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Analysis of poverty and its covariates among smallholder farmers in the Eastern Hararghe highlands of Ethiopia

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This paper analyses the extent and determinants of rural household poverty in the eastern highlands of Ethiopia. The study examines 216 households using a household consumption expenditure approach. The study was particularly interested in the effects of location-specific and institutional factors (networks) in determining the probability of being poor. The findings suggest that poverty is location-specific, depends on access to irrigated land (not land per se) and access to non-farm income. Results also indicate that household wellbeing is negatively affected by household size, and positively affected by age of household head. Involvement in governance, social and production related networks are also found to be strongly associated with the probability of a household being poor.

Key words: Rural poverty, ordered probit, institutional factors, Eastern Hararghe, Ethiopia.

INTRODUCTION

Ethiopia is undoubtedly among the poorest nations in the World. The most recent World Development Report 2007 calculated a per capita income of US\$ 160 (World Bank, 2007), and in the Human Development Index (HDI), Ethiopia has been ranked 170th out of 177 nations with HDI value of 0.371 (UNDP, 2006). Poverty has persisted even during the comparatively stable political period since the downfall of the so-called derg regime in 1991. While, on an aggregate scale, poverty seems to persist at debilitating levels, this does not say much about the location specific extent and determinants of poverty. Several questions become important here: The intensity of poverty, its *dynamics* over time (Sahn and Stifel, 2000; Bigsten et al., 2003; Dercon, 2006), including the question of chronic poverty (Barrett et al., 2006; Hulme and Shepherd, 2003) and poverty traps (Barrett and Swallow, 2006), and the different demographic, socio-economic and institutional factors that explain the incidence of poverty.

A number of studies have sought to examine the extent of poverty in rural Ethiopia. The government's 2004/05 Household Income and Consumption Expenditure Survey is the most extensive survey available on the extent of

poverty. It indicates that the incidence of poverty is higher in rural compared to urban areas with the poverty head count ratio being 39.3 and 35.1%, respectively. The survey also revealed that national poverty incidence has declined by 12% as compared to the 1999/2000 level (MoFED, 2006). Dercon and Krishnan (1998) have assessed changes in poverty level between 1989 and 1995 and tested the robustness of measured changes to the problems of the choice of poverty lines and impact of uncertainty in measured inflation rates. They found that poverty declined between 1989 and 1994, but remained unchanged between 1994 and 1995. Dercon (2006) confirms the fall in poverty over the same period and shows an increase in consumption levels. He identifies relative price changes, affecting returns on labor, land, human capital and location, as main driving factor in income levels.

Bigsten et al. (2003), Sharp and Devereux (2004), Dercon et al. (2005) and Little et al. (2006) study the dynamics of poverty and consumption levels and emphasize the role of shocks in influencing fluctuations in consumption levels over relatively short periods of time. Dercon et al. (2005) studied consumption levels in 15

Ethiopian villages in the period of 1999 to 2004 and found that virtually all households experienced adverse effects of shocks, among which they enumerate drought and illness as most important. The former reduced consumption levels in the sample by 20% and the latter by 9%. Policy shocks, such as risk of land distribution or arbitrary taxation were found to be less significant, a change compared to earlier studies conducted (Dercon, 2001). Investigating poverty dynamics in South Wollo between 1997 and 2003 (including the 1999/2000 drought), Little et al. (2006) found that the incidence of poverty in their survey area changed a little, but the very poorest improved their welfare a lot, though not sufficiently to escape poverty.

Researches on factors that affect incidence of rural poverty in Ethiopia have indicated that entitlement failures are key in explaining low consumption levels (Bevan and Joireman, 1997; Webb et al., 1992; Webb and von Braun., 1994; Bigsten et al., 2003). Bogale et al. (2005) found that cultivated land per adult equivalent, geographical location, education and oxen ownership to be important determinants of rural poverty. Bevan and Joireman (1997) emphasize the important role of non-economic forms of capital, such as social and human capital as well as entitlement rules, such as access rights to productive resources, political voice, inheritance rules and access to community support in determining household poverty. Sharp and Devereux (2004) found that destitute households in Wollo region of Ethiopia face constrained access to land, labor, livestock, social networks and transfers. Dercon and Krishnan's (1998) survey results indicated that households with better human and social capital as well as better access to roads and towns have both, lower poverty levels, are more likely to improve their poverty status over time and are less prone to seasonal fluctuations in welfare.

