuous indicators of poverty as dependent variables and employs a much larger set of household characteristics as explanatory variables. An important as 3 pect of Oyugi's study is that it analyses poverty both at micro (household) and meso (district) level, with the meso level analysis being the innovative component of the study.

Oyugi (2000) estimates a probit model using data of the 1994 Welfare Monitoring Survey data. The explanatory variables (household characteristics) include: holding area, livestock unit, the proportion of household members able to read and write, household size, sector of economic activity (agriculture, manufacturing/industrial sector or wholesale/retail trade), source of water for household use, and off-farm employment. The results of the probit analysis show that almost all variables used are important determinants of poverty in rural areas and at the national level, but that there are important exceptions for urban areas (Oyugi, 2000). These results are consistent with those obtained from the meso-level regression analysis.

It is interesting to compare the implications of the levels (Mwabu *et al.,* 2000) and probit (Oyugi, 2000) regression approaches. From the levels regressions, age, household size, residence, reading and writing and level of schooling are the top five important determinants of poverty at the national level. In the probit model, however, in order of importance the key determinants of poverty are: being able to read and write, employment in off-farm activities, being engaged in agriculture, having a side-business in the service sector, source of water and household size. Region of residence appears to be equally important in determining poverty status in the two approaches. Although the two approaches did not employ the same explanatory variables, this comparison points to the possibility of arriving at different policy conclusions from the two approaches.

