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CHRONIC POVERTY, TRANSIENT POVERTY, AND VULNERABILITY IN RURAL ETHIOPIA

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Chronic Poverty, Transient Poverty, and Vulnerability in Rural Ethiopia

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Declaration

I, Lemi Taye, declare that this thesis titled, "Chronic Poverty, Transient Poverty and Vulnerability in Rural Ethiopia" and the work presented in it are my own. I confirm that:

- This work was done wholly or mainly while in candidature for a masters degree at this University.
- Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated.
- Where I have consulted the published work of others, this is always clearly attributed.
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Abstract

This study analyzes the nature of poverty—chronic versus transient—and household vulnerability to poverty in rural Ethiopia using panel data from the Ethiopia Socioeconomic Survey (ESS). Much of the poverty observed in the sample is transient in nature, and the proportion of persistently poor households among the chronically poor is relatively low. Quantile regression is used to see whether the same set of variables determine chronic and transient poverty. The results suggest that processes that generate the two types of poverty are different; while household characteristics such as size of land owned, value of crops, and number of livestock were significant in determining chronic poverty, they do not affect transient poverty. This implies that measures applied to deal with chronic poverty may not have an impact on transient poverty and vice versa. The analysis of vulnerability to poverty is important to design appropriate forward-looking antipoverty interventions. This study measures vulnerability as the probability that a household's level of consumption falls below the poverty line in the future. Vulnerability is found to be higher among the poor and exhibited an inverse correlation with a household's ownership of assets. Moreover, vulnerability is more widespread than poverty. The probability of being vulnerable was higher for households who have faced agricultural shocks and are endowed with less human and physical capital. Focusing on reducing risk and its consequences, through safety nets, credit and insurance schemes, in addition to raising the average level of well-being, is important to minimize vulnerability.

Keywords: Ethiopia, chronic poverty, transient poverty, vulnerability

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Chapter 1

Introduction

1.1 Background of the Study

The World Bank (2000) defines poverty as a "pronounced deprivation in wellbeing." Wellbeing is conventionally associated with command over commodities and the poor, according to this definition, are those who do not have adequate income or cannot consume enough to surpass some social definition of basic needs (Haughton & Khandker, 2009; Seff & Jolliffe, 2016). This conventional view sees poverty largely in monetary terms as a lack of income, expenditure or consumption. Money-metric approaches that measure these deficiencies are commonly used by economists for quantitative analysis. These approaches permit precise measurement and comparisons over time and between regions (Hulme, Moore, & Shepherd, 2001). The broadest approach to wellbeing is the one articulated by Sen (1987), who argued that personal wellbeing is mainly assessed by "capability to function, i.e., what a person can do or can be". In this perspective, poverty is seen as the deprivation of basic capabilities rather than merely as lowness of incomes (Sen, 1999). Critics of the money-metric method have argued that broader definitions, such as Sen's capabilities approach, provide a better understanding of poverty. However, money-metric measurement is relatively simple and straightforward, and can be linked up easily with other methods of analysis in development economics (Bigsten, Kebede, Shimeles, & Taddesse, 2005).

Understanding the nature of poverty, its persistence, and in particular, the chance of moving out of poverty is a key to derive appropriate policies targeted to reduce it (Glauben, Herzfeld, Rozelle, & Wang, 2012). Poverty needs to be seen from a dynamic point of view if poverty analysis has to aid policymaking and evaluate the effect of certain shocks on poverty. According to Krishna (2016), investigating poverty dynamics is necessary for serving at least the following four objectives: estimating the risk of impoverishment and the probability of escaping poverty; identifying the reasons associated, respectively, with poverty descents and escapes; distinguishing between transient and chronic poverty; and examining the social mobility prospects of individuals in different economic situations. In particular, distinguishing households that are poor occasionally from those that are poor all the time is of practical importance, because the types of intervention relevant for dealing with persistent and transient poverty are likely to be different.

Poverty is an *ex-post* indicator of wellbeing. To analyze appropriate forward-looking antipoverty interventions, however, it may be preferable to assess the *ex-ante* possibilities that a household will be poor in the future, i.e., vulnerability to poverty (Chaudhuri, Jalan, & Suryahadi, 2002; Ward, 2016). Vulnerability is defined as the risk a household will fall into poverty in the future (Pritchett, Shryahadi, & Sumarto, 2000). It measures or describes the exposure to poverty rather than the poverty out-

come itself (Dercon, 2001). Vulnerability is an important aspect of households' experience of poverty. Many households, while not currently in poverty, recognize that they are vulnerable to events—a bad harvest, a lost job, an illness, an unexpected expense, an economic downturn—that could easily push them into poverty. The measurement of vulnerability is particularly important for monitoring the wellbeing of the poor and also for the design of poverty alleviation policies (Duclos, 2002).

Although Ethiopia has registered robust economic growth in recent decades, poverty is still pervasive in rural Ethiopia (Abro, Alemu, & Hanjra, 2014; Bogale, Hagedorn, & Korf, 2005). According to the 2015/16 Household Income and Consumption Expenditure (HICE) survey, the incidence of poverty was markedly higher in rural than in urban areas with poverty headcount ratio of 25.6% and 14.8%, respectively. Moreover, the rural poverty severity index (3.1%) was found to be considerably higher than that of urban areas (1.4%) (National Planning Commission [NPC], 2017). Looking at trends, although poverty has shown a substantial decline over the five year period of 2010/11-2015/16 in both urban and rural areas, the decline in urban poverty indices were particularly much higher than rural poverty. While the incidence and severity of poverty declined in urban areas by 42% and 47%, respectively, the same indices for rural areas declined only by 16% and 3%, respectively (NPC, 2017). This reveals, notwithstanding the progress made in poverty reduction, poverty in Ethiopia is still a predominantly rural phenomenon.

1.2 Statement of the Problem

Ethiopia has made some progress in poverty reduction in recent years. The estimated percentage of the population living below the national poverty line decreased to less than 25% in 2016 from 44% in 2000 (NPC, 2017). Leaving aside the controversy on positive developments of poverty reduction (Devereux & Sharp, 2003), poverty headcount rates, which are usually based on cross-sectional surveys at different points in time, fail to reveal the nature of poverty. Some of the poverty observed at one date arises from a low long-term level of living ('chronic poverty'), whereas some of it is likely to be a temporary state ('transient poverty') (Jalan & Ravallion, 2000).[1] If poverty is largely a transitory phenomenon, more households could move into and out of poverty, although poverty headcount remains the same between any two periods. As a result, standard poverty measures such as the headcount ratio ignore such underlying dynamics (Glauben et al., 2012). This analysis underlines the importance of panel data sets to measure these different types of poverty. Unfortunately, in the developing world, particularly in Africa, the study of income mobility and poverty dynamics has been hindered by a lack of panel data sets (Haddad & Ahmed, 2003; Dercon & Krishnan, 2000).

The distinction between chronic and transient poverty is important for both descriptive and policy purposes. Moving into and out of poverty looks less serious than remaining stuck in poverty. Someone who is poor now, but can reasonably expect to be out of poverty next year, is in a better position than someone who is equivalently poor now, and is likely to remain there in the future (Haughton & Khandker, 2009).

[1] A precise definition of chronic and transient poverty is provided in chapter 3.

Moreover, the types of policies needed to address chronic poverty and transient poverty differ. If poverty is more of a temporary phenomenon, then policies that focus predominantly on social safety nets that help people to manage their present deprivation and stabilize short-term income fluctuations are more appropriate. These include, among others, limited term unemployment allowances, social grants, workfare, micro-credit and new skills acquisition programs. By contrast, in a country where a significant proportion of the poor are chronically poor, then policies that address concerns of a more structural nature, such as redistribution of assets, direct investment toward basic physical infrastructure, reduction of social exclusion and provision of long-term social security will be necessary (Hulme & Shepherd, 2003; Glauben et al., 2012).

The analysis of vulnerability to poverty is more relevant to policy than the analysis of poverty itself. Dercon (2001) argues for increased attention to the quantification of vulnerability for the important reason that vulnerability and risk is increasingly shown not to be just another dimension of poverty; it is also a cause of poverty and destitution. The World Bank is encouraging the development and use of Risk and Vulnerability Assessments (RVAs), which aim to understand the sources of vulnerability to poverty, design instruments to increase social protection, and identify policy gap (Holzmann, Sherburne-Benz, & Tesliuc, 2003). Quite recently, the analysis and measurement of vulnerability to poverty has become an active area of research.

Despite the fact that poverty rates came down in Ethiopia, vulnerability to poverty remained high (World Bank, 2015). Households are still prone to risks and external shocks that cause them to slip back into poverty or remain in it, particularly if they are near the poverty line. Household incomes also fluctuate strongly due to shocks and since there is very limited scope for insurance, household consumption and poverty vary considerably over time (Bigsten & Shimeles, 2008). The impact of this on welfare can be substantial if risk coping mechanisms are inefficient or nonexistent. The analysis of vulnerability is demanding if only to design effective interventions towards sustainable poverty reduction. Nevertheless, vulnerability to poverty in Ethiopia has been measured in only a handful of studies (e.g., Dercon & Krishnan, 2000; Bigsten & Shimeles, 2004; Goshu, 2013; Demissie & Kasie, 2017).

This study contributes to the literature in poverty dynamics in two ways. First, it uses the recent three waves of the Ethiopia Socio-economic Survey (ESS) panel data to analyze the nature of poverty among rural households. Thus it adds another panel study to the small set of studies on poverty from Africa. Second, it fills the gap in the study of household vulnerability to poverty. Studies that explicitly consider vulnerability are quite a few in Ethiopia and given their valuable contribution to policymaking, there is unsatisfied demand for studies on this topic. Hence, this study attempts to explore vulnerability to poverty in rural Ethiopia, using a relatively recent panel data set.

