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Master in Economic Development and Growth

Determinants of Poverty in Rural Ethiopia: A Household Level Analysis

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Abstract: This paper investigates the dynamics of poverty in rural Ethiopia during the period from 1994 to 2009. In order to explore factors that decisively affect the possibility of falling into and exiting out of poverty, the paper uses six rounds of data and employs alternative dynamic probit model which handles the problem of serial correlation, unobserved individual heterogeneity, state dependence and the initial conditions problem. The estimation result shows that the likelihood of falling in to poverty in any round is a direct function of previous experience in poverty suggesting strong evidence for the existence of true state dependence. Socioeconomic variables like land size, oxen and other tropical livestock units have tremendous role in reducing the probability of falling into poverty. Additionally, while demographic characteristics and drought has significant effect in the northern part, cash crop production plays a vital role for households in southern Ethiopia. Finally, the paper draws important policy implications that can be helpful for policy making and enlighten appropriate intervention areas.

Key words: poverty dynamics, state dependence, transitory shocks

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1. Introduction

In recent years, many countries in Africa have experienced extraordinary rebound in economic growth. Have poor individuals benefited from this growth? This is a policy debate and controversial issue in recent literature. Over the past three decades, there has been substantial number of works on the analysis of poverty worldwide. The research interest in poverty analysis is further intensified with the decision of many countries, including Ethiopia, to adopt the United Nations Millennium Declaration during the 2000 Summit and to exert as much effort as possible to achieve the Millennium Development Goals (MDGs). The first goal in MDGs is 'eradication of extreme poverty and hunger'. This goal has three specific targets: (a) to halve the proportion of people living on less than one dollar a day; (b) achieve decent employment for men, women, and young people; (c) to halve the proportion of people who suffer from hunger. However, recent evidences reveal that despite considerable progress in reducing poverty in some regions over the past decades-remarkably in East Asia- still nearly 1.4 billion people are living on less than US\$1.25 a day, and about 1 billion people are suffering from hunger (IFAD, 2011).

Poverty continues to be the main challenge in developing countries, especially in sub-Saharan Africa (SSA). Three fourths of the poor in the developing world live in rural areas, and rural poverty remains high and persistent-51 percent in SSA-while the absolute number of poor people increased since 1993 (World Bank, 2008). In fact, the burden of poverty in SSA is disproportionately borne by rural dwellers and women (UNECA, 2012).

Nowadays, across SSA rural infrastructure has almost deteriorated, farming has languished, food systems have stagnated, and inequalities have deepened (UNDP 2012). While the rapid growth and quick reduction in poverty continue to be witnessed in Eastern Asia, growth in SSA could not be fast enough to eradicate extreme poverty. Despite the recent improvements, majority of SSA countries have very low Human Development

Index (HDI). In the year 2011, the 15 lowest ranked countries with HDI are from SSA; and of the bottom 30 countries, only Afghanistan and Haiti are outside SSA (UNDP, 2012). This poor level of achievement is manifested in all dimensions of the HDI: income, health, and education.

Specifically, poverty is widespread in Ethiopia as a large proportion of its population lives below one dollar a day. Despite rapid economic growth in the past decade, averaged 10.1 percent for the last nine years, poverty is still prevalent in Ethiopia that makes the country among the poorest in the world. According to UNDP (2012), Ethiopia is ranked 174th out of 187 countries in terms of HDI. Similar to in other developing countries, majority of the poor in Ethiopia live in rural areas (Alemu et al., 2011) where 83 percent of the total population lives (World Bank, 2012).

Poverty, underdevelopment and backwardness in Ethiopia are not confined to destiny. What matters is taking relevant reforms that can relax the binding constraint. The poor in Ethiopia are not fated to be malnourished and face misery as long as the government moves determinedly to introduce appropriate reforms, policies and support mechanisms. Indeed, proper policies might necessarily differ based on the inherent features of poverty in the target population. However, if one finds the relative influence of different correlates of poverty, government policies can easily focus on those determinants and take appropriate measures to combat poverty.