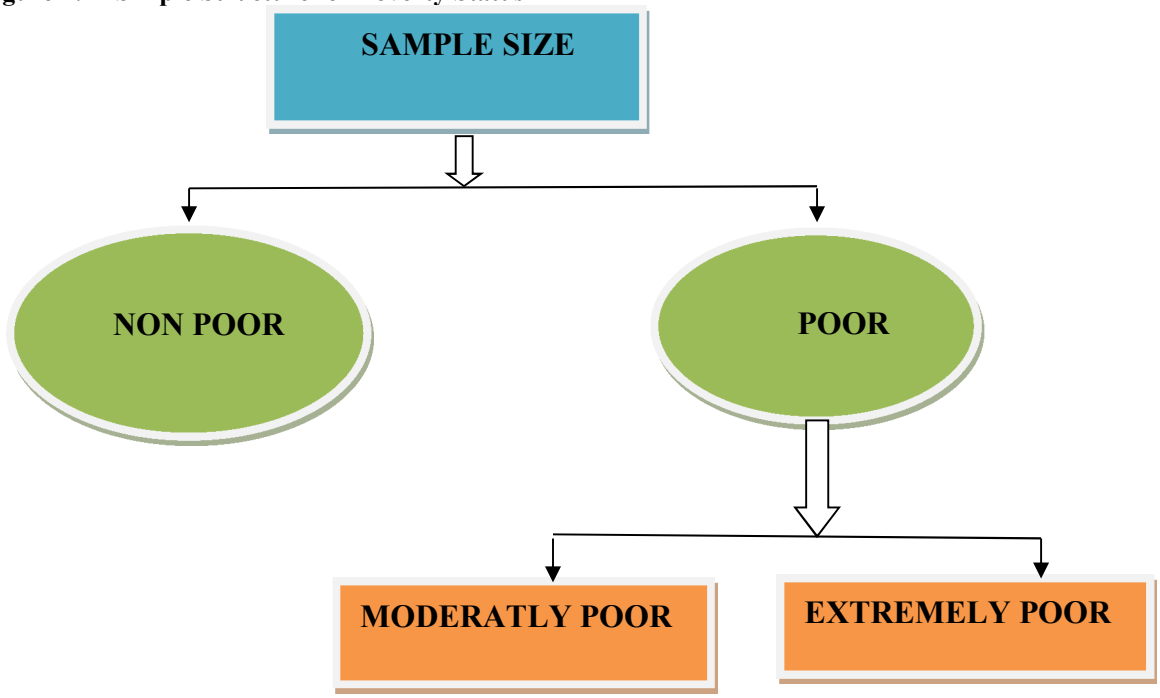
3.0 Methodology

The data used are based on the 1994 Welfare Monitoring Survey (Government of Kenya 1998, 2000). These data were collected for the whole county and covered 272 households. The existing sub counties were clustered into six agro-regional zones. Using standard proportional random sampling, aided with data from Central Bureau of Statistics, households were randomly sampled for interviews. The fundamental rationale behind the choice of a household as a unit of analysis is the assumption of sharing of resources among households. Although the quality of the data we use is in general relatively high, two factors need to be borne in mind in using the results derived from them. First, the results might be affected by the seasonal effect on household expenditure, since seasonality was not controlled for while collecting the data. A comprehensive list of explanatory variables was used and may be grouped into the following categories: property related, such as land and livestock holding; household characteristics, such as status of employment, age, gender, educational level, household size; and *others*, such as time spent to fetch water and to obtain energy, place of residence of the household whether in rural or urban or in a particular province (see Table 2). The estimation was made after inflating the number of households in the sample (272) to that in the total population (nearly one million in 2013), using expansion factors. The expansion factors are however adjusted downwards for children in case of adult equivalent based estimations. The household characteristics are assumed to affect (adult equivalent) members of the household equally.

3.1 Binomial and Polychotomous Models of Poverty

The approach followed by this study intends to explain why some population groups are non-poor, poor, or extremely poor. It identifies different population sub-groups in several stages. In the first stage, it identifies the poor and non-poor. In the second stage, it examines the probability of being in hard-core poverty conditional on being identified as poor. That is, we can also compute the probability of being what we term as 'extremely poor'. This poverty identification process is displayed in Figure 1 below.

Figure 1: A Simple Structure for Poverty Status



It is assumed that the probability of being in a particular poverty category is determined by an underlying response variable that captures the true economic status of an individual. In the case of a binary poverty status (*i.e.* being poor or non-poor), let the underlying response variable y* be defined by the regression relationship:

$$y_i^* = \sum X_i^{'} \beta^{'} + \mu_i \quad \text{..... (1)}$$

Where

$$\beta^{'} = [\beta_1, \beta_2 ..... \beta_k] \text{ And } X_i^1 = [X_{i1}, X_{i2} ..... X_{ik}]$$

In equation (1), y^* is not observable, as it is a latent variable. What is observable is an event represented by a dummy variable y defined by:

y=1 if $y^*>0$, and

y=0 otherwise ..... (2)

The following equation can be obtained from (1) and (2)

$$prob(y_i = 1) = prob\left(u_i > -\sum X_i^{'} \beta^{'} \right)$$

$$= 1 - F\left(-\sum X_i^{'} \beta^{'} \right) \quad \text{..... (3)}$$

Where *F* is the cumulative distribution function for ui, and

$$\Pr ob(y_i = 0 / \beta X_i) = F(-\sum X_i^{'} \beta^{'})$$

The observed values of *y* are the realization of the binomial with probabilities given by equation (3), which varies with **X***i*. Thus, the likelihood function can be given by:

$$L = \prod_{y_i=1} \left[F(-\sum X_i^{'} \beta^{'}) \right] \prod_{y_i=1} \left[1 - F\left(-\sum X_i^{'} \beta^{'} \right) \right] \quad \text{..... (4a)}$$

Re-written as:

$$L = \prod_{y_i=1} \left[F(-\sum X_i^{'} \beta^{'}) \right]^{1-y_i} \left[1 - F\left(-\sum X_i^{'} \beta^{'} \right) \right]^{y_i} \quad \text{..... ..... (4b)}$$

The functional form imposed on *F* in equation (4) depends on the assumptions made about *ui* in equation (1). The cumulative normal and logistic distributions are very close to each other. Thus, using one or the other will basically lead to the same result (Maddala 1983). Moreover, following Amemiya (1981), it is possible to derive the would-be estimates of a probit model once we have parameters derived from the logit model. Thus, the logit model is used in this study. The logit model for this study has been specified by assuming a logistic cumulative distribution of *ui* in F (in equations (4a) and (4b)). The relevant logistic expressions are:

$$1 - F\left(-\sum X_i^{'} \beta^{'} \right) = \frac{e^{\sum X_i^{'} \beta^{'}}}{1 + e^{\sum X_i^{'} \beta^{'}}} \quad \text{..... (5a)}$$

$$F\left(-\sum X_i^{'} \beta^{'} \right) = \frac{e^{-\sum X_i^{'} \beta^{'}}}{1 + e^{-\sum X_i^{'} \beta^{'}}} = \frac{1}{1 + e^{\sum X_i^{'} \beta^{'}}} \quad \text{..... (5b)}$$

As before, **X***i* are the characteristics of the households/individuals, and β_i the coefficients for the respective variables in the logit regression. Having estimated equation (4) with maximum likelihood (ML) technique, equation (5a) basically gives us the probability of being poor (Prob(yi=1)) and equations (5b) the probability of being non-poor (Prob(yi=0)). After modeling the process that generates the poor or non-poor status, we focus attention on the hard-core poor versus the moderately poor and non-poor.