1.3 Objectives of the Study

The general objective of the study is to analyze the nature of poverty and vulnerability in rural Ethiopia. The specific objectives of the study are:

- To decompose total poverty into its chronic and transient components.

- To examine whether the same set of variables determine transient poverty and chronic poverty.
- To quantify household vulnerability to poverty.
- To analyze household and community level correlates of vulnerability.

1.4 Significance of the Study

This study will help to understand the various correlates of transient and chronic poverty. This endeavor has a major significance for poverty targeting. Identifying households that are chronically poor against those that are transient poor will help to design a more efficient approach to fighting poverty since chronically poor households are likely to need a different set of policies than temporarily poor ones. The other concern of this study is vulnerability, a related but distinct concept from poverty. The study of poverty focuses on those who are currently poor (or were poor in the past). But governments and policy makers are typically more interested in the effects that their measures will have in the future. For this it would be valuable to be able to identify those who are expected to be poor ex ante (that is, in the future).

1.5 Scope and Limitations of the Study

This study is based on a short panel of household from three rounds of survey spanning the period 2011/12 – 2015/16. The spatial scope is limited to rural areas only. Moreover, only four regions are considered out of a total of nine. The study uses a cross-sectional data from the latest wave to measure vulnerability, although it is ideal to use a panel data. A sizable sample is dropped from the regression analysis, particularly the quantile regressions, due to outliers and missing values. These and other limitations can be addressed in future studies.

1.6 Organization of the Study

The study is organized as follows. In chapter 2 the relevant conceptual and empirical literature are reviewed. Chapter 3 discusses the data used and the methodology employed in the study. Chapter 4 presents and discusses the major findings of the study. Finally, conclusions and recommendations are presented in chapter 5.

Chapter 2

Literature Review

2.1 Conceptual Literature Review

The theoretical approach to understanding the process by which poverty arises and persists can broadly be classified into two. The first is macroeconomic, mainly arising from growth theories, and focuses on the mechanism by which a whole nation can achieve a sustained rise in aggregate income or be caught in a poverty trap (Acemoglu, 2008; Barro & Sala-i Martin, 2004). The second is microeconomic and outlines factors that affect poverty dynamics and economic mobility at the household level. We will focus here on the second approach. The more formal exposition of this approach considers a household that maximizes an inter-temporal utility function defined over current and future consumption subject to an inter-temporal budget constraint (Deaton, 1992; Carter & May, 2001; Dercon & Krishnan, 2000). The household has endowments of capital and labor. The concept of capital here is broad and includes physical capital, natural capital, human capital, financial capital, and social capital, among others. According to Shaffer (2000), changes in any one these forms of capital interact in complex ways with other forms of capital to constitute poverty-relevant social change. Piachaud (2002) argues for a broadening of the concept of capital in order to understand poverty and social exclusion better.

The household allocates these endowments across a number of activities. The household's level of consumption at any time depends on the stock of endowments, returns to endowments in these activities, and shocks. Shocks can affect both the stock of endowments and/or the returns to these endowments. The household tries to achieve smooth consumption given these shocks. But households facing liquidity constraints have limited smoothing ability (Baulch & Hoddinott, 2000). If liquidity constraints are binding, negative shocks may result in households having to reduce consumption relative to long-term levels. Consumption may fall below a poverty line and households would become temporarily poor (Dercon & Krishnan, 2000). On the other hand, chronic poverty can result due to a structurally low asset base (Carter & May, 2001). Jalan and Ravallion (1998, 2000) have provided a framework for decomposing total poverty into transient poverty and chronic poverty. They defined transient poverty as the contribution of consumption variability over time to expected consumption poverty. The non-transient component, also called 'chronic poverty', is the poverty that remains when inter-temporal variability in consumption has been smoothed out.

Chronic poverty has been typically assessed in the literature using two approaches; the spells approach, which focuses on transitions into and out of poverty, and the components approach, which distinguishes between the relative contributions that structural factors and idiosyncratic factors make to a household's poverty (Hulme et al., 2001). The former corresponds more to the intuitive idea of chronic poverty as persis-

tent poverty, but it is susceptible to overestimate transient poverty because of measurement error, especially when the object of analysis is income or consumption (Hulme & Shepherd, 2003). The components approach utilizes average income or consumption over a period of time to analyze chronic poverty. As useful these approaches are in understanding chronic poverty, there is a need to also consider individuals' or households' asset holdings and changes in these assets over time to get a fuller picture of chronic poverty.

The discussion of transitory poverty inevitably leads to the concept of vulnerability. Vulnerability is the possibility of suffering a decline in well-being, in particular a drop below some minimum benchmark or poverty threshold (Duclos, 2002). Alwang, Siegel, & Jorgensen (2001) considered vulnerability from the perspective of risk. Accordingly, they decomposed vulnerability into several components: the risk, or risky events, the options for managing risk, or the risk responses, and the outcome in terms of welfare loss. The presence of risk—the fact that the level of future wellbeing is uncertain—is what distinguishes vulnerability from poverty (in the ex-post sense). The uncertainty that households face about the future stems from multiple sources of risk; harvests may fail, food prices may rise, the main income earner of the household may become ill, etc. If such risks were absent (and the future were certain) there would be no distinction between ex-ante (vulnerability) and ex-post (poverty) measures of wellbeing (Chaudhuri, 2003). Vulnerability has to be defined relative to some benchmark for operational use and measurement (Dercon, 2001). Various approaches have been proposed to quantify vulnerability to poverty from a given data (Pritchett et al., 2000; Chaudhuri et al., 2002).

2.2 Empirical Literature Review

Several studies have attempted to analyze the nature of poverty—whether it is more chronic or more transitory—and determinants of poverty persistence. Bhide and Mehta (2004) used panel data that longitudinally track around 3000 households to identify the factors that influenced or constrained changes in poverty status between 1970/1971 and 1981/1982 in rural India. They used data on expenditures to classify households into different poverty categories and applied a binary probit model with household and village level characteristics, other macro-level factors and the interaction among them as explanatory variables. They found that more than half of the panel households who were poor in 1970/1971 remained in poverty over a decade later, indicating widespread chronic poverty. Their regression analysis indicated that caste status was not an important determinant of income mobility of the poor. On the other hand, the tribal status and the demographic composition of households were very important determinants of income mobility of the poor. Factors that are related to the persistence of poverty were the scheduled tribe status, larger household size, increase in household size, larger number of dependent children and increase in the number of dependent children.

Jalan and Ravallion (1998) use data from four large provinces in China—Guangdong, Yunnan, Guangxi, and Guizhou—for each year from 1985 to 1990 to measure the extent of persistent, chronic, and transient poverty. They found that almost 60% of rural poverty in the three poorest provinces, Yunnan, Guangxi, and Guizhou, can be classi-

fied as persistent, but less than 20% in the better-off province, Guangdong. They used censored conditional quantile estimators to investigate the household and geographic determinants of both chronic and transient poverty to see whether chronic and transient poverty are determined by the same set of variables. They found that a household's average wealth holding is an important determinant for both transient and chronic poverty. On the other hand, although household demographics, levels of education, and the health status of members of the household are important for chronic poverty, they are not significant determinants of transient poverty—implying that different sets of interventions are required to deal with each type of poverty. More recently, Ward (2016)—using a balanced panel from rural China from 1991 through 2006—considered the effects of economic reforms on changing the chronic nature of poverty and reducing household vulnerability to poverty. To investigate the determinants of household income, he run both fixed effects and random effects regression of log of real household income per person on various household-level characteristics and found that roughly the same type of variables were significant in both settings. In addition, he found that most of the poverty among the sample has shifted from being chronic in nature to being transient. In his analysis of household vulnerability among the sample, vulnerability to poverty has been declining over time, but the declines were not uniform over time or space.

A notable study on vulnerability to poverty from Africa is Kasirye (2007). He used a panel data set of 1309 households in Uganda to measure vulnerability to poverty between 1992/93 and 1999/2000 and to estimate the impact of household characteristics on vulnerability. He measured the likelihood of future poverty (vulnerability) based on the expected mean and variance of household consumption. He then run a regression of the measured vulnerability on household characteristics and found that education, spatial characteristics, and access to community infrastructure had important impacts on vulnerability. Specifically, the reduction in vulnerability increased with higher educational attainment of the household head. From his geographic assessment, household residents in northern Uganda were found to be about 60% more vulnerable compared to their counterparts in central Uganda. The study also found that the causes of vulnerability in Uganda are similar to causes of poverty and concludes by asserting that policies that would raise the earning capacity of poor households would help both vulnerability and poverty.

Few studies have analyzed poverty dynamics and vulnerability in Ethiopia. Dercon and Krishnan (2000) used a data set on a panel of 1450 households in different communities in rural Ethiopia, surveyed thrice, to explore short-run poverty dynamics. They observed that, on average, year-to-year poverty was very similar but there was high variability in consumption and poverty over the seasons and year-by-year. They presented a simple extension of the standard inter-temporal optimization model of consumption under uncertainty that allowed for productivity effects and fluctuations in food prices. This model was tested using the panel data available, and using explicit information on shocks. Their econometric analysis suggested that consumption was affected by idiosyncratic and common shocks, including rainfall and household-specific crop failure, while households respond to seasonal incentives related to changing labor demand and prices. The results implied that a larger number of households are vulnerable to shocks than reported by the standard poverty statistics. Their study also showed that the results from poverty analysis may well be misleading if the fluctuations

over relatively short periods are ignored, drawing some implications for household surveys on poverty. Finally, they noted that the safety net that was operating in the form of food-for-work and food aid distribution at the time had only a relatively marginal effect on vulnerable households, at least in the areas studied.