1.1 Research Question

After decades of political instability, civil war and economic decline, economic reform in Ethiopia began in the late 1980s. The initial phase of the reform program, which took place following the downfall of the military (Derge) regime in 1991, focussed mainly on liberalization of food markets (Dercon, 2000; Dercon, 2006). As of 1994, with enormous supports from the World Bank and IMF, Ethiopia implemented a structural adjustment program and took several reforms related to investment and trade liberalization, exchange rate determination and removal of fertilizer subsidies. This was followed by economic recovery after 1996 (Dercon, 2000;

Dercon, 2006) which led to a reduction of poverty in the country (IMF, 1999; Demery, 1999; Dercon, 2000; Dercon, 2006).

In 2002, the government instigated a comprehensive poverty reduction strategy (i.e. the Sustainable Development and Poverty Reduction Program) with four building blocks: (a) Agricultural Development Led Industrialization (ADLI), (b) justice system and civil service reform, (c) decentralization and empowerment, and (d) capacity building in public and private sectors (MoFED, 2002). Since the livelihood of the majority of the population in Ethiopia is based on the agricultural sector, poverty reduction policies in the country have targeted at strategies to increase agricultural productivity through provision of credit and input supply services, access to better extension packages, expansion of infrastructure facilities, mainly water supply and rural roads, and expansion of healthcare services and primary education (MEDaC, 1999; Dercon, 2000; FDRE 2000). The poverty reduction strategies have been complemented with food transfers, food-for-work and cash-for-work programs primarily to alleviate short-term food insecurity, and also to finance public investments such as schools, clinics, rural roads and irrigation facilities (MEDaC, 1999; FDRE 2000). Regardless of the implementation of various reform programs and poverty reduction strategies and despite the rapid economic growth in the past decade, poverty is still a widespread phenomenon in Ethiopia.

The literature that analyse poverty dynamics in Ethiopia is at best scanty. Majority of available studies predominantly focus on poverty profile which describes the pattern of poverty. To date, to the best of my knowledge, there have not been much rigorous studies on the determinants of household poverty in Ethiopia. Even among those do exist, some focus specifically on urban areas (e.g. Tadesse, 1999; Kedir, 2005; Bigsten & Shimeles, 2011; Gebremedihin & Whelan, 2008; Alem, 2011), where only small proportion of the Ethiopian poor lives in, and others are based on cross sectional data and very limited sample size (e.g. Alemu et al., 2011; Oumer & de Neergaard, 2011; Regassa & Stoecker, 2012; Uruguchi, 2012). Static analysis of poverty using cross sectional data gives the picture for a particular point in time,

and hence, shows a meagre analysis of the evolution of poverty. In order to tackle poverty, analysing poverty dynamics using longitudinal data and exploring factors that determine the possibility of falling into poverty is indispensable. Examining and understanding factors that determine the situation of rural poor in Ethiopia helps to draw clear direction for policy making and enlightens appropriate intervention areas.

Therefore, the prime aim of this research is to answer the following specific questions.

1. What are factors that decisively affect the likelihood of rural households to fall into poverty in Ethiopia?
2. Do those factors that affect the likelihood of rural households to fall into poverty vary across regions?
3. What lessons or policy implications can be drawn from the findings, if any?

1.2 Outline of the Thesis

This paper is divided into five parts. The first part discusses an introduction to the topic and clarifies the research question that is going to be thoroughly addressed in the paper. The second part deals with the theory. It, in the beginning, discusses existing empirical works on the topic, and later on presents the theoretical framework. The third part describes the data and explains the methodology used for the entire analysis. The fourth part presents the results and discusses thoroughly by comparing the north with the southern part of the country. Finally, the fifth part concludes the paper and sheds light on important policy implications.

2. Theory

2.1 Review of Previous Studies

There is limited but highly growing literature on poverty dynamics. The beginning of pragmatic works on poverty dynamics is attributed to Bane and Ellwood (1986). They use Panel Study of Income Dynamics (PSID), a

longitudinal survey of a representative sample of the United States (US) individuals and families, for the periods between 1970 and 1981 in their study. They argue that poverty dynamics is properly understood as long as it is defined in terms of poverty spells that allows estimating the degree of falling in to and exiting out of poverty due to variations in income and changes in family structure. They found majority of the poor are characterized by longer spells of poverty. Besides, nearly two-fifth of the spells of poverty begun due to a decline in the earnings of the household head while three-fifth of the spells end as a result of a rise in the earnings of the household head.