Education was also found to be a central factor: Weir and Knight (2004) found significant externality benefits of schooling in lifting up agricultural productivity, but they did not compare this with household consumption levels.

Devereux and Sharp (2006) question the validity of some of the above findings on the basis of the methodological foundations of the data up on which poverty trends and determinants are derived and the conceptual understanding of poverty itself. Moreover, they argue that the use of uniform national poverty line used to define the poor and the non-poor may camouflage the significant regional variations one can observe within the nation. Location specific, methodologically comparable and disaggregated studies need to complement findings from large-scale panel data employed in the government's Household Income and Expenditure Survey (MoFED, 2006) and the panel data collected by Addis Ababa University (Bigsten et al., 2003).

This paper provides a disaggregated household survey and studies household and community level covariates that affect the probability of a rural household to be poor (on various levels of poverty or deprivation) at a particular

time. The study is based on a survey of 216 households in three districts in the Eastern Hararghe highland using the Eastern Hararghe highlands of Ethiopia using a household expenditure approach. Eastern Hararghe highlands are characterized by more intensive, but small-scale farmland holdings producing largely for the market with cash crops, for example, khat, constituting an important part in the landscape. These characteristics differ from the Tigray and Wollo regions where much more research on poverty and exclusion has been conducted and where extreme poverty, recurrent famine and drought related problems are more persistent than in our study region. The results therefore, provide an important complementary insight to the research discussed previously.

DATA

The analysis of poverty in this paper is based on a household survey conducted in three districts in Eastern Ethiopia in the period of 2003/2004. The three districts, namely Babile, Kersa and Kombolcha were selected purposively to capture agro-ecological, economic and social diversities within the Eastern Hararghe highlands. That was followed by two-stage random sampling procedure. In the first stage four, two and three peasant associations (PAs) were selected randomly from a list of PAs in the district of Babile, Kersa and Kombolcha, respectively. In the second stage, sample households were randomly drawn from a complete list of respective PA members in conformity with the proportionate to size random sampling procedure. In total, the survey covered 216 households. Generally being located in different districts, the sample households display interesting regional variation even within the region.

Analysis of household poverty

The analysis here is based on the expenditure dataset of the sample households. Household expenditure is considered as an adequate measure of household welfare in developing countries as it is better able to capture household's consumption capabilities (Grootaert, 1986). Accordingly, a household is considered as poor when household expenditure is insufficient to meet the food and other basic needs of all household members. To make the assessment, a basket of goods and services corresponding with local consumption patterns and satisfying a pre-set level of basic needs for one person is constructed and valued at local consumer prices to compute its minimum cost. The value of this basket is called the "poverty line", and is most appropriate if expressed in per-adult equivalent terms (Lipton and Ravallion, 1995). Even though the data requirements of this method are considerable, and very comprehensive questionnaires are needed to collect it, it remains to be a widely accepted measure of poverty as far as its economic dimension is concerned. In this study too, household expenditure on basic needs, including those on food, clothing, housing, education and medical care-estimated to be ETB 1468.00 per adult per annum was used as poverty line.

In this study, the Foster, Greer and Thorbecke (FGT) (Foster et al., 1984) class of poverty index was followed to scrutinize the extent of poverty at the household level. Let begin with some notations. Define a vector of a suitable measure of living standards Y (household calorie intake per capita, or expenditure) in increasing order, $Y_1, Y_2, Y_3, \dots, Y_n$, where n represents the number of households under consideration. The General Foster, Greer and

Table 1. Poverty and inequality by district.