Bigsten and Shimeles (2004) attempted to address issues related to the dynamics of income poverty and vulnerability using household panel data for urban and rural areas of Ethiopia covering the period 1994-97. They applied both the spells approach and the components approach, using the former to understand the underlying processes that move people into or out of poverty over a certain span of time, and the later to distinguish the chronically poor from the temporarily poor. The results showed that poverty is more persistent in urban areas than in rural areas: the proportion of people who remained poor throughout the sample period in urban areas was twice that of rural areas. Accordingly, they recommended the need for different approaches to fight poverty in these areas. In their analysis of vulnerability, they found that the probability of a household being poor at any point in time during the period covered was about 40%, indicating a high degree of insecurity. In rural areas, factors such as age of the head of the household and dependency ratio within the household greatly affected the odds of moving into poverty, whereas household size, age of the head of the household, region of residence (particularly the capital) were found to increase the probability of being in poverty in urban areas.

Chapter 3

Data and Methodology

3.1 Data Source

This study uses the three rounds of the Ethiopian Socioeconomic Survey (ESS) panel data. The ESS is a collaborative effort of the Central Statistical Agency of Ethiopia and the World Bank's Living Standards Measurement Study – Integrated Surveys of Agriculture program. The first wave of the survey (ESS1) covers only rural and small town areas and the second and third waves (ESS2 and ESS3) of the survey expanded to also include urban areas. The urban supplement was done in such a way to ensure that the ESS data can provide nationally representative estimates.[1] Thus ESS1, ESS2, and ESS3 together create a panel data set of households from rural and small town areas, whereas ESS2 and ESS3 together represent a panel of households and individuals for rural and all urban areas. Since the analysis of this study is based on a panel of households from all three surveys, the urban sample is automatically excluded. Therefore, the results are representative at the national level for rural and small town areas only.

The ESS began in 2011 with 3776 rural and small-town households. Of these, ESS2 and ESS3 successfully re-interviewed 3699 households. This implies a panel attrition rate of 2%, or a successful follow-up rate of 98%. The ESS used a stratified, two-stage sampling design, where the regions of Ethiopia served as the strata from which enumeration areas (EAs) were selected proportionally based on regional population size. In order to ensure sufficient sample in the most populous regions (Amhara, Oromiya, SNNP, and Tigray), quotas were set for the number of EAs in each region. Hence, the sample is not representative for each of the small regions including Afar, Benshangul Gumuz, Dire Dawa, Gambella, Harari, and Somalie. As a result, this study uses the sample only from the four largest regions of Ethiopia, viz. Amhara, Oromiya, SNNP, and Tigray. Restricting the sample to these four regions reduces the sample size to 2839. Some observations were then excluded due to missing information on total annual consumption in any of the three rounds. Finally, measures of chronic and transitory poverty, as well as vulnerability were constructed using a sample of 2509 households from the four regions.

3.2 Setting Poverty Lines

This study uses the poverty lines constructed by the National Planning Commission (NPC) as reported in its 2017 poverty analysis interim report. The NPC used the cost

[1] Detailed information about the ESS data set can be found from the Basic Information Document of the survey, which is available at `http://go.worldbank.org/ZK2ZDZYDD0`.

of basic needs method, which is the most widely used method of estimating poverty lines. In this method, first, the food poverty line is determined by choosing a bundle of food typically consumed by the poor. The quantity of the bundle of food is determined in such a way that the bundle meets the predetermined level of minimum caloric requirement. This bundle is valued at local prices or at national average prices if the objective is to get a consistent poverty line across regions and socio-economic groups. Then a specific allowance for the non-food goods consistent with the spending pattern of the poor is added to the food poverty line. To account for the non-food expenditure, the food poverty line is divided by the food share of the poorest quartile or quintile (NPC, 2017).

The method described above was first applied in the context of the 1995/96 Poverty Analysis Report. This was based on the cost of 2200 kcal per day per adult food consumption with an allowance for essential nonfood items. The food and total poverty lines used since 1995/96 in the country are 648 and 1075 birr at national average prices, respectively. The poverty line based on the 2010/11 Household Income and Consumption Expenditure Survey was set using the consumption groups (basket of goods) defined in 1995/96. This basket of goods, which provides 2200 kcal, was valued at 2010/11 national average prices in order to obtain food poverty line for 2010/11. This food poverty line was then divided by the food share of the poorest 25% of the population to arrive at the absolute poverty line for the year 2010/11. Accordingly, the food and absolute poverty lines for 2010/11 were determined to be Birr 1985 and 3781, respectively (NPC, 2017). The 2015/16 poverty line was set by applying the GDP deflator provided by the MoFEC (2011-2016) to the poverty line figures set for the year 2010/11. The food poverty line for 2015/16 is computed to be Birr 3772 per year per adult person and the absolute poverty line is Birr 7184 per year per adult person (NPC, 2017).

Regional poverty lines were estimated by deflating the national food and absolute poverty lines for 2010/11 and 2015/16 using spatial price indices, which were also calculated by the NPC. These provided regional poverty lines relevant for the first and third waves of the ESS. To generate poverty lines for the second wave, the 2010/11 poverty lines were adjusted using regional consumer price indices to bring them to the December 2014 constant prices.[2] This study uses the food poverty lines for each region to analyze the nature of poverty and to measure vulnerability.

3.3 Method of Analysis

3.3.1 Decomposition of Total Poverty

This study follows the method proposed by Jalan and Ravallion (1998, 2000) to decompose total poverty into its transient and chronic components. They gave two conditions for a household to experience transient poverty: First, the household must be observed to be poor for at least one date in some period of time for which data is available. Second, the household's standard of living must vary over time within the time period.

[2]The CPIs used are from CSA (2015). *Country and Regional Level Consumer Price Indices for the month of July 2015.*

Their method mainly decomposes the extent of poverty experienced, P_i, into transient component, T_i, and a chronic component C_i, where each is defined over a stream of income, y_{it} for the i^{th} household within D time period. Let $P(y_{i1}, y_{i2}, \ldots, y_{iD})$ be an aggregate inter-temporal poverty measure for household i. The transient component, T_i of $P(\cdot)$ is defined as the portion that is attributable to inter-temporal variability in consumption and is calculated as:

$$T_i = P(y_{i1}, y_{i2}, \ldots, y_{iD}) - P(\bar{y}_{i1}, \bar{y}_{i2}, \ldots, \bar{y}_{iD})$$

in which $\bar{y}_{it}$ is the expected value of consumption overtime ('time-mean consumption') for household i. The non-transient component becomes chronic poverty, so the measure of chronic poverty C_i is simply poverty at time mean consumption for all dates:

$$C_i = C(\bar{y}_{i1}, \bar{y}_{i2}, \ldots, \bar{y}_{iD})$$

The Squared Poverty Gap (SPG) index is used as the empirical measure of total, chronic and transient poverty. The SPG for household i at date t is

$$p(y_{it}) = \begin{cases} (1 - y_{it})^2 & \text{if} \quad y_{it} < 1 \\ 0 & \text{otherwise} \end{cases}$$

where y_{it} is normalized by the poverty line and thus takes the value of unity for someone at the poverty line. The (total) poverty measure for household i is the time mean of $p(y_{it})$ and a measure of transient poverty is the time mean of $p(y_{it}) - p(\bar{y}_i)$.

To examine whether the household and geographic characteristics that determine chronic poverty also influence the extent of transient poverty, a regression of the measures of transient and chronic poverty on the same set of variables is carried out. The model of transient poverty is

$$T_i = \begin{cases} T_i^* & \text{if} \quad T_i^* > 0 \quad \text{where} \quad T_i^* = \mathbf{x}_i \boldsymbol{\beta}^T + u_i^T \\ 0 & \text{otherwise} \end{cases}$$

where T_i^* is a latent variable, T_i is the observed transient poverty, $\boldsymbol{\beta}^T$ a vector of unknown parameters, $\mathbf{x}_i$ is a vector of explanatory variables, and u_i^T is the residual term. The analogous model for chronic poverty is given by:

$$C_i = \begin{cases} C_i^* & \text{if} \quad C_i^* > 0 \quad \text{where} \quad C_i^* = \mathbf{x}_i \boldsymbol{\beta}^C + u_i^C \\ 0 & \text{otherwise} \end{cases}$$

The common way to estimate such specifications is to use censored regression techniques like the Tobit model. But as Jalan and Ravillion (2000) indicate, these estimators are sensitive to the misspecification of the error distribution. The estimates from such a model are both inconsistent and inefficient in the presence of heteroscedasticity and/or non-normality in the errors. To overcome these, the models are estimated by

quantile regression with bootstrap standard errors, with the relevant quantile being inferred from the data.

3.3.2 Measuring Vulnerability

The next model considers the measurement of vulnerability to poverty. Following Chaudhuri et al. (2002), the vulnerability level of a household h at time t is defined as the probability that the household will find itself consumption poor at time $t+1$:

$$v_{ht} = \Pr(c_{h,t+1} < z)$$

where $c_{h,t+1}$ is the household's per-capita consumption level at time $t+1$ and z is the appropriate consumption poverty line. The practical problem here is that $c_{h,t+1}$ is not directly observable. Chaudhuri et al. (2002) proposed a technique for actually quantifying v_{ht}. According to this approach, three pieces of information are required to measure a household's vulnerability to poverty: The household's expected level of consumption per capita in the next period, the variance of the household's expected level of consumption per capita in the next period (σ^2), and the poverty line (z). To this, we add the assumption that the expected level of consumption follows the normal (Gaussian) distribution. Although we do not know what a household's level of consumption will be next year, it is possible to arrive at a reasonable estimate by first building a model of the determinants of consumption and then using the model to predict next year's consumption. Formally, we have[3]

$$\ln c_h = X_h\boldsymbol{\beta} + e_h \tag{3.1}$$

where c_h is per capita consumption expenditure, X_h represents a bundle of observable household characteristics, characteristics such as household size, location, educational attainment of the household head, etc., $\boldsymbol{\beta}$ is a vector of parameters, and e_h is a mean-zero disturbance term that captures idiosyncratic factors (shocks) that contribute to different per capita consumption levels for households that are otherwise observationally equivalent.