Bane and Ellwood (1986), further, examine female-headed households excluding the male-headed ones and come to know that changes in household structure are fairly important, though not important as earnings. They find that a quarter of female-headed households having children exit out of poverty when they shift their family structure in to a male-headed household. Stevens (1994) updated the work of Bane and Ellwood (1986) using PSID but by extending the period through 1987 and finds that during the period under consideration, female-headed households are less likely to move out of poverty than their male-headed counterparts.

Jalan and Ravallion (1998) use panel data for China and apply components approach to decompose the poor in to transient and chronic poor. They also employ the censored conditional quintile regression model to investigate the process behind transient and chronic poverty. They find that physical assets as important determinant of transient poverty, wealth holdings decreases the amount of transient poor while demographic characteristics and education level of the household are less likely to affect transient poverty. However, chronic poverty is highly influenced by household demographic characteristics, high variance of wealth holding and size of cultivated land. In general, they find that the determinants of transient and chronic poverty are different except for life cycle effects and physical asset holding. They recommended that poverty reduction strategies require policy instruments

like seasonal credit schemes, public works, insurance options, and buffer stocks for the poor that can smooth the consumption variability.

Glewwe, Gragnolati and Zaman (2002) use the decomposition method and multinomial logit regression models to investigate factors driving the change in poverty status of a household between years 1993 and 1998 in Vietnam. Their results show that the common drivers of poverty dynamics are demographic characteristics, education of household head, type of employment, ethnicity, access to infrastructure and location. Litchfield and Justino (2004) use similar dataset to examine factors affecting the rural poverty dynamics in Vietnam. Their result confirmed the findings of Glewwe, Gragnolati and Zaman (2002) that the major drivers of poverty dynamics are education of household head, type of employment, access to infrastructure and location.

Woolard and Klasen (2005) employ multivariate analysis method on a panel household data from a populous province in South Africa, Kwazulu-Nata, and find a quite high degree of mobility, in contrast to developing economies. Their analysis shows that employment changes and demographic changes are the principal determinants of mobility. These factors relay on high unemployment resulted from labour market volatility as well as on demographic changes resulted from rapidly shifting household boundaries (i.e. changes in fertility and mortality). The authors also explore four poverty traps that obstruct the advancement of the poor. These obstructions are low level of assets, poor initial education, large household size, and poor labour market participation. In contrast, having more job opportunities, smaller household size and better education offer them chance to be better-off.

However, when we come specifically to Ethiopia, despite the rampant poverty in the country, the literature on poverty dynamics is at best scanty. This may be because of the demanding nature of the longitudinal data to analyze the dynamics. Most of existing studies of poverty in Ethiopia are attributable to Dercon and Krishnan (1998; 2000), Dercon (2000; 2004;

2006), Bigsten, et al (2003; 2005) and Bigsten and Shimeles (2003; 2008; 20011).

Dercon and Krishnan (1998) examine rural poverty in Ethiopia using the longitudinal data from the Ethiopian Rural Household Survey (ERHS) i.e. rounds of 1989, 1994, and 1995. They use consumption per adult equivalent as welfare indicator and observed significant decline of poverty between 1989 and 1994 but remained almost unchanged between 1994 and 1995. They also found that households with better access to roads and towns, and considerable human and physical capital have lower poverty levels and have higher possibility to be better-off over time. Besides, access to roads and towns and having substantial human capital also reduce the variations in poverty across the seasons.

Dercon (2004) and Dercon, Hoddinott and Woldehanna (2005) explore that shocks significantly affect rural households in Ethiopia. The most prominent types of shocks that distress the welfare of households are drought, crop pests, shocks on price of inputs and outputs, crime, death and serious illness. In addition, Dercon (2006) analyzes rural poverty changes and determinants of growth during the initial phases of the economic reform in Ethiopia (1989–1995). His result indicates that generally, there was a substantial reduction in poverty and considerable improvement in consumption during the period under consideration. Moreover, he noted that on average the poor were better-off than the non-poor households, although the benefits from the reforms are not evenly distributed among all the poor. He also finds that shocks led to changes in the returns to human capital, land, labor and location. This implies that, besides the short-run poverty impact, shocks in Ethiopia have serious negative growth implications.