This can be handled by a polychotomous model, more in particular an ordered probit or logit model. This approach is justifiable, because we explicitly make the ordering of the population sub-samples, using total and food poverty lines as cut-off points in a cumulative distribution of expenditure.3 Since these categories have a natural order, the ordered logit is the appropriate model to be employed in the estimation of relevant probabilities (see Maddala 1983, Amemiya 1985, Greene 1993).

Assuming three categories (1, 2 and 3 and associated probabilities P1, P2 and P3), an individual would fall in category 3 if u < $\beta^{'}$ **x**, in category 2 if $\beta^{'}$ **x** < u ≤ $\beta^{'}$ **x** + α; and in category 1 if u ≥ $\beta^{'}$ **x** + α, where α > 0 and *u* is the error term in the underlining response model (see Equation 1). These relationships may be given by:

$$P_3 = F\left(\hat{a}^{'} \; X_i \right)$$

$$P_2 = F\left(\hat{a}^{'} \; X_i + \alpha \right) - F\left(\hat{a}^{'} \; X_i \right) \quad \text{..... (6)}$$

$$P_1 = 1 - F\left(\hat{a}^{'} \; X_i + \alpha \right)$$

Where the distribution F is logistic in the ordered logit model. This can easily be generalized for *m* categories (see Maddala 1983). Assuming the underlying response model is given by:

$$y_i = \hat{a}' X_i + u_i \quad \text{..... (7)}$$

We can define a set of ordinal variables as:
Z_{ij}=1 if y_i falls in the j^{th} category
Z_{ij}=0 otherwise i=1,2……n; j=1,2……m

$$\Pr ob(Z_{ij} = 1) = \Phi(\alpha_j - \beta' X_i) - \Phi(\alpha_{j-1} - \beta' X_i) \quad \text{..... (8)}$$

Where Φ is the cumulative logistic distribution and the α_j 's are the equivalents of the α's in equation (6). The likelihood and log-likelihood functions for the model can be given by equations (9) and (10) respectively, as:

$$L = \prod_{i=1}^{n} \prod_{j=1}^{m} \left[\Phi(\alpha_j - \beta' X_i) - \Phi(\alpha_{j-1} - \beta' X_i)\right]^{Z_{ij}} \quad \text{..... (9)}$$

$$L^* = \log L = \sum_{i=1}^{n} \sum_{j=1}^{m} Z_{ij} \log\left[\Phi(\alpha_j - \beta' X_i) - \Phi(\alpha_{j-1} - \beta' X_i)\right] \quad \text{..... (10)}$$

Equation (10) can be maximized in the usual way, and can be solved iteratively by numerical methods, to yield maximum likelihood estimates of the model (see Maddala1983).

4.0 Discussion of Results

4.1 Poverty Status: County Sample

According to the estimation results, male headed households are less likely to be poor. Similarly, the likelihood of being poor is smaller in urban areas than in rural areas. Probably to some extent related to this, people living in households mainly engaged in agricultural activities are more likely to be poor, compared to households in manufacturing activities. In all models the most important determinant of poverty status is the level of education. The effects of this variable are similar across the four models. The coefficient for household size is almost twice as high in the consumption-based as income based models ones, while the impacts of the sector of employment, as well as the number of animals owned is insignificant in the consumption-based models. Total holding of land does not seem to be important in any of the specifications. An explanation for this may lie on the importance of the quality of land and/or lack of complementary agricultural inputs. Table 3 shows the estimated model and the marginal effects of each explanatory variable on the probability of being poor, based on models in which per adult equivalent consumption is used to estimate poverty. Estimation results using per capita income and consumption.

4.2 Poverty Status: Rural and Urban Sub-Samples

Following the finding that place of residence is associated with level of poverty; we have fitted the model to data for rural and urban areas separately. The estimation results and the marginal effects are given in Table 4. In general, the results show that the factors strongly associated with poverty (level of education, household size, engagement in agricultural activities) are the same in both rural and urban areas. However, the size of the coefficients associated with these regressors is larger in rural areas. Moreover, polygamous marriage seems to worsen poverty in urban as opposed to rural areas.