The model in 3.1 assumes that the idiosyncratic shocks to consumption are identically and independently distributed over time for each household. However, this is highly unlikely to hold for a single cross-section. Hence, we allow the variance of e_h ($\sigma^2_{e,h}$) to depend upon observable household characteristics in some parametric way. In the simplest case, we assume that the variance of e_h is given by:

$$\sigma^2_{e,h} = X_h\boldsymbol{\theta}.$$

$\boldsymbol{\beta}$ and $\boldsymbol{\theta}$ are estimated using a three-step feasible generalized least squares (FGLS) procedure suggested by Amemiya (1977). First, we estimate equation 3.1 using an ordinary least squares (OLS). We then use the estimated residuals from equation 3.1 to estimate

[3]According to Chaudhuri et al. (2002), measuring vulnerability would, ideally, require using longitudinal data of sufficient length, which is usually not available. This section, therefore, discusses a method for estimating vulnerability to poverty that can be implemented using cross-sectional data.

$$\widehat{e}^2_{OLS,h} = X_h\boldsymbol{\theta} + \eta_h \tag{3.2}$$

using OLS. The predictions from 3.2 are used to transform the equation as follows:

$$\frac{\widehat{e}^2_{OLS,h}}{X_h\widehat{\boldsymbol{\theta}}_{OLS}} = \left(\frac{X_h}{X_h\widehat{\boldsymbol{\theta}}_{OLS}}\right)\boldsymbol{\theta} + \frac{\eta_h}{X_h\widehat{\boldsymbol{\theta}}_{OLS}}.$$

This transformed equation is estimated using OLS to obtain an asymptotically efficient FGLS estimate, $\widehat{\boldsymbol{\theta}}_{FGLS}$. Note that $X_h\widehat{\boldsymbol{\theta}}_{FGLS}$ is a consistent estimate of $\sigma^2_{e,h}$, the variance of the idiosyncratic component of household consumption. The estimates

$$\widehat{\sigma}_{e,h} = \sqrt{X_h\widehat{\boldsymbol{\theta}}_{FGLS}}$$

are then used to transform 3.1 as follows:

$$\frac{\ln c_h}{\widehat{\sigma}_{e,h}} = \left(\frac{X_h}{\widehat{\sigma}_{e,h}}\right)\boldsymbol{\beta} + \frac{e_h}{\widehat{\sigma}_{e,h}} \tag{3.3}$$

OLS estimation of 3.3 yields a consistent and asymptotically efficient estimate of $\boldsymbol{\beta}$.

Using the estimates $\widehat{\boldsymbol{\beta}}$ and $\widehat{\boldsymbol{\theta}}$ that we obtain we are able to directly estimate expected log consumption:

$$\widehat{E}[\ln c_h \mid X_h] = X_h\widehat{\boldsymbol{\beta}}$$

and the variance of log consumption:

$$\widehat{V}[\ln c_h \mid X_h] = \widehat{\sigma}^2_{e,h} = X_h\widehat{\boldsymbol{\theta}}$$

for each household h. By assuming that consumption is log-normally distributed, we are then able to use these estimates to form an estimate of the probability that a household with the characteristics, X_h, will be poor, i.e, to estimate the household's vulnerability level. Letting $\Phi(\cdot)$ denote the cumulative density of the standard normal, this estimated probability will be given by:

$$\widehat{v}_h = \widehat{\Pr}(\ln c_h < \ln z \mid X_h) = \Phi\left(\frac{\ln z - X_h\widehat{\boldsymbol{\beta}}}{\sqrt{X_h\widehat{\boldsymbol{\theta}}}}\right). \tag{3.4}$$

While the above techniques allow us to examine the extent of vulnerability, they are not very informative with regard to the effects of a change in a particular household and community characteristics on the probability of being vulnerable. A probit model is run to measure such impacts.

Chapter 4

Results and Discussions

4.1 Correlates of Poverty Components

This section presents and discusses the main results of the analysis of poverty and its components in rural Ethiopia based on the ESS panel data. Table 4.1 is a poverty transition matrix, which depicts the movement of households in to and out of poverty over the three waves. The proportion of households who remain in poverty in consecutive periods is small, although it shows a slight increase over time. On the other hand, households who are non-poor in consecutive periods is markedly high, with about 60% of households remaining non-poor from 2011/12 to 2015/16. There is a considerable rise in the proportion of households who entered into poverty over time, from 10% in 2011/12-2013/14 to 20% in 2013/14-2015/16.

Table 4.1: Poverty Transition Matrix

		2013/14		2015/16	
		Poor	Non-poor	Poor	Non-poor
2011/12	Poor	0.08	0.11	0.09	0.10
	Non-poor	0.10	0.71	0.22	0.59
2013/14	Poor			0.11	0.08
	Non-poor			0.20	0.61

Note: Sampling weights are from ESS3. Data refers to 2509 households tracked in the panel data

Table 4.2 classifies households as to whether they are chronically poor or transient poor. Those who are chronically poor have a time mean consumption which is below the poverty line. The chronically poor can further be classified as persistently poor or not persistently poor. Persistently poor households are chronically poor households whose level of consumption is below the poverty line at all dates. If chronically poor households have a level of consumption above the poverty line for at least one period, they are called "not persistently poor" (Haughton & Khandker, 2009). Transient poor households have a mean consumption above the poverty line but are occasionally poor, i.e., their level of consumption sometimes falls below the poverty line. The never poor households are those whose mean consumption and consumption at all periods are above the poverty line. As can be observed in Table 4.2, the majority of households in the sample are either transiently poor or never poor. 9% of all households in the sample are persistently poor, although this varies enormously by region. SNNP has the highest proportion of households who are persistently poor (20%), while Oromia and

Table 4.2: Chronic, Persistent, and Transient Poverty

	Chronically Poor			
	Persistently Poor	**Not persistently poor**	**Transient Poor**	**Never poor**
Tigray	0.05	0.07	0.34	0.53
Amhara	0.11	0.18	0.44	0.27
Oromia	0.04	0.09	0.27	0.61
SNNP	0.20	0.15	0.31	0.34
Total	0.09	0.13	0.33	0.44

Note: Sampling weights are from ESS3. Constructed using the mean national food poverty line in the three waves.

Tigray have relatively small percentage of households in persistent poverty (4% and 5%, respectively). Overall this suggests that the nature of poverty in rural Ethiopia is mainly transient.

Table 4.3 presents the results of quantile regressions on household and community level determinants of total, chronic and transient poverty. Appendix A provides descriptive statistics of variables used in the regressions, which are from the latest wave of the survey in 2015/16. As can be observed from the table, a quarter of the sample are female-headed households. The mean head years of schooling (5.2) is relatively low but is typical of rural and small town areas. Only 28% and 6% of households live in communities that have access to a health center and a bank, respectively. The sample is, on average, proportionally represented across the four regions.

The dependent variables are the squared poverty gap measures of total poverty and its transient and chronic components. One common problem with such regressions, however, is the heavy censoring that occurs because a large proportion of the sample will be non-poor. One way of dealing with this problem is to estimate the models at a very high quantile, like the 90^{th} quantile or more. But the estimates, in this case, will be less precise since fewer observations are used in the estimation (Jalan & Ravallion, 2000). To overcome the high censoring problem this study adopted the method proposed by Jalan and Ravallion (1998, 2000): scaling up the poverty line to decrease censoring. Thus the food poverty line was scaled up by 50% and measures of total, chronic and transient poverty were recalculated. Using the new poverty line, 951 households (46% of the sample used in the regression) had chronic poverty and 1576 households (76%) were transient poor. The models were estimated at the 75^{th} quantile.[1] The standard errors of the estimates were computed using bootstrap technique.[2]

According to the results, as reported in Table 4.3, large households are likely to experience total, chronic and transient poverty. Female-headed households are less likely to experience poverty whereas the age of the household head has no significant

[1]The models were also estimated at the 65^{th}, 70^{th}, 80^{th}, and 85^{th} quantiles and these are reported in Appendix B. As can be observed, the results are qualitatively very similar to those obtained for the 75^{th} quantile.

[2]The model was estimated using the "bsqreg" command in Stata 14.

Table 4.3: Results of quantile regressions (75^{th} quantile)

	Total Poverty	Chronic Poverty	Transient Poverty
Household size	2.051***	1.624***	0.431***
	(10.49)	(7.17)	(4.43)
Female headed hh	−1.518*	−0.917	−0.479
	(1.80)	(1.27)	(1.03)
Age of hh head	0.159	0.143	−0.012
	(1.32)	(1.43)	(0.18)
Age squared	−0.001	−0.002*	0.000
	(1.26)	(1.71)	(0.31)
Head Years of Schooling	−0.571***	−0.372***	−0.188***
	(7.29)	(5.54)	(4.52)
Proportion of children (< 15 yrs)	2.573*	2.168	0.428
	(1.67)	(1.39)	(0.53)
Proportion of old aged (> 65 yrs)	0.543	0.820**	−0.142
	(1.23)	(2.56)	(0.67)
Log land size owned (m^2)	−1.046***	−0.687***	−0.089
	(4.01)	(3.19)	(0.71)
Log asset value (durables)	−1.744***	−1.302***	−0.569***
	(9.47)	(6.48)	(6.10)
Log value of crops sold	−0.342***	−0.255**	−0.080
	(2.84)	(2.33)	(1.46)
Number of Livestock	−0.058*	−0.055**	−0.023
	(1.68)	(2.04)	(1.10)
Distance to nearest primary sch (KMs)	0.071	−0.128	0.230**
	(0.62)	(1.12)	(1.98)
Distance to nearest market (KMs)	0.062***	0.045***	0.010**
	(6.80)	(5.38)	(2.07)
Access to hospital/health center	−1.954**	−1.357**	−0.836**
	(2.56)	(2.11)	(2.20)
Access to bank	0.635	0.663	0.212
	(0.51)	(0.72)	(0.29)
Amhara	4.496***	3.657***	1.248**
	(5.02)	(4.60)	(2.24)
Oromia	−0.023	−0.125	−0.296
	(0.03)	(0.18)	(0.58)
SNNP	2.786**	2.337**	0.476
	(2.52)	(2.33)	(0.86)
Constant	19.591***	11.169***	8.755***
	(4.95)	(3.37)	(4.05)
Observations	2070	2070	2070

Note: * Significant at 10%, ** significant at 5%, *** significant at 1%. Absolute value of t-statistics in parentheses. Standard errors in the above table are calculated from 10,000 bootstrap replications

association with poverty, as well as with its two components. Years of schooling of the household head has a negative and highly significant impact on all forms of poverty, with the estimated coefficient for chronic poverty being almost twice the estimated coefficient for transitory poverty. A higher proportion of old aged members is associated with chronic poverty but not transient poverty. On the other hand, a higher proportion of children less than fifteen years of age has only a weak relationship with total poverty and no relationship at all with chronic and transient poverty. This may be due to the fact that, in many poor households, children join the labor force at a relatively young age, making them a potential source of income.