Bigsten and Shimeles (2003) use ERHS 1994-1997 and employ the spells and component approach to analyze the dynamics of poverty in Ethiopia. They noticed that transient poverty dominating rural households and found a modest decline in poverty for the rural areas. They also found that factors

that affect the probability of moving into poverty are dependency ratio and age of the household head. Besides, factors that significantly reduce the likelihood of falling in to poverty are education of the household head, size of cultivated land, type of crops planted, value of crop sales, and access to local markets.

2.2 Theoretical Framework

Poverty continues to attract global attention particularly in programmes that concerns development since it is a lifelong phenomenon that plagued mankind in our efforts on the way to development. It is difficult to define poverty mainly due to its multidimensionality. Poverty is usually taken as the lack of necessities though what is a necessity to one individual may not be for the other. Necessities are relative to what is possible usually based on social characterization and past experience (Sen, 1999). Poverty is also a social phenomenon which goes further than economic spheres and encompasses inability of individuals to participate in social life and political milieu. One way of defining poverty is by letting the poor to explain their own poverty. It is allowing individuals or groups who are practically facing poverty to define what represents their basic requirements in life. However, the most commonly used definition is the one defined by the World Bank (2000) as “the economic condition in which people lack sufficient income to obtain certain minimal levels of health services, food, housing, clothing and education generally recognized as necessary to ensure an adequate standard of living”.

According to the World Bank (2000), poverty is pronounced deprivation in well-being. It is possible to look well-being in three different dimensions: (a) as the command over commodities in general, (b) as an ability to obtain specific type of consumption good, or (c) as a “capability” to function in society (World Bank, 2005). In the first approach of looking poverty (well-being), the prime interest is whether households have sufficient resources to satisfy their needs. Accordingly, poverty is measured in monetary terms by comparing household’s income or consumption against specified threshold

level below which they are considered as poor. The second approach goes beyond monetary measures to look detail nutrition, health and education of individuals under consideration. The third approach to well-being is articulated by Sen (1987), who argues that lack of key capabilities, inadequate income, inadequate education, poor health, low self confidence, insecurity, freedom of speech, and sense of powerlessness leads people towards poverty.

Of the three approaches, the money-metric approach (i.e. using income or consumption as welfare indicator) is a dominant approach mainly due to the fact that one can analyse the individual characteristics and other socioeconomic conditions that are correlated with poverty (Bigsten et al., 2005). Particularly, consumption is usually viewed as the better indicator of poverty measurement than income (Ravallion 1994; Lipton & Ravallion 1995; Deaton 1997). There are two crucial reasons for preferring consumption to income (Coudouel et al., 2002). First, consumption is considered to be a better indicator of outcome than income. Actual consumption indicates the ability of a household to meet its basic needs, while income is only one of the basic elements (there are others like availability and access) that influence levels of consumption. Therefore, it implies that a standard of living of individuals is better reflected by consumption data than purely by income. Second, consumption data can be better measured than income mainly due to seasonality of income among rural households, and underreporting of their income than their actual consumption. For these reasons, consumption expenditure is the main indicator of welfare to categorise households as poor and non-poor.

Up on discussing the pertinent way of measuring poverty, the next step is to look poverty theories which provide comprehensive explanation of why people are poor. Recent literature acknowledges various theories that explain poverty. This review presents a brief description of individualistic, cultural, geographical and structural theories of poverty.

2.2.1 Individualistic Theory of Poverty

The individualistic theory explains poverty as a result of the characteristics that are intrinsic in the individual and that consists the personal ability like intelligence and the character of the person. This theory states that the poor people become poor due to their lack of ability to compete with others for resources. This theory perceives the poor as if they are born with it (i.e. born being disabled like crippled, blind, or deformed) and for that reason they cannot do anything to change the situation in which they are living (Rainwater, 1970). Furthermore, the individualistic theory perceives that poverty is resulted due to acquired personality traits like character and actions of individuals. The idea here is that some individuals who are born being lazy do not voluntarily participate in tasks that have meaningful effect in their life. However, this theory fails to realize the ability of those born disabled to do something that can drive them out of poverty. Asen (2002) argue that any individual can succeed by hard work, and that persistence and motivation are all that are required to be successful.

In favour of the idea of individualistic theory, the neoclassical economics advocates that the poor are poor because of their decisions. The assertion is due to the fact that individuals seek to maximize well being by making their own choices and investments. When some individuals choose low-payoff and short term returns, economic theory holds those individuals largely responsible for their choices, for instance to forego the adoption of production process that will boost output or to forego education that will lead to better paying jobs in the future.