District	Head count ratio FGT(0)	Poverty gap FGT(1)	Severity of poverty FGT(2)	Gini coefficient	
				Expenditure per adult equivalent	Income per adult equivalent
Babile	0.523	0.163	0.072	0.28	0.26
Kersa	0.175	0.029	0.009	0.18	0.23
Kombolcha	0.301	0.056	0.017	0.19	0.28
Overall sample	0.356	0.091	0.036	0.23	0.29

Thorbecke (FGT) poverty index (P_α) can be expressed as:

$$P_\alpha(x; z) = \frac{1}{n} \sum_{i=1}^q (g_i / z)^\alpha \quad (1)$$

where x represents income; z is the poverty line; q is the number of the poor; g_i is shortfall in chosen indicator of standard of living, say expenditure per capita shortfall of the i -th household. That is, let x_i denote the per capita expenditure of household i , then $g_i = z - x_i$ if $x_i < z$; $g_i = 0$ if $x_i \geq z$. α represents poverty aversion parameter (measure with larger α are more sensitive to the poorest of the poor. For $\alpha = 0$, P_α will be equal to the poverty headcount ratio; for $\alpha = 1$, P_α will be equal to the normalized poverty gap and for $\alpha = 2$, P_α will be equal to the squared normalized poverty gap ratio.

Based on the poverty line estimated earlier, the analysis undertaken for the whole sample households yields a poverty head count ratio of 0.356, that is, 35.6% of the total population spends less than what they would need to meet minimum living standard requirements. By decomposing across districts, we observe a differentiated picture of the distribution of poverty. Table 1 depicts that a high proportion (52.3%) of the population in Babile district live below the poverty line followed by Kombolcha district with head count ratio of 0.301. The results with respect to the depth of poverty and severity of poverty also show that both the depth and severity of poverty seem to be highest in districts with highest incidence of poverty. One can observe that not only is the incidence of poverty in Babile district the highest, almost three times that of Kersa and two times that of Kombolcha, but also poverty in Babile is found to be deeper and more severe.

Covariates of rural poverty

While economic theory provides a well-developed framework for studying earnings and income, no similar and uniform theory exists that could guide in the more complicated case of poverty analysis (Bigsten et al., 2003; Barrett and Swallow 2006; Glauben et al., 2006; Dercon, 2006). In principle, a whole variety of factors could be considered as important determinants of lifetime poverty, among those are: age, human capital (formal or informal education), sex of household head, household size, and resource endowment. Table 2 presents code, definitions and descriptive statistics of variables considered in this study.

A particular interest in our study is the role of active membership in or effective access to (the benefits of) various types of local level organizations and networks, often referred to as “social capital” (Putnam, 1993; Woolcock and Narayam, 2000; Donnelly-Roark et al., 2001; Grootaert and Van Basteler, 2002), as a covariate to household poverty. The study defined “active membership” as having a decision making power and regularly contributing to social obligations defined by an organisational structure (for example,

payments, attending meetings, participation in elections, number of days participated in food for work of employment generation schemes). Of course, this is only a proxy of the real decision making power an individual disposes off in a specific organisational structure that is also influenced by informal power plays.

The study has differentiated local-level organisations and networks into three types, namely (a) governance and administrative networks (GALLI), for example, involvement in peasant organizations, (b) social and religious (SRLLI) and (c) natural resource and productive networks and organizations (NPLLI), for example, involvement in networks of labour exchange). GALLI mainly refers to the formal and informal local governmental set-up of peasant associations (*kebeles*) with their council, executive council and tribunal. Furthermore, the regional government of Oromiya has recently introduced a set of quasi-governmental organisations below the *kebele* level, for example, the *gott*, which is considered a voluntary association of farmers encompassing between sixty to ninety households. *Gott* can be further sub-divided into *garee* or *misoma*. In addition, there are traditional institutions, such as the village leader (*aba genda*) and council of elders (*jarsota*), who mediate in minor social conflicts. SRLLI encompasses mainly informal institutions and organisations, mostly linked with Islam, that offer mutual aid and religious dealings, as well as those religious organisations dealing with education and health. These include, among others, *sedeka* and the *imam*. Secondly, it takes account of voluntary associations, such as *afosha* (burial societies), *uqqubii* (mutual assistance, savings) as well as *iddirii* or *mandar*. NPLLI comprises formal and informal institutions dealing with the productive affairs of the community and includes customary organisations and practices of labour exchange (*guza*, *maro*, *garre*, *uqqubi*), herding groups among agro-pastoralists as well as NGO driven organisations and practices for soil and water conservation, including food-for work programmes. We anticipate that very poor, poor and non-poor will have differential access to and will participate differently in each of these forms of organisations and networks.