Moving on to physical asset variables, the size of land owned by the household is negatively associated with total and chronic poverty but has no significant association with transient poverty. Value of durable assets is highly significant in reducing all forms of poverty, with twice as much impact on chronic poverty than transient poverty. The value of crops sold is negatively associated with poverty and chronic poverty, but not transient poverty. Similarly, households with more livestock are less likely to be poor and chronically poor. Among community variables, distance to the nearest primary school is a significant predictor of transitory poverty only. Households farther from a market center are more susceptible to total and chronic poverty, and to some extent to transient poverty. Access to a health center reduces all forms of poverty, whereas access to a bank is not associated with poverty as well as its components.

Two things are worth noting about these results. First, though there are some differences between the regression for total poverty and that for chronic poverty, these two regressions are more similar to each other than to the transient poverty regression. On the other hand, there are a number of important differences in the determinants of transient and chronic poverty. This is in line with what previous studies have found (see Jalan and Ravallion, 2000; Haddad and Ahmed, 2003). Second, we have less number of statistically significant variables for transient poverty regression than for chronic poverty and total poverty. This implies that we are better able to predict chronic poverty than transient poverty, as Haddad and Ahmed (2003) asserted. These observations have important policy implications in dealing with chronic and transient poverty.

4.2 Estimating Vulnerability and Sources of Vulnerability

As outlined in chapter 3, the approach by Chaudhuri et al. (2002) was used to estimate a vulnerability index for each household . This entailed, first, determining a household's expected level of consumption per adult equivalent and its variance. To allow for heteroscedasticity, Amemiya's (1977) three-step feasible generalized least squares (FGLS) procedure was used in estimating the expected value and variance of consumption. Following Kasirye (2007), in order to account for as much as possible, the variations in expected consumption, the specifications for the FGLS regressions included, among other regressors, shocks faced by the household and interactions of shocks with household characteristics, particularly household assets (i.e., land and durable assets). The results are reported in Appendix C.

Table 4.4: Poverty and Vulnerability

	Poor	**Non-poor**	**Poor and non-poor**
High vulnerability	0.11	0.08	0.19
Low vulnerability	0.13	0.21	0.34
Not vulnerable	0.07	0.40	0.47
All groups	0.31	0.69	1.00

The fitted values of the regression from the last stage were used as an estimate of expected mean consumption and the fitted values of the second stage regression were used as the variance. The procedure by Chaudhuri et al. (2002) assumes that the expected level of consumption follows the normal (Gaussian) distribution. A Kernel density graph of predicted log consumption was constructed to test whether this assumption is fulfilled and this is provided in Appendix D. Comparing this with the Gaussian distribution curve, it is reasonable to infer that the estimated expected consumption is log-normally distributed. Thus the estimates of the expected value and variance of consumption from the FGLS regressions were used to generate an index of household vulnerability as specified in 3.4.

Table 4.4 presents a cross-tabulation of poverty and vulnerability status. Those who are highly vulnerable have a vulnerability index that is at least as high as 0.5. The low vulnerable households have a vulnerability index greater than the headcount poverty rate (which is 0.31 for 2016) but less than 0.5. If the vulnerability index is less than the headcount poverty rate, the household is considered to be not vulnerable.[3] The overall picture shows that vulnerability is higher among the poor: the poor constitute 31% of the entire sample, but about 58% of those who are highly vulnerable. On the other hand, the non-poor households are less likely to be vulnerable as they make up 85% of those who are not vulnerable. This result is graphically confirmed in Appendix E, which provides a histogram of vulnerability index by poverty status of households. As can be observed, the histogram for the non-poor group is skewed to the right.

The relationship of vulnerability to households' endowment of capital (physical and human) is important. Generally, households with greater endowments of assets will tend to be less vulnerable (Baulch & Hoddinott, 2000). Table 4.5 presents the proportion of vulnerable households by different categories of capital. Households whose heads are illiterate are by far the most vulnerable groups and household heads who had up to primary level education are more vulnerable and poor as compared to secondary and higher level education. Similarly, smallholders are by far the most vulnerable groups with a little over 40% being vulnerable. Households with more livestock are also seen to be less vulnerable. The table also suggests that vulnerability is more widespread than poverty.

The correlation of vulnerability with physical and human capital endowment can clearly be seen in Figures 4.1 and 4.2, respectively. Figure 4.1 is a scatter plot of the value of durable household assets versus the vulnerability index. On the horizontal axis

[3]This method of classification follows Chaudhuri et al. (2002).

Table 4.5: Vulnerability and Poverty across Groups

	Status		
Groups	**Vulnerable**	**Poor**	**Ratio of Vuln. to Poor**
No Schooling	38.25%	21.62%	1.77
Primary education	13.95	8.99	1.55
Secondary education	0.39	0.36	1.08
Higher education	0.01	0.11	0.11
Landless households	3.57	2.11	1.69
Small landholders (up to 2 ha)	40.92	25.11	1.63
Medium landholders (3 to 10 ha)	7.93	3.70	2.14
Large landholders (> 10 ha)	0.18	0.16	1.13
Up to 5 livestocks	20.02	12.78	1.57
5 to 12 livestocks	16.58	10.29	1.61
12+ livestocks	16.00	8.02	2.00

"ha" stands for hectares

is percentile of the value of household assets and on the vertical axis is the vulnerability index of various households in each percentile group. As the fitted line indicates there is a clear negative relationship between ownership of durable assets and vulnerability with households becoming less vulnerable as the percentile of asset value rises. The same picture arises in Figure 4.2, where vulnerability is plotted against mean years of schooling of household members, a proxy for a household's human capital. However, the relationship of vulnerability with household's ownership of livestock and land is less clear, as illustrated in Appendices F and G.

Table 4.6 presents the results of probit regression of the determinants of vulnerability. Overall, the model is a good fit as indicated by the pseudo R-squared and the Wald statistic. Household size is positively related to vulnerability, with each additional household member increasing the likelihood of being vulnerable by approximately 11%. Female-headed households are less likely to be vulnerable compared to male headed households. The result strongly indicates that increased educational attainment of the household head, as well as each household member (aggregated by mean years of schooling), reduces vulnerability. While increased ratio of children raises the probability of vulnerability, increased ratio of old age dependent members reduces it.

Once more, physical capital variables are observed to be negatively associated with vulnerability. Households with more land and livestock are less likely to be vulnerable. In addition households with more durable assets have a lower probability of becoming vulnerable. This is to be expected since physical assets in most rural areas provide a secure source of income and are used to manage risk in the face of adverse shocks, thereby reducing the likelihood of falling to poverty. On the other hand, present poverty status is found to be insignificant in explaining vulnerability.

The occurrence of different types of shocks within the last twelve months is shown