2.2.2 Cultural Theory of Poverty

The second theory is cultural theory of poverty which is primarily originated from the culture of poverty. It is the theory developed by an anthropologist Oscar Lewis in 1959 based on his experience of Mexico. This theory advocates that poverty is caused by the spread over generations of a set of skills, values, and beliefs that are socially created but individually held (Lewis, 1959). The culture of poverty is a syndrome that develops in some

specific situations. It occurs in an economic setting with low wages, high rate of unemployment, and people with low skills. In the absence of deliberate support from the government, the low-income population have a tendency to build up the culture of poverty against the prevailing ideology of expanding the middle class. The poor understand that they have a negligible position within an individualistic and highly stratified capitalistic society, which does not give them any hope for upward mobility (Lewis, 1959). As a result, the poor create survival strategy by developing their own subculture and institutions, and finally come to embody a common pattern of behaviour, norms and values. The subculture developed by the poor is characterized by pervasive feelings of dependency, helplessness, marginality, and powerlessness (Lewis, 1959).

Nevertheless, the cultural theory of poverty and the way in which it is understood and applied to society was not far from flaws and criticisms. The main critics comes due to the fact that the culture of poverty takes for granted that culture itself is unchanging and relatively fixed, i.e. once a population falls within the culture of poverty, poverty alleviation interventions will not change the behaviours and cultural attitudes embodied in that population. Thus state support and public welfare assistance to the poor cannot eliminate poverty for the reason that poverty is integrated in the culture of the poor. Due to this reasoning, the cultural theory of poverty shifts the blame for poverty from economic and social conditions to the poor people themselves (Bourgois, 2001). Though the theory acknowledges basic factors that led to the initial state of poverty (such as lack of sufficient social services, substandard housing and education, persistent racial discrimination, and lack of job opportunities), it primarily focuses on the cause of current poverty as the attitudes and behaviours of the poor.

2.2.3 Geographical Theory of Poverty

The third theory is geographical theory of poverty which corresponds to spatial characterization of poverty. This theory states that poverty is severe

in certain areas than in the other due to the fact that individuals, cultures, and institutions in some areas are deficient in the objective resources essential to generate income and well being. Recent explanations include proximity to natural resources, disinvestment, density, and other similar factors (Morrill and Wohlenberg, 1971). The theoretical perspective on geographical theory of poverty comes from the economic theory of agglomeration. The economic theory of agglomeration is used to characterize the emergence of industrial clusters, the concentration of firms in proximate area so as to benefit from internal and external economies (Bradshaw, King, and Wahlstrom, 1999). In the same way, the geographical theory of poverty describes that the proximity of poverty and favourable conditions leading to poverty generate more poverty. For example, the poor usually live in areas where there is more crime and inadequate social services. These places have commonly low housing prices and this attracts more poor individuals to the area.

The other theoretical insight of geographical theory of poverty is from central place theory that traces the flows of capital as well as knowledge. For example, rural areas are most of the time the last stop of technologies, and competitive pricing and low wages dominate production (Hansen, 1970). The lack of social infrastructure limits economic activity and places left behind experience the largest competition (Lyson and Falk, 1992). Therefore, privileged areas stand to grow more than underprivileged areas even during the time of general economic growth with some "trickle-down" but not lead to equalizing effects as classical economists assert (Rural Sociological Society, 1990; cited in Bradshaw, 2007). The geographical theory of poverty connotes that responses need to be focussed to solving the key dynamics that create deprivation and economic decline in disadvantaged areas while other areas are growing (Bradshaw, 2007). Instead of focusing on individuals, governments, businesses, cultural processes, or welfare systems, the geographical theory guides community developers to emphasize at depressed areas. The prime reason is that the evils of poverty are highly

reinforced by the geographical environment of the slum districts where the poor are concentrated.

2.2.4 Structural Theory of Poverty

Finally, the structural theory is a progressive social theory. This theory does not blame the victim for his/her own poverty as individualistic and cultural theories do, but it looks to the social, political, and economic system which causes individuals to have inadequate resources with which to realize their income and well being. The standards of living and social relations of individuals in a society are shaped by educational facilities, labour market opportunities, and economic growth. The inherent structures in the society including social relations such as gender, race, power and class determines the fate of individuals (Bradshaw, 2007). This implies that it is the malfunction of the structures that causes poverty in the society.