The empirical model

Three crucial methodological issues are involved in the analysis of poverty: The first one relates to the problem of determining an appropriate poverty line and thus identifying those who are classified as poor, the second one relates to the problem of constructing a suitable overall index of poverty, and the third one relates to identification of the proper econometric model to analyse the correlates of poverty. The standard tools for assessing the correlates of poverty are multivariate consumption expenditure regressions (World Bank, 2000). These regressions can also estimate the partial correlation coefficients between consumption expenditure per adult equivalent and the included explanatory variables.

An alternative to exploring the correlates of poverty by using per adult equivalent consumption expenditure as the endogenous

Table 2. Variable definition and their descriptive statistics.

Variable	Description	Mean	Std. Dev.	Min.	Max.
Dependent variable					
POVCAT	Four poverty categories: Extremely poor (ODRPOV = 0); moderately poor (ORDPOV = 1); slightly non poor (ORDPOV =2) and non poor (ORDPOV = 3).				
Explanatory variable					
SEX	Dummy: 1 if the household head is male, 0 otherwise	0.875	0.331	0	1
AGE	Age of the household (years)	38.87	10.641	21	85
AGESQ	Age of the household squared	1623.6	1001.32	441	7225
HHAЕ	Number of household members in adult equivalent (AE)	5.029	1.704	1	11.4
DEP	Age dependency ratio	1.478	0.896	0	4.0
EDUC	Year of schooling of the household head	1.185	1.213	0	4
TLHPAE	Land owned by the household per adult equivalent (ha)	0.206	0.131	0.03	0.91
TLU	Total livestock owned by the household in tropical livestock unit (TLU)	3.56	2.666	0	16.5
NONFARM	Total non farm income of the household	248.39	514.23	0	4800
IRRLANDP	Proportion of irrigated land owned	0.143	0.210	0	0.83
GALLI	Participation and active membership in governance and administrative institutions	0.514	0.501	0	1
SRLLI	Participation and active membership in social and religious institutions	0.815	0.389	0	1
NPLLI	Participation and active membership in natural resource and productive institutions	0.532	0.500	0	1
DW1	Dummy: 1 if the household lives in Babile district; 0 otherwise	0.398	0.491	0	1
DW2	Dummy: 1 if the household lives in Kersa district; 0 otherwise	0.264	0.442	0	1
DW3	Dummy: 1 if the household lives in Kombolcha district; 0 otherwise	0.338	0.474	0	1

variable is to perform categorical data analysis such as Probit, Logit or Tobit. Such response models are often used when a dependent variable takes one of a number of discrete values and simulations can conveniently demonstrate how much the likelihood of being poor is reduced if an exogenous variable such land ownership were to change (Bogale et al., 2005). These models estimate the probabilities of being poor using maximum likelihood estimation (MLE) while accounting for the discrete nature of the dependent variable (Greene, 2002). Binary response models (e.g. probit, logit) are used where poverty is considered as a “yes” or “no” decision. However, in this study, we do not only consider whether a household is poor or not, but also the intensity or depth of poverty. Therefore, the model needs to consider more than two possible responses. Similar approach has been followed by Alemayehu et al. (2001). They focus attention on the hard-core poor, moderately poor and non-poor categories to employ an ordered logit model. This approach is justifiable, because it explicitly makes the ordering of the population sub-samples, using the poverty lines as cut-off points in a cumulative distribution of expenditure. Whenever poverty

categories have a natural order, the ordered probit is the appropriate model to be employed in the estimation of relevant probabilities (Greene, 2002). Ordered response models recognize the indexed nature of various response variables. Underlying the indexing in such models is a latent but continuous descriptor of the response. In the ordered probit model, the random error associated with this continuous descriptor is assumed to follow a normal distribution.

The ordered probit model differs from a univariate probit one in that the dependent variable is no longer a dummy variable, but an ordered variable taking values 0, 1, 2, 3 according to the level of poverty the household is encountered with. As in a univariate probit model, the model is built around a latent regression variable. An ordered probit model allows for multiple ordered values for the dependent variable and analyzes the effect of each independent variable on the dependent variable. It measures the probability that this dependent variable (Y_i , for the i -th household) falls in one of the discrete categories conditioned on levels of the independent variables (X_i). Suppose the level of poverty of the sample

household i (Y_i^*) is the unobserved variable (latent variable) and Y_i^* is expressed in the following equation:

$$y_i^* = \beta_0 + \sum_{j=1}^k \beta_j x_{ji} + u_i \quad (2)$$

where x_{ji} are the aforementioned explanatory variables; u_i are the residuals or error term and the β and μ_i are parameters to be estimated (Greene, 2002).