In rural areas all the members of the extended household do often work in agriculture, while in urban areas there may be less scope for all the members of the extended household to be meaningfully engaged. This result does not seem to hold in the consumption-based estimation, however**.** Given the reliability problem with income data and the fact that even the consumption based estimates are not statistically significant at conventional levels, this result may be taken as inconclusive. The consumption-based estimation yield fairly similar results about determinants of poverty, particularly with regard to educational attainment. The coefficients obtained in the latter model are relatively smaller, however. Moreover, factors such as age, size of land holding (albeit with very small coefficients) are found to be statistically significant in this version of the model. Regional dummies for Kesses and Moiben sub counties that is virtually insignificant in the income-based model are found to be statistically significant in the consumption based version of the model for rural areas. Moreover, working in the urban modern sector seems to reduce the likelihood of being poor.

4.3 Ordered Poverty Status: County and Urban-Rural Sub-Samples

Following the discussion in Section 3, we have ordered the sample into three mutually exclusive categories: non-poor (category 1), moderately poor (category 2) and hard-core or extremely poor (category 3), with households in category 3 being most affected by poverty. This classification is based on the poverty and food poverty lines computed from the 1994 Welfare Monitoring Survey (see Appendix). The estimated model and the marginal

effects of the regressors for the consumption based models are given in Table 5. We noted that the consumption-based model is fairly different from the income-based model. It exhibits regressors with statistically significant coefficients as well as weaker explanatory effects in the case of category 1 (non-poor) and category 2 (poor), respectively. In general, it is interesting to note that those factors that are important in the binomial model are still important in the ordered logit model. More importantly, by comparing the marginal effects for categories 2 and 3, we note that these variables are much more important in tackling extreme than moderate poverty.

Basically the results are similar to those obtained for the national sample. However, the following interesting differences are observed. First, although secondary and university level education are important both in rural and urban areas, primary education is found to be extremely important in rural areas. Second, agriculture as main occupation is more closely associated with poverty in urban areas than in rural areas. This indicates that agriculture being the main occupation is a factor that more strongly differentiates between being poor or non-poor in urban areas. Third, the negative impact of aging is stronger in urban than rural areas.

This may reflect the collapse of the extended family network in urban areas, which normally serves as a traditional insurance scheme in Africa. Finally, urban poverty is worst in Kesses and Moiben sub counties. The ordered logit estimation of income-based models shows that at the national level the predicted probability of falling in the non-poor category and into moderately and extremely poor categories are 42, 13 and 45 percent, respectively.

The corresponding figures for rural areas are similar, while for urban areas they are 58, 19 and 23 percent respectively. This basically shows that for a poor Kenyan residing in rural areas the probability of falling in extreme poverty is much greater than for his/her urban counterpart. A similar pattern is observed when the ordered logit model is estimated using consumption-based data. However, the probability for the first category in general declines while that for the third category rises. The ordered logit model results show clearly that determinants of poverty have different impacts across the poverty categories defined. For instance, if we take the most important determinant of poverty status in Kenya, *i.e.* the level of education, Table 4 shows that the marginal effect of having a primary level of education are 0.10, -0.03 and -0.07 for non-poor, moderately poor and hard-core poor categories, respectively. The comparable marginal effects for secondary level education are 0.25, -0.08 and -0.16; and for university level education 0.36, -0.14 and -0.22, respectively. This shows that, in general, education is more important for the hard-core poor than for the moderately poor. The relative difference is largest in the case of primary education.

5.0 Conclusions and Recommendations

In this paper an attempt has been made to explore the dynamics of poverty in Uasin Gishu County, Kenya. Both binomial and Polychotomous logit models using the 1994 Welfare Monitoring Survey data. Although a number of specific policy conclusions could be drawn from the estimation results leading to the following policy implications;

To begin, the study found out that poverty is concentrated in rural areas in general, and in the agricultural sector in particular. Those employed in the agricultural sector accounts for a good part of the probability of being poor. Thus, investing in the agricultural sector to reduce poverty should be a matter of great priority. Moreover, the finding that the size of land holding is not a determinant of poverty status may suggest the importance in poverty reduction not only of improving the quality of land, but also of providing complementary inputs that may enhance productivity.