Therefore, using structural theory in explaining poverty helps to target on factors that perpetuates poverty. It can be made without changing the poor themselves, rather by changing the condition of the poor by means of adjusting the restrictive socioeconomic structures that aggravate poverty. This theory advocates that elimination of structural barriers and implementing a wide range of socioeconomic policies generates substantial numbers of successes in reducing poverty. The range of socioeconomic policies that can be adjusted to realize poverty reduction include raising wages, providing jobs, assuring effective access to medical care, expanding the safety net, and coordinating social insurance programs (Bradshaw, 2007).

The conclusion to be drawn from the discussion of the poverty theories, in so far as this research is concerned, is that all the individualistic, cultural, geographical and structural theories seek to identify the various reasons of falling in to poverty. Nevertheless, all poverty theories are divergent and do not add to a single consistent theory of explaining poverty. No one theory has appeared that either invalidates or subsumes the others (Blank, 1997). For example, some individuals/households can be poor due to their lack of

ability (for instance, due to old-age or gender bias) to compete with others for resources. Others can be poor because they are born being lazy and do not voluntarily participate in tasks that have meaningful effect in their life. Such factors can be well explained by individualistic theory. But this explanation is partial since it does not describe the whole neighbourhood. Part of the community might be hardworking, but still stay in poverty due to disadvantaged settlement in less fertile and drought prone areas. For such neighbourhoods geographical theory is well suited than the rest. It might also be explained with structural theory if it is the social, political, or economic system which causes individuals to settle on such neighbourhoods and have inadequate resources. Hence, the conceptual framework in this research does not solely depend on one particular poverty theory. It is sensible to combine the different theories since, as Duncan (1984) notes, a framework with a complete explanation of why the poor become poor would require several interrelated theories of poverty.

Based on the above discussed theories and empirical literature, it is possible to summarize the various factors that affect the likelihood of households to experience poverty. Poverty may arise due to household or individual level characteristics. It may also arise due to factors that are external to the household, i.e. due to community level, and/or regional level characteristics. It is possible to disaggregate household level characteristics in to two broad categories as demographic and socioeconomic characteristics. Indicators of demographic characteristics that may be associated with poverty are household size and structure, dependency ratio, the age of the household head and the gender of household head.

The size and composition of the household is usually different for the poor and non-poor, as the poor tend to live in larger households (Lanjouw & Ravallion 1995; Deaton & Paxson 1998; Jalan & Ravallion, 1998). It is also possible to argue that the rich may have many children than the poor as the rich can afford the cost of raising a child. Finding an evidence for these arguments can have policy implications, either to incorporate population policy or implement demographically contingent interventions for fighting

poverty. Households headed by women and/or with high dependency ratio tend to be poorer (World Bank, 2005; Jalan & Ravallion, 1998).

The most familiar socioeconomic characteristics that explain poverty are household asset and household employment. The ownership of tangible goods, livestock units and financial assets affects the income flow of a household. The employment status, the type of work and the length of hours an individual works also highly matters. Typically, in rural areas, the cropping system of the household can affect the income obtained from farming activities. Cash crop farmers may generate higher income and, therefore, be less poor than food crop farmers irrespective of the amount of inputs and the size of the cultivated land.

There are various community level characteristics that might be related with poverty for certain neighbourhood. Infrastructure is the core determinant at this level. It includes access to electricity, proximity to paved roads, access to market, access to schools and health care service centres. In addition, inadequate social service provision, social exclusion and discrimination are associated with chronic poverty (Grant & Marcus, 2009). At the regional level, poverty might be associated with several features. Grant and Marcus (2009) identify remoteness (geography) as structural factor associated to chronic poverty. Generally, poverty is higher in areas characterized by low resource base, geographical isolation, rainfall deficit, and other harsh climatic conditions (World Bank, 2005).

Despite the prime focus of this research is on household level characteristics, some important community and regional level characteristics like drought and access to market are also made part of the analysis in the research.