The study assumes that u_i is normally distributed across observations. As mentioned previously, Y_i^* is unobserved and we can only observe whether the household under consideration falls in category "0," "1," "2," or "3". So, what was observed is the following actual placement in the discrete category:

$Y_i = 0$ if $Y_i^* < \mu_1$ (extremely poor)
 $Y_i = 1$ if $\mu_1 \leq Y_i^* < \mu_2$ (moderately poor)
 $Y_i = 2$ if $\mu_2 \leq Y_i^* < \mu_3$ (slightly non poor)
 $Y_i = 3$ if $\mu_3 \leq Y_i^*$ (non poor)

In this model, Y (the dependent variable) represents the intensity of poverty experienced by a household. Here intensity of poverty is defined according to the following four categories:

0 = Extremely poor; PCAE expenditure less than Br. 1102
 1 = Moderately poor; PCAE expenditure lies between Br. 1103 to 1468
 2 = Slightly non poor; PCAE expenditure between Br. 1469 to 1835
 3 = Non-poor; PCAE expenditure more than Br. 1835.

Coefficients of the ordered probit model (β) give an indication of positive or negative impact of an independent variable on the probability of being poor, but do not relay information concerning the magnitude of the effect. Using a transformation function, the model creates a linear index of the probabilities with a cumulative standard normal distribution. Given the classification, the study derives the probabilities of being poor of different degrees as follows:

$$\begin{aligned} \Pr(Y_i = 0) &= \Pr(Y_i^* < \mu_1) = \Phi(\mu_1 - \beta'X_i) \\ \Pr(Y_i = 1) &= \Pr(\mu_1 \leq Y_i^* < \mu_2) = \Phi(\mu_2 - \beta'X_i) - \Phi(\mu_1 - \beta'X_i) \\ \Pr(Y_i = 2) &= \Pr(\mu_2 \leq Y_i^* < \mu_3) = \Phi(\mu_3 - \beta'X_i) - \Phi(\mu_2 - \beta'X_i) \\ \Pr(Y_i = 3) &= \Pr(\mu_3 \leq Y_i^*) = 1 - \Phi(\mu_3 - \beta'X_i) \end{aligned}$$

where μ_i represent the threshold or cut-off parameters for placement of Y_i^* in the discrete poverty categories, and $\Phi(\)$ is the standard normal cumulative distribution function such that the sum total of the aforementioned probabilities is equal to one.

The study maximizes the log-likelihood function to obtain the estimates of μ 's and β 's employing LIMDEP statistical software. Marginal effects are calculated using the linear probability index. They tell the effect on the probability of being poor in a particular category for changes in the independent variables ($\partial \Pr(Y = 0, 1, 2, \text{ and } 3) / \partial X_i$). The marginal effect is the percentage change on the probability associated with a unit change in the explanatory variable. The marginal effect for each variable is calculated at the mean values of the independent variables. In this context, it is possible to assess the probability of being poor for given factors, and comparisons can then be made across characteristics.

EMPIRICAL RESULTS AND DISCUSSION

The use of an ordered probit model enabled the study to

look at how particular variables affect the extent of household poverty. The results of the ordered probit estimation presented in Table 3 depict that the signs of most of the estimated parameters conform to the expectations with the exception of TLHPAE and TLU. But both were statistically insignificant ($P > 0.10$). The likelihood ratio test for the goodness of fit shows a good fit for the model ($P < 0.001$).