Secondly, the educational attainment of the head of the household (in particular high school and university education) is found to be the most important factor that is associated with poverty. Lack of education is a factor that accounts for a higher probability of being poor. Thus, promotion of education is central in addressing problems of moderate and extreme poverty. Specifically, primary education is found to be of paramount importance in reducing extreme poverty in, particularly, rural areas.

Lastly, and related to the second point above, the importance of female education in poverty reduction should be noted. We have found that female-headed households are more likely to be poor than households of which the head is a men and that female education plays a key role in reducing poverty. Thus, promoting female education should be an important element of poverty reduction policies. Because there is evidence that female education and fertility are negatively correlated, such a policy could also have an impact on household size, which is another important determinant of poverty in Kenya. Moreover, given the importance of female labour in rural Kenya and elsewhere in Africa, investing in female education should be productivity enhancing.

Last but not least, in line with the three strategies that are outlined in the PRSP and directly related to issues of poverty (economic growth and macro stability, raising income opportunity of the poor, and improving quality of life), the findings in this study point to the importance of focusing on education in general and primary education in rural areas in particular. The study also highlights the higher likelihood of being poor of those who are engaged in the agricultural sector. Thus, the PRSP's strategy of raising income opportunities of the poor should focus on investing in agriculture. Since the macroeconomic environment is important in determining the

productivity of such investment, macroeconomic and political stability are a pre-requisite for addressing poverty.

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Appendix

TABLE A1
POVERTY LINES ADJUSTED FOR PRICE CHANGES
(IN KSHS. PER MONTH)

	1992	1994	1997
Per capita			
Urban	728.65	1252.7	1552.97
Rural	499.00	857.88	1063.51
Per adult equivalent			
Urban	771.85	1326.96	1645.03
Rural	527.33	906.59	1123.90
Deflators used (1986=100)*	275.07	472.9	586.252

* CPI of December for 1992 and that of June for 1994 and 1997

TABLE 1
POVERTY IN 1994
(ESTIMATES BY GOVERNMENT OF KENYA IN BRACKETS)

	Rural			**Urban**			**National**		
	Consumption Based		**Income Based**	**Consumption Based**		**Income Based**	**Consumption Based**		**Income Based**
Per capita income or consumption-based measures									
General poverty									
Headcount ratio	0.64	[0.42]	0.71	0.37	[0.29]	0.52	0.61	[0.40]	0.68
Poverty gap	0.27	0.38	0.13	0.23	0.26	0.36			
Poverty severity	0.15	0.26	0.06	0.14	0.15	0.24			
Extreme poverty									
Headcount ratio	0.52	[0.25]	0.60	0.20	[0.10]	0.37	0.48	[0.22]	0.56
Poverty gap	0.21	0.30	0.06	0.14	0.19	0.28	\		
Poverty severity	0.11	0.19	0.03	0.08	0.11	0.18			
Per adult equivalent income or consumption-based measures									
General poverty									
Headcount ratio	0.50	[0.42	0.61	0.27	[0.28]	0.42	0.48	[0.44]*	0.58
Poverty gap	0.20	[0.15]	0.31	0.08	[0.09]	0.17	0.19	[0.14]	0.28
Poverty severity	0.10	[0.08]	0.20	0.04	[0.04]	0.09	0.10	[0.07]	0.18
Extreme poverty									
Headcount ratio	0.36	[0.25]	0.47	0.10	[0.10]	0.23	0.33	[0.22]	0.45
Poverty gap	0.13	[0.08]	0.22	0.03	[0.02]	0.09	0.12	[0.07]	0.21
Poverty severity	0.06	[0.04]	0.14	0.01	[0.01]	0.05	0.07	[0.03]	0.13

Source: Authors' calculations based on Welfare Monitoring Survey 1994 (see Appendix for the method used)

* The 0.40 figure in the 1998 Government of Kenya report is adjusted to 0.44 in the 2000 version.