Figure 4.1: Vulnerability and Ownership of Durable Assets

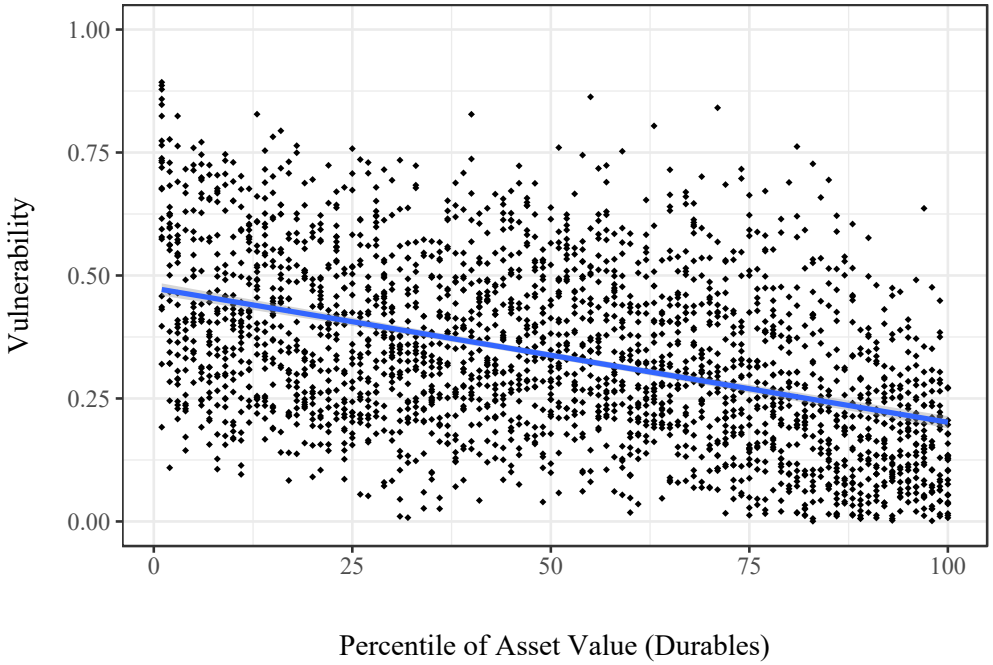


Figure 4.2: Vulnerability and Mean Years of Schooling

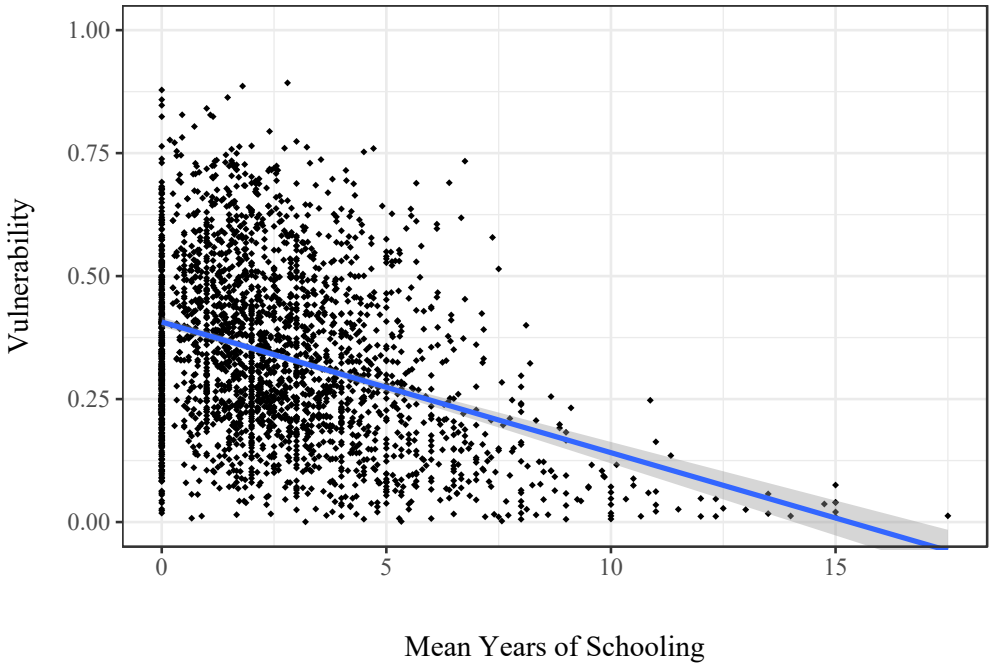


Table 4.6: Results of Probit Model (Determinants of Vulnerability)

	Coeff.	**s.e**	**Mfx.**	**s.e**
Household size	1.907***	0.179	0.105***	0.003
Female headed hh	−2.097***	0.201	−0.115***	0.008
Age of hh head	0.218***	0.030	0.012***	0.001
Age squared	−0.002***	0.000	−0.000***	0.000
Head Years of Schooling	−0.514***	0.040	−0.028***	0.001
HH members, mean yrs of schooling	−0.567***	0.071	−0.031***	0.002
Proportion of children (< 15 yrs)	1.055***	0.245	0.058***	0.013
Proportion of old aged (> 65 yrs)	−1.780***	0.205	−0.098***	0.010
Log land size owned (m^2)	−0.086***	0.026	−0.005***	0.001
Log asset value (durables)	−1.490***	0.165	−0.082***	0.005
Number of Livestock	−0.172***	0.017	−0.009***	0.000
Poor (dummy)	0.219	0.155	0.012	0.008
Agricultural shocks	0.346**	0.141	0.019**	0.008
Price shocks	−0.500***	0.150	−0.028***	0.008
Human capital shocks	−0.013	0.176	−0.001	0.010
Other shocks	2.776***	0.457	0.153***	0.024
Distance to nearest road (KMs)	−0.022***	0.004	−0.001***	0.000
Distance to nearest market (KMs)	0.035***	0.003	0.002***	0.000
Access to hospital/health center	−3.121***	0.286	−0.172***	0.009
Access to water supply	2.738***	0.259	0.151***	0.008
Access to bank	−1.604***	0.343	−0.088***	0.019
Access to microfinance	−1.282***	0.183	−0.071***	0.009
Amhara	−2.432***	0.285	−0.134***	0.011
Oromia	0.458**	0.226	0.025**	0.012
SNNP	−4.839***	0.485	−0.266***	0.012
Constant	5.002***	1.322		
Observations	2463			
Pseudo R^2	0.864			
Wald χ^2	252.3			
Prob > χ^2	0.000			

Note: ** significant at 5%, *** significant at 1%. *Mfx.*: Marginal effects. *s.e*: standard error

to have diverse impacts on vulnerability. Agricultural shocks (such as drought, crop damage, etc.) and other shocks (such as local unrest, displacement due to government project, etc.) increase the probability of being vulnerable. Price shocks, on the other hand, reduce the likelihood of vulnerability. This at first might seem paradoxical, but it is possible that if the households are producers of food items (which is highly likely, since they are rural households), then a sudden rise in food prices might actually benefit these households and reduce their prospect of being vulnerable. Finally, human capital shocks (death/illness of household member(s), loss of non-farm job of a household member(s), etc.) are not significant predictors of vulnerability. The overall result suggests that shocks affecting physical capital are more significant in determining the vulnerability of households in rural areas.

Access to community infrastructure are the other groups of factors determining vulnerability. Households who live far away from market centers are more vulnerable. Access to a hospital or health center reduces the probability of vulnerability. Households living in communities with access to bank and microfinance are less likely to be vulnerable. This is to be expected since the availability of credit is an important risk coping strategy to smooth consumption. The final set of results concerns geographical locations, i.e., the region in which the household resides (Tigray is the base category). All other factors remaining constant, households living in Amhara and SNNP are 13% and 27% less likely to be vulnerable, respectively, than households living in Tigray. On the other hand, households living in Oromia are slightly (2.5%) more likely to be vulnerable compared to households in Tigray.

Chapter 5

Conclusions and Implications

This study attempted to decompose poverty into its chronic and transient components for rural Ethiopia using the ESS panel data. The results indicated a modest amount of persistent poverty and a large extent of transient poverty in all four regions (i.e., Amhara, Oromiya, SNNP, and Tigray) analyzed. The household and community correlates of each component, as well as, total poverty were then investigated using quantile regression. The results suggest that different models are determining chronic versus transient poverty. Moreover, the results for total poverty and chronic poverty are very similar: variables which are typically identified as being determinants of total poverty were also found to be variables which are important in determining chronic poverty. However, few of these were found to be significant in the transient poverty model. Such variables include size of land owned by the household, value of crops sold, and the livestock wealth of the household.

These results have strong implications for poverty targeting. If different processes create the two types of poverty, then different policies may be needed to mitigate each. Transient poverty may be addressed by safety-net type measures that help people manage their temporary problems and enable them to return to the status of non-poor. If poverty is chronic, then policies should address concerns of a more structural nature such as addressing labor markets or increasing rates of capital accumulation, including human capital. The policy package might also include redistribution of assets, direct investments in physical infrastructure, reduced social exclusion from employment, markets and institutions, and possibly some measures to provide more long-term social security. As Hulme and Shepherd (2003) indicate, the per unit costs of poverty reduction for chronically poor people will often be higher than for those experiencing occasional spells of poverty. This is mainly because the poor usually live in less accessible areas (geographically or in terms of physical insecurity) and have social positions that make contacting them problematic. Thus addressing chronic poverty requires considerable financial resources. Moreover, the chronically poor are a heterogeneous group and many different factors and combinations of factors explain specific experiences of chronic poverty in specific contexts. The World Bank's (2000) strategy of pursuing empowerment, opportunity and security provides a comprehensive basis for poverty reduction.

The study also addresses vulnerability to poverty, which is defined to be the probability that a household will be poor in the future. A range of household and community characteristics, including shocks faced, were considered in developing a measure of vulnerability. Three observations stand out in the analysis of measured vulnerability. First, vulnerability is higher among the poor as compared to the non-poor. While the poor constituted 58% of the highly vulnerable, they make up only 15% of the not vulnerable. Second, measured vulnerability was observed to be inversely associated with households' endowment of assets. Households endowed with more physical and human

capital were among the least vulnerable in the sample. Third, vulnerability is more widespread than poverty, which is typical of most studies on vulnerability. The probit model measuring determinants of vulnerability indicates that households with larger family size, older heads, higher proportion of children, agricultural shocks and located farther from market centers are more likely to be vulnerable. Measures designed to deal with transient poverty are also relevant in dealing with vulnerability. These include different forms of safety nets, credit, and insurance schemes.

References

Abro, Z. A., Alemu, B. A., & Hanjra, M. A. (2014). Policies for agricultural productivity growth and poverty reduction in rural Ethiopia. *World Development*, *59*, 461–474.

Acemoglu, D. (2008). *Introduction to modern economic growth*. Princeton University Press.

Alwang, J., Siegel, P. B., & Jorgensen, S. L. (2001). *Vulnerability: a view from different disciplines.* Social protection discussion paper No .0115, Social Protection Unit, Human Development Network. Washington, DC: World Bank.

Amemiya, T. (1977). The maximum likelihood and the nonlinear three-stage least squares estimator in the general nonlinear simultaneous equation model. *Econometrica (pre-1986)*, *45*(4), 955.

Barro, R. J., & Sala-i Martin, X. (2004). *Economic Growth*. MIT Press. Cambridge, Massachusettes.

Baulch, B., & Hoddinott, J. (2000). Economic mobility and poverty dynamics in developing countries. *The Journal of Development Studies*, *36*(6), 1–24.

Bhide, S., & Mehta, A. K. (2004). Chronic Poverty in Rural India: issues and findings from panel data. *Journal of Human Development*, *5*(2), 195–209.