3. Data and Methodology

3.1 Data Source

Most researches on Poverty are typically constrained by lack of adequate data on various indicators of households. Recently, in many developing countries including Ethiopia, governments and development partners placed

a high concern and started to develop relatively reliable longitudinal data for poverty analysis. This study uses a unique longitudinal household dataset from the Ethiopia Rural Household Survey (ERHS)¹. The ERHS started in 1989, when a survey was commenced with 450 households in 6 Peasant Associations² (or Kebeles) specifically in Central and Southern Ethiopia. The survey was further expanded in 1994 to increase the sample size from 450 to 1477 households from a total of 15 Peasant Associations. The selection of Peasant Associations took in to account the diversity of the farming systems found in Ethiopia. Additionally, stratified sampling within each village was made to include a representative sample of female-headed and landless households. The survey addressed a wide range of characteristics which include household characteristics, food consumption, livestock and agriculture information, health, sewage and toilet facilities, electricity and water, production and marketing, wages, education, and health services (Dercon & Hoddinott 2011, for further details about ERHS).

In order to create a longitudinal data, additional consecutive rounds was conducted in the late 1994, 1995, 1997, 1999, 2004 and 2009. In all rounds (except in 1989) of the survey, the questions asked were identical, or very similar, and the data were processed in comparable ways. Therefore, due to the fact that the 1989 round had relatively smaller sample size with a narrow set of questions, this study will consider the data of later rounds (1994-2009). However, there are still caveats in this dataset to be considered as nationally representative since it does not include urban dwellers and pastoral households which constitute 17 and 12 percent of the total population respectively.

¹ These data have been made available by the Economics Department of Addis Ababa University (AAU), the Centre for the Study of African Economies (CSAE) at the University of Oxford and the International Food Policy Research Institute (IFPRI). Funding for data collection was provided by the Economic and Social Research Council (ESRC), the Swedish International Development Agency (SIDA) and the United States Agency for International Development (USAID); the preparation of the public release version of these data was supported, in part, by the World Bank. AAU, CSAE, IFPRI, ESRC, SIDA, USAID and the World Bank are not responsible for any errors in these data or for their use or interpretation.

² Peasant Association or Kebele is the lowest administrative unit in Ethiopia consisting of a number of villages.

3.2 Sub-dividing the Samples

Analysing poverty dynamics at the aggregate level shows the overall picture at country level and this aggregation hides the stark contrast of living conditions in different regions and may overlook some important features which are specific to some places/regions. Since Ethiopia is endowed with diverse agro-ecological zones which vary in terms of topography, climate, rainfall patterns, soil types, farming system and living arrangements, a one-fits-all approach does not help much (Alemu, Nuppenau and Bolland 2009), and hence it will be worthwhile to scrutinize poverty dynamics at disaggregated level.

The data I am using in this research (i.e. ERHS) is collected from four main administrative regions in Ethiopia, namely Tigray, Amhara, Oromia and SNNP³. According to CSA (2010), these four regions cover about 60 percent of the total land area and constitute more than 86 percent of the total population. Tigray and Amhara are located in the northern part while Oromia and SNNP are in Southern part of the country. The northern part is characterized by subsistence agriculture, rugged topography, land degradation, rainfall variability and drought, and higher population pressure (Bewket, 2009). However, the southern part, which includes Oromia and SNNP, is endowed with diverse natural resources, has fertile soil, rich for its abundant surface and ground water, is a region of relatively high rainfall by Ethiopia standards, and the source of major cash crops such as coffee and khat⁴ (USAID, 2005; FDRE, 2011). As a result, the samples are sub-divided in to two, north and south constituting 620 and 840 sample households respectively and the underlying features of poverty dynamics is analyzed for both regions separately.

³ Southern Nations, Nationalities, and People's Region

⁴ Khat is a flowering plant native to East Africa, especially Ethiopia and Somalia, which is chewed as a stimulant, for excitement and euphoria

3.3 Methodology

3.3.1 Setting Poverty Line

The three basic steps in poverty analysis are choosing a welfare indicator, establishing a poverty line and aggregating poverty data (Ravallion, 1994; Deaton, 1997). As discussed in section 2.2.1, consumption expenditure is the main indicator of welfare to categorise households as poor and non-poor in this study. It is figured in monthly percapita terms and deflated by using the Food Price Index (FPI) with 1994 base year.

In order to set poverty lines, the research employs the cost of basic needs approach (CBN) and uses a bundle of food items from the 1994 data that would provide 2300 Kcal per person per day, which is the minimum calories required for an adult to lead an average physical life under normal conditions based on estimation of the Ethiopian Nutrition and