TABLE 2
DEFINITION OF VARIABLES USED IN THE ESTIMATED EQUATIONS

Variables	*Definition*	**Symbol in the Estimated Equation**	**Mean**	**Std dev.**
Dependent variable				
Poverty	P=1 if poor, 0 otherwise Poverty estimate based on consumption per adult equivalent	P0_CPAE in binomial logit model; PM_CPAE in ordered logit model		
Explanatory variables				
Sex	Sex = 1 if male, 0 female years	SEXD	0.75	0.43
Age and Age square	= 1 if yes and 0 otherwise	AGE &AGE2	43.11	14.3
Member can read and write		CANREWTE	0.64	0.48
Marital Status	=1 if married & Monogamy, 0 Otherwise	MARYMONO	0.69	0.46
	=1 if married & polygamy, 0 otherwise	MARYPOLY	0.10	0.30
Employment Sector	=1 if formal/public and 0 otherwise	EMPSECD	0.27	0.45
Main occupation of member	=1 if in Agriculture (Commercial farmer, subsistence farmer and pastoralists), 0 otherwise	OCCp	0.56	0.50
Highest level attained (three categories: Primary, Secondary and University)	=1 if in Primary (Standard 1-8 and KCPE) and 0 Otherwise.	PRIMARD	0.37	0.42
	=1 if in Secondary and certificate (Form 1-4, KCE/KCSE/KAC, Trade test cert I-III and Other Post Secondary cert) and 0 otherwise	SECONDD	0.23	0.48
	=1 if in University degree and 0 otherwise	UNIVDD	0.01	0.10
Area of Residence	= 1 if in Rural and 0 otherwise	URBRUR	0.84	0.36
Total holding of land	in acres	TOHOLNOW	3.98	0.31
Number of animals owned	livestock units	ANIMANOW	14.6	56.98

Provincial Dummies: AIN for Ainabkoi Sub County; KAP for Kapseret; KES for Kesses; MOIB for Moiben; SOY for Soy and TUR for Turbo Sub County

TABLE 3
BINOMIAL LOGIT ESTIMATES FOR CONSUMPTION PER ADULT EQUIVALENT MODEL: NATIONAL SAMPLE

Variables	Estimated Coefficients		Marginal Effects	
	β' s	Z-values	Dy/dx	Z-values
SEXD*	-0.139	-1.50	-0.033	-1.49
MARYMONO*	0.059	0.55	0.014	0.55
MARYPOLY*	-0.146	-1.02	-0.034	-1.04
OCCPD*	0.373	3.85*	0.088 3	3.94
EMPSECD*	0.004	0.04	0.001	0.04
PRIMARD*	-0.323	-3.93*	-0.076	-3.95*
SECONDD*	-1.062	-10.09* *	-0.230	-11.07*
UNIVDD*	-2.608	-4.65*	-0.350	-11.72*
HHSIZE *	0.213	13.66*	0.051	13.74*
ANIMANOW	-0.002	-1.01	0.000	-1.01
TOHOLNOW	-0.012	-2.44*	-0.003	-2.44*
URBRUR	0.130	0.92	0.031	0.92
AGE	0.035	2.69*	0.008	2.70*
AGE2	0.000	-2.02**	0.000	-2.02**
AIN*	-0.142	-0.44	-0.033	-0.44
KAP*	-0.093	-0.29	-0.022	-0.29
KES	0.413	1.24	0.101	1.23
MOIB*	0.270	0.82	0.065	0.81
SOY*	0.00	0.00	0.00	0.00
TUR*	-0.373	-1.14	0.086	-1.17
Constant	-2.335	-5.29*		
Ratio of Predicted to actual: 61%; Log Likelihood=-6357.1				

(*) dy/dx is for discrete change of dummy variable from 0 to 1
*, **, ^ significant at 1, 5 and 10 per cent level.