Bigsten, A., Kebede, B., Shimeles, A., & Taddesse, M. (2005). Poverty, Income Distribution and Labour Markets in Ethiopia. In A. Bigsten, B. Kebede, & A. Shimeles (Eds.), (pp. 22–35). Nordic Africa Institute.

Bigsten, A., & Shimeles, A. (2004). *Dynamics of Poverty in Ethiopia* (resreport No. 2004/39). Helsinki, Finland: UNU-WIDER.

Bigsten, A., & Shimeles, A. (2008). Poverty transition and persistence in Ethiopia: 1994–2004. *World development*, *36*(9), 1559–1584.

Bogale, A., Hagedorn, K., & Korf, B. (2005). Determinants of poverty in rural Ethiopia. *Quarterly Journal of International Agriculture*, *44*(2), 101–120.

Carter, M. R., & May, J. (2001). One kind of freedom: Poverty dynamics in post-apartheid South Africa. *World development*, *29*(12), 1987–2006.

Chaudhuri, S. (2003). *Assessing vulnerability to poverty: concepts, empirical methods and illustrative examples.* Department of Economics, Columbia University, New York.

Chaudhuri, S., Jalan, J., & Suryahadi, A. (2002). *Assessing household vulnerability to poverty from cross-sectional data: A methodology and estimates from Indonesia.* Discussion Paper Series No. 0102-52, Department of Economics, Columbia University, New York.

Deaton, A. (1992). *Understanding Consumption.* Oxford: Clarendon Press.

Demissie, B. S., & Kasie, T. A. (2017). Rural Households' Vulnerability to Poverty in Ethiopia. *Journal of Poverty*, *21*(6), 528–542.

Dercon, S. (2001). *Assessing Vulnerability to Poverty.* Paper prepared for the UK Department for International Development. Department of Economics, Oxford University.

Dercon, S., & Krishnan, P. (2000). Vulnerability, Seasonality, and Poverty in Ethiopia. *Journal of Development Studies*, *36*(6), 25–53.

Devereux, S., & Sharp, K. (2003). *Is Poverty Really Falling in Rural Ethiopia?* Draft paper presented at the conference on Staying poor: Chronic poverty and Development policy, University of Manchester, April 7-9, 2003.

Duclos, J.-I. (2002). *Vulnerability and poverty measurement issues for public policy.* Social Protection discussion paper series No. SP 0230. The World Bank.

Glauben, T., Herzfeld, T., Rozelle, S., & Wang, X. (2012). Persistent poverty in rural China: where, why, and how to escape? *World Development*, *40*(4), 784–795.

Goshu, D. (2013). The Dynamics of Poverty and Vulnerability in Rural Ethiopia. *Ethiopian Journal of Economics*, *22*(2), 1–20.

Haddad, L., & Ahmed, A. (2003). Chronic and Transitory Poverty: Evidence from Egypt, 1997- 99. *World Development*, *31*(1), 71–85.

Haughton, J., & Khandker, S. R. (2009). *Handbook on Poverty and Inequality.* World Bank Publications.

Holzmann, R., Sherburne-Benz, L., & Tesliuc, E. D. (2003). *Social Risk Management : The World Bank 's Approach to Social Protection in a Globalizing World.* Washington, DC: World Bank.

Hulme, D., Moore, K., & Shepherd, A. (2001). *Chronic poverty: meanings and analytical frameworks.* CPRC Working Paper No. 2. Manchester: IDPM, University of Manchester.

Hulme, D., & Shepherd, A. (2003). Conceptualizing Chronic Poverty. *World Development*, *31*(3), 403–424.

Jalan, J., & Ravallion, M. (1998). Transient Poverty in Rural China. *Journal of Comparative Economics*, *26*(2), 338–357.

Jalan, J., & Ravallion, M. (2000). Is Transient Poverty Different? Evidence from Rural China. *Journal of Development Studies*, *36*(6), 82–99.

Kasirye, I. (2007). *Vulnerability and poverty dynamics in Uganda, 1992-1999.* Research Series No. 51. Economic Policy Research Center.

Krishna, A. (2016). The Oxford Handbook of the Social Science of Poverty. In D. Brady & L. M. Burton (Eds.), (pp. 293–314). Oxford University Press.

National Planning Commission. (2017). *Ethiopia's Progress towards Eradicating Poverty: An Interim Report on 2015/16 Poverty Analysis Study.* Addis Ababa, Ethiopia.

Piachaud, D. (2002). *Capital and the Determinants of Poverty and Social Exclusion.* Centre for Analysis of Social Exclusion paper 60. London School of Economics, London.

Pritchett, L., Shryahadi, A., & Sumarto, S. (2000). *Quantifying Vulnerability to Poverty: A Proposed Measure, Applied to Indonesia.* Social Monitoring and Early Response Unit, Jakarta.

Seff, I., & Jolliffe, D. (2016). Multidimensional poverty dynamics in Ethiopia: how do they differ from consumption-based poverty dynamics? *Ethiopian Journal of Economics*, *25*(2), 1–35.

Sen, A. (1987). *Commodities and Capabilities.* Amsterdam: North-Holland.

Sen, A. (1999). *Development as Freedom.* New York: Random House.

Shaffer, P. (2000). *New Thinking on Poverty Dynamics: Implications for Policy.* Paper Presented to the Poverty Reduction Working Group, Canadian International Development Agency, Ottawa.

Ward, P. S. (2016). Transient poverty, poverty dynamics, and vulnerability to poverty: An empirical analysis using a balanced panel from rural China. *World development*, *78*, 541–553.

World Bank. (2000). *World Development Report 2000/2001: Attacking Poverty.* Oxford University Press.

World Bank. (2015). *Ethiopia Poverty Assessment.* Washington, DC: World Bank.

APPENDIX

Appendix A: Descriptive Statistics of Variables Used in the Study

	Quantile Regressions		Probit Regression	
Variable	**Mean**	**sd**	**Mean**	**sd**
Household Size	5.21	2.26	5.04	2.32
Female headed HH	0.25	0.43	0.28	0.45
Age of HH head	48.75	15.09	48.13	15.23
Head Years of Schooling	2.46	3.98	2.89	4.51
HH members, mean yrs of schooling	—	—	3.14	2.67
Proportion of Children (< 15 years)	0.41	0.24	0.40	0.28
Proportion of Old aged (> 65 years)	0.35	0.62	0.34	0.60
Log Land Area (m^2)	8.58	1.49	7.41	3.17
Log Asset Value (durables)	8.74	1.60	8.81	1.73
Log Crop Value	4.71	3.46	—	—
Number of Livestocks	10.50	10.05	9.78	11.49
Distance to nearest primary school	0.99	3.60	—	—
Distance to nearest road	—	—	14.70	15.91
Distance to the nearest market	70.64	48.68	71.03	49.04
Access to hospital/health center	0.28	0.45	0.34	0.47
Access to Water Supply	—	—	0.35	0.48
Access to Bank	0.06	0.24	0.12	0.32
Access to Microfinance	—	—	0.35	0.48
Agricultural Shocks	—	—	0.35	0.48
Price Shocks	—	—	0.31	0.46
Human Capital Shocks	—	—	0.27	0.44
Other Shocks	—	—	0.05	0.21
Tigray	0.13	0.34	0.14	0.34
Amhara	0.28	0.45	0.29	0.45
Oromia	0.25	0.43	0.26	0.44
SNNP	0.34	0.47	0.32	0.46
Sample Size	2070		2463	

Appendix B: Determinants of Total, Chronic and Transient Poverty at various quantiles