In general, nine of the fifteen variables were found to be statistically significant in the ordered probit model at less than 10% probability level. Among the nine statistically significant explanatory variables, we found age of household head, non farm income, proportion of irrigated land owned, active participation in productive and social local level institutions and residence in Kersa and Kombolcha districts to be positively related to household well-being. Whereas size of household in adult equivalent and active membership of natural resource related local level institutions are covariates that are negatively correlated with the probability of being non-poor. Given that the dependent variable of the regression, ORDPOV, is an ordered variable, the marginal effects of the explanatory variables have been computed for the four categories of poverty which, to some extent, would reflect the effect of a unit change in any explanatory variable on the probability of a household of being extremely poor (ORDPOV = 0), moderately poor (ORDPOV = 1), slightly non poor (ORDPOV = 2), and non poor (ORDPOV = 3). Table 4 shows the estimates of marginal effects of the variables, which allow further assessment of the estimate with respect to each poverty category. These marginal effect figures further strengthen the inferences obtained from the parameter estimates in the ordered probit model. In particular, the study focuses on the marginal effects which are statistically significant in determining household poverty status, namely age of the household head, size of household in adult equivalent, non farm income, active membership in local level networks and organizations and the location.

Age (to a limit) is expected to be associated with skills enhancement (experience), accumulation of resources, extensive social capital and others that ought to contribute positively to well-being (Bashaasha et al., 2006). The results seem also to confirm this statement. Age of household head is found to be positive and statistically significant ($p < 0.10$), implying that among the sample households, older households have greater likelihood of being non poor. More specifically, an increase in age of household head by one year would increase the probability of being slightly non poor and non poor by 0.11 and 1.64%, respectively, where as it lowers the likelihood that a household will fall under category extremely poor and moderately poor by 0.66 and 1.09%, respectively. Family size reflects the number of units among which household resources need to be allocated according to the weights of each unit. Family size may have an ambiguous role in poverty status of

Table 3. Parameter estimates of ordered probit model.

	Coefficient	Std. Error	P-value
Constant	2.128	1.125	0.079
Sex of household head	0.1153	0.2530	0.649
Age of the household (years)	0.0489	0.0264	0.064
Age of household head squared	-0.0005	0.0003	0.132
Members of household (AE)	-0.2318	0.0630	0.000
Dependency ratio	-0.0242	0.1035	0.816
Schooling of household head (year)	-0.0053	0.0772	0.945
Total land holding per AE	-0.0814	0.7754	0.916
Livestock owned in TLU	-0.0288	0.0345	0.404
Total non-farm income	0.0004	0.0002	0.052
Proportion of irrigated land	1.2032	0.5874	0.041
Participation and membership in government and administration institutions	0.7119	0.1773	0.000
Participation and membership in social and religious institutions	1.0910	0.2351	0.000
Participation and membership in natural resource and production institutions	-0.5850	0.1750	0.001
Household lives in Kersa district	0.6369	0.2473	0.010
Household lives in Kombolcha district	0.5222	0.2484	0.036
Mu(2)	1.0047	0.1536	0.000
Mu(3)	2.0591	0.1962	0.000
Log-likelihood		-219.26	
Restricted log-likelihood		-288.79	
Chi-squared		139.06	

Mu(0) is normalized to 0 by LIMDEP statistical software.

rural households depending on the relative strength of size economies in consumption as against the diminishing return to scale. The study results also depict that increase in household size by one adult equivalent would increase the probability of being extremely poor and moderately poor by 3.13 and 5.16%, respectively, where as it lowers the likelihood that a household will fall under category slightly non-poor and non-poor by 0.49 and 7.79%, respectively.

Access to a non-farm source of income is also an important determinant of wellbeing in Eastern Ethiopia. For a given level of other regressors, the probability of being slightly non-poor and non-poor increases by 0.01 and 0.01, respectively. Non-agricultural activities complement agricultural sources of income by availing the household additional resources for both consumption and investment. Investment in turn enhances asset accumulation and opens up additional escape routes out of poverty. Whereas much of non-agricultural sources of income have to do with education, opportunities exist to design strategies to stimulate low and semi-skilled types of non-farm employment opportunities in the rural areas as escape routes out of poverty. Access to irrigated land is essential for household welfare: The coefficient “proportion of land under irrigation” is statistically significant in

determining the probability of being non-poor. The marginal effects indicate that a household with better access to irrigation is 40.43% more likely to be non-poor.