TABLE 4
BINOMIAL LOGIT ESTIMATES FOR CONSUMPTION PER ADULT EQUIVALENT MODEL BY REGION

	Rural				**Urban**			
Variable	**β**	**Estimated Coefficients Z-values**	**dy/dx**	**Marginal Effects Z-values**	**β**	**Estimated Coefficients Z-values**	**dy/dx**	**Marginal Effects Z-values**
SEXD*	-0.163	-1.72^	-0.037	-1.42	-0.080	-0.25	-0.120	-2.18**
MARYMONO*	0.127	1.14	0.047	1.53	-0.236	-0.75	-0.013	-0.25
MARYPOLY*	-0.170	-1.16	-0.028	-0.76	0.041	0.08	0.228	2.40*
OCCPD*	0.417	4.19*	0.198	7.72*	1.162	3.05*	0.249	3.20
EMPSECD*	0.138	1.24	0.048	1.58^	-0.389	-1.91**	0.012	0.28
PRIMARD*	-0.344	-4.02*	-0.068	-3.08*	-0.147	-0.47	-0.017	-0.24
SECONDD*	-1.071	-9.27*	-0.246	-9.78*	-0.989	-3.24*	-0.190	-2.84*
UNIVDD*	-2.951	-4.20*	-0.457	-8.93*	-2.344	-3.18*	-0.362	-8.03*
HHSIZE	0.218	13.55*	0.029	6.79*	0.230	5.06*	0.031	3.42*
ANIMANOW	-0.002	-0.97	-0.001	-4.67*	0.004	0.74	-0.001	-2.05**
TOHOLNOW	-0.010	-2.14**	0.000	0.08	-0.091	-1.85**	-0.009	-1.30
AGE	0.034	2.50*	-0.001	-0.41	0.165	3.18*	0.002	-0.22
AGE2	0.000 -	1.63^	0.000	0.15	-0.002	-3.29*	0.000	-0.20
AIN*	0.377	1.32	0.013	-0.20	-0.385	-1.16	0.047	0.61
KAP*	0.269	1.16	-0.043	-0.82	0.257	0.69	0.046	0.76
KES*	* 0.810	2.95*	0.042	0.69	0.673	1.25	0.220	2.76*
MOIB*	0.684	2.67*	0.029	0.51	-0.169	-0.33	-0.033	-0.49
SOY*	0.398	1.52	-0.012	-0.21	0.296	0.66	0.000	-0.01
TUR*	0.006	0.02	-0.061	-1.09	0.079	0.079	0.20	0.09
Constant *	2.763 -	6.89*			-4.563	-3.64*		

(*) dy/dx is for discrete change of dummy variable
*, **, ^ significant at 1, 5 and 10 per cent level
Rural: Number of observations 9063, Log likelihood -5488.25
Urban: Number of observations 1645; Log likelihood -828.767

TABLE 5
ORDERED LOGIT ESTIMATES USING CONSUMPTION PER ADULT EQUIVALENT: NATIONAL SAMPLE

		The Model		**Probability of being Non-poor**		**Probability of being moderately poor**
Variable	**β**	**Estimated Coefficients Z-values**	**dy/dx**	**Marginal Effects Z-values**	**Estimated Coefficients dy/dx**	**Marginal Effects Z-values**
SEXD*	-0.104	-1.20	0.025	1.20	-0.006	-1.22
MARYMONO*	0.060	0.60	-0.014	-0.60	0.004	0.59
MARYPOLY*	-0.121	-0.91	0.029	0.92	-0.007	--0.88
OCCPD*	0.315	3.33*	-0.075	-3.40*	0.019	3.31*
EMPSECD*	-0.020	-0.20	-0.020	0.20 -	-0.001	-0.20
PRIMARD*	-0.430	-5.54*	0.101	5.58*	-0.026	-5.23*
SECONDD*	-1.149	-11.22*	0.248 *	-12.29*	-0.075	-10.00*
UNIVDD*	-2.642	-4.81*	0.356	13.80*	-0.139	--10.14*
HHSIZE	0.199	14.82*	-0.048*	-14.91*	0.012	11.03*
ANIMANOW	-0.002	-0.97	0.000	-0.97	0.000	-0.96
TOHOLNOW	-0.011	-2.55*	-0.003	2.55*	-0.001	-2.51*
URBRU	0.291	2.19**	-0.069	-2.19**	0.017	2.17**
AGE	0.041	3.25* -	-0.010	-3.26*	-0.010	3.19*
AGE2	0.000	-2.76*	0.000	2.77*	0.000	-2.73*
AIN*	-0.166	--0.56	0.039	0.56	-0.010	0.54
KAP*	-0.092	-0.31	0.022	0.31	-0.006	-0.31
KES*	0.375	1.23 -	0.092	-1.22	0.019	1.53
MOIB*	0.289	0.95	0.070	-0.94	0.016	1.07
SOY*	-0.029	-0.10	0.007	0.10	-0.002	-0.10
TUR*	-0.401	-1.32	0.093	1.36	-0.026	-1.25
-CUT 1	2.379	0.425				
-CUT 2	3.140	0.422				
Constant *						

No. of Observations 10708
Log Likelihood=-9426.21

(*) dy/dx is for discrete change of dummy variable from 0 to 1
*, **, ^ significant at 1, 5 and 10 per cent level