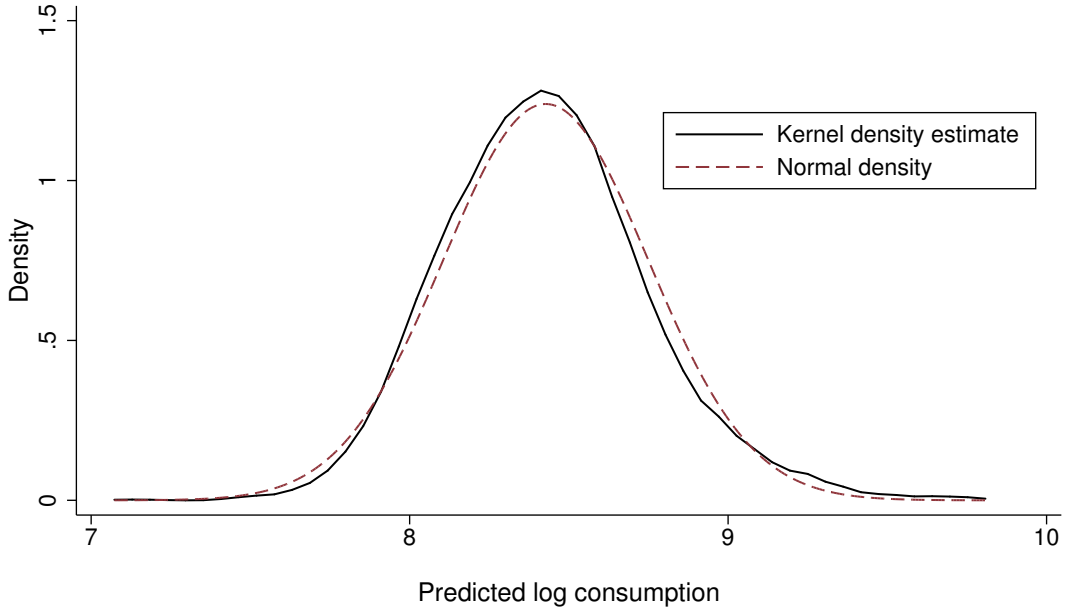
	65th quantile			70th quantile			80th quantile			85th quantile		
Variable	**Total**	**Chronic**	**Transient**	**Total**	**Chronic**	**Transient**	**Total**	**Chronic**	**Transient**	**Total**	**Chronic**	**Transient**
hhsize	1.682***	0.945***	0.380***	2.006***	1.333***	0.425***	2.252***	1.919***	0.513***	2.341***	2.158***	0.553***
female	−1.695**	−0.642*	−0.368	−1.415*	−0.729	−0.479	−1.524*	−0.943	−0.481	−1.575	−1.498	−0.416
age	0.208**	0.124**	0.004	0.154	0.104	−0.036	0.135	0.223*	−0.096	0.166	0.171	−0.050
agesq	−0.002**	−0.001**	−0.000	−0.002	−0.001*	0.000	−0.001	−0.002*	0.001	−0.002	−0.002	0.001
head yrs	−0.500***	−0.199***	−0.102***	−0.531***	−0.303***	−0.134***	−0.699***	−0.410***	−0.243***	−0.782***	−0.568***	−0.256***
chl ratio	3.746***	0.943	−0.072	2.522*	1.811	−0.078	2.692*	3.127*	0.421	3.345*	3.608**	1.437
old ratio	0.854**	0.660***	−0.043	0.883**	0.772***	−0.035	0.464	0.958**	−0.114	0.890	0.877*	−0.093
log land	−0.973***	−0.541***	−0.066	−1.006***	−0.713***	−0.100	−0.934***	−0.801***	−0.133	−0.948***	−0.964***	−0.107
log asset	−1.485***	−0.752***	−0.423***	−1.696***	−0.981***	−0.516***	−1.566***	−1.537***	−0.608***	−1.632***	−1.438***	−0.778***
log crop	−0.227**	−0.132**	−0.085**	−0.275***	−0.165**	−0.078	−0.424***	−0.410***	−0.075	−0.469***	−0.535***	−0.044
livestk	−0.076**	−0.019	−0.025*	−0.074**	−0.035	−0.028	−0.085**	−0.086***	−0.034	−0.098***	−0.119***	−0.028
prmry dist	0.035	−0.082	0.073	0.083	−0.063	0.154	0.061	−0.011	0.361***	0.021	−0.085	0.283***
market dist	0.051***	0.026***	0.005	0.056***	0.040***	0.005	0.062***	0.058***	0.010**	0.057***	0.068***	0.015**
health	−1.888***	−1.058***	−0.755**	−2.026***	−1.293***	−0.632*	−2.005**	−1.518*	−1.054***	−2.235**	−1.741*	−1.140**
bank	0.388	0.511	−0.047	0.711	0.543	0.098	0.437	−0.341	0.464	−0.137	−0.882	1.100
Amhara	3.882***	2.264***	1.289***	3.976***	2.919***	1.176**	5.042***	5.081***	1.328**	4.822***	4.801***	1.358**
Oromia	−0.366	−0.396	−0.127	−0.491	−0.299	−0.485	0.759	0.399	−0.367	1.221	0.473	−0.302
SNNP	2.084**	0.954	0.188	1.813*	1.270	0.232	4.137***	3.408***	0.416	5.614***	4.247***	0.231
Constant	14.976***	6.129***	6.025***	18.772***	9.270***	8.866***	18.798***	11.841***	12.343***	20.616***	15.640***	12.469***

Note: * Significant at 10%, ** significant at 5%, *** significant at 1%. Only coefficients of variables reported.

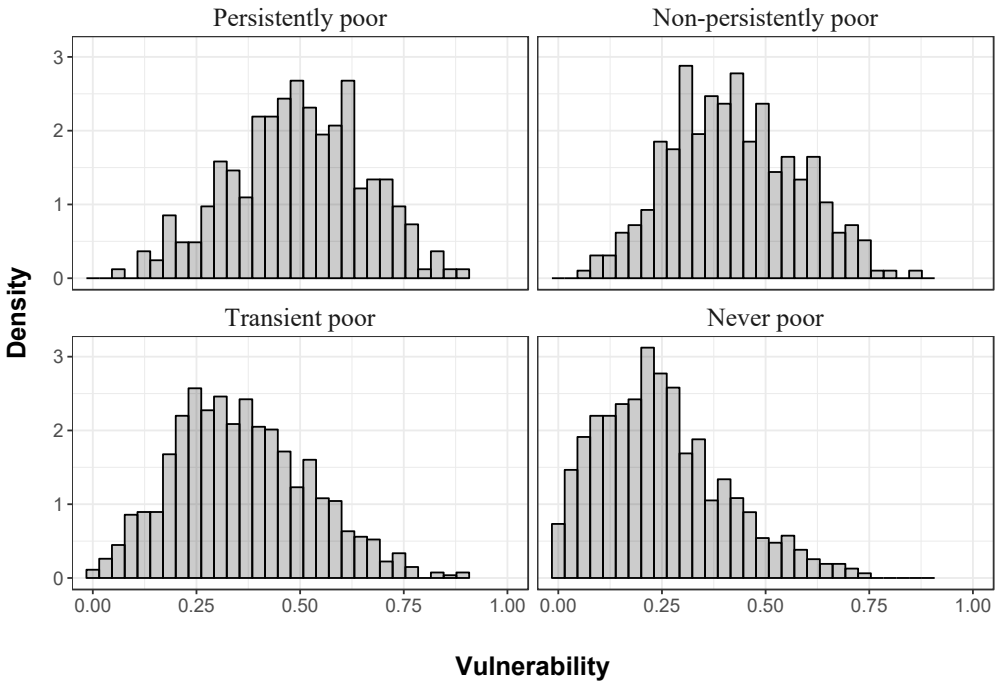
Appendix C: Three Stages Feasible Generalized Least Squares Regression results

	Stage 1	**Stage 2**	**Stage 3**
Variable	log(cons)	e_sq	log(cons)
Household size	−0.084***	−0.002	−0.083***
Female headed hh	0.102***	0.023	0.099***
Age of hh head	−0.011**	0.002	−0.011**
Age squared	0.000**	−0.000	0.000**
Head Years of Schooling	0.020***	−0.003	0.020***
HH members, mean yrs of schooling	0.024***	−0.004	0.023***
Proportion of children (< 15 yrs)	−0.004	0.028	−0.021
Proportion of old aged (> 65 yrs)	0.061***	0.007	0.062***
Log land size owned (m^2)	−0.003	−0.011**	−0.002
Log asset value (durables)	0.045***	0.009	0.044***
Number of Livestock	0.007***	−0.000	0.007***
Distance to nearest road (KMs)	0.001	−0.001	0.001
Distance to nearest market (KMs)	−0.001***	0.001***	−0.001***
Access to hospital/health center	0.146***	0.045**	0.152***
Access to water supply	−0.102***	0.023	−0.100***
Access to bank	0.058	−0.000	0.054
Access to microfinance	0.021	−0.050***	0.018
Agricultural shocks	−0.318**	−0.094	−0.327**
Price shocks	−0.020	0.197*	0.007
Human capital shocks	−0.517***	−0.055	−0.492***
Other shocks	−0.544*	0.334	−0.485
Land_agricultural shock	0.009	0.006	0.008
Land_price shock	−0.002	0.005	−0.004
Land_human capital shock	0.005	0.006	0.004
Land_other shocks	−0.011	−0.009	−0.009
Asset_agricultural shock	0.026*	0.002	0.028**
Asset_price shock	0.008	−0.023**	0.007
Asset_human capital shock	0.055***	−0.001	0.053***
Asset_other shocks	0.063**	−0.027	0.054*
Constant	8.547***	0.224*	8.534***
Observations	2463	2463	2463

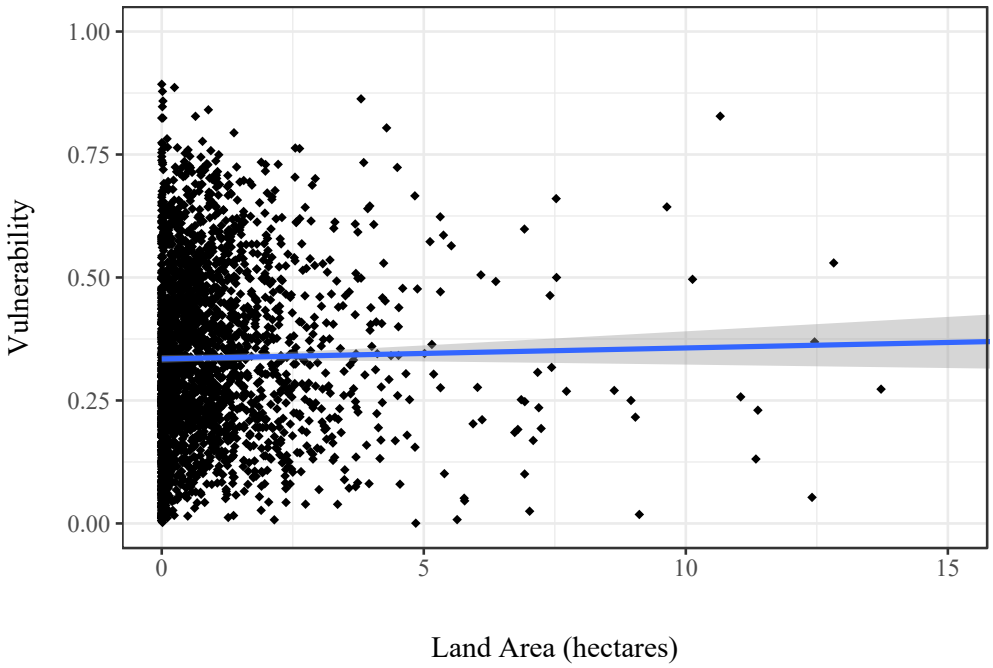
Appendix D: Kernel density of expected log consumption per-adult equivalent



Appendix E: Distribution of vulnerability by poverty status



Appendix F: Vulnerability and Land Ownership



Appendix G: Vulnerability and Livestock ownership