Results of the ordered probit model indicate that better off households are more likely to participate in social and religious (SRLLI) and governance and administration (GALLI) networks and organizations, where as the poorer are active with natural resource and production related networks and organizations (NPLLI). This result finds its explanation from the fact that natural resource related local level networks are largely supported by NGOs and also coordinated by the district bureau of agriculture so that rural households can participate in conservation practices such as building and maintaining terraces, planting trees and construction of feeder roads in return for food items through food for work programs. In this sense, participating in the latter offers immediate benefits in the form of food for poor households, but not necessarily social assets upon which further networks of social and economic benefits for the future could be built. This finding indicates that poor households are significantly underrepresented in governance networks as well as social networks. These networks are dominated by non-poor households.

Two district dummies for the three districts accounted

Table 4. Marginal effects of explanatory variables.

Variable	ORDPOV = 0	ORDPOV = 1	ORDPOV = 2	ORDPOV = 3
Sex of household head	-0.0155	-0.0257	0.0025	0.0387
Age of the household (years)	-0.0066	-0.0109	0.0011	0.0164
Age of household head squared	0.0001	0.0001	0.0000	-0.0002
Members of household (AE)	0.0312	0.0516	-0.0049	-0.0779
Dependency ratio	0.0033	0.0054	-0.0005	-0.0082
Schooling of household head (year)	0.0007	0.0012	-0.0001	-0.0018
Total land holding per AE	0.0110	0.0181	-0.0017	-0.0274
Livestock owned in TLU	0.0039	0.0064	-0.0006	-0.0097
Total non-farm income	-0.0001	-0.0001	0.0001	0.0001
Proportion of irrigated land	-0.1622	-0.2679	0.0258	0.4043
Participation and membership in government and administration Institutions	-0.096	-0.1585	0.0153	0.2392
Participation and membership in social and religious institutions	-0.1470	-0.2430	0.0234	0.3666
Participation and membership in natural resource and production institutions	0.0788	0.1303	-0.0125	-0.1966
Household lives in Kersa district	-0.0858	-0.1418	0.0136	0.2140
Household lives in Kombolcha dist.	-0.0704	-0.1163	0.0112	0.1755

for location-specific, district-level variations in the provision of public services, market opportunities and vulnerability to ecological uncertainties across the study districts. The probability of being non-poor was 21.40% for a rural household living in Kersa district, but only 17.55% in Kombolcha district.

Conclusions

This paper has studied extent of and the determinants of poverty in three districts in rural areas of Eastern Ethiopia. The methodology used in this study confines to the analysis of relevant variables that make it more or less probable for a household to be poor. What we cannot assess through this methodology is the temporal aspect of welfare and vulnerability, that is, the dynamics of poverty. However, a number of studies (Dercon et al., 2005; Little et al., 2006) have indicated the persistence of poverty in rural Ethiopia and the study complements these insights by looking into the factors that explain household poverty.

The study points out, among others, to three main reasons that explain the extent and variation in poverty levels across households studied: (1) Poverty is location-specific as the stark variation between Babile and the other two districts has shown. This indicates how endowments with market access and relatively better agro-ecological conditions are essential factors in increasing household welfare, something where outside intervention can only partly help improve the situation. (2) Access to

irrigated land (not land per se) and non-farm income are strongly correlated with lower probabilities of being poor.

(3) Involvement in networks is a strong predictor of the probability of being poor, and the study identified a clear differentiation in the types of networks that matter. Whereas poor households tend to participate in externally driven natural resource management networks, often induced through food for work incentives, the networks that really impact upon poverty levels are governance and social networks. It appears that active membership in the latter two is strongly correlated with a lower probability of being poor. This indicates that poor households face some kind of exclusion from those networks, possibly because others intentionally exclude them or because they cannot afford to participate and contribute to those networks.

This study also identifies spaces of entitlement failure that increase the probability of a household to be poor.

These spaces encompass location (its agro-ecological endowments and its access to markets and non-farm income), social and governance networks (those networks where the poor are largely not a part of) and household composition. This conforms to findings of Bogale et al. (2005), Sharp and Devereux (2004) and Bevan and Joireman (1997). The latter have argued that non-economic forms of assets, such as social assets and human assets are extremely important determinants in household welfare; Sharp and Devereux (2004) also mention (lack of) access to social network as important determinant of destitution. Not all of these entitlement failures can easily be addressed by external interventions.

However, the exclusion of the poor from important governance networks could be politically mediated if the Ethiopian state and ruling regime were eagerly committed to doing so.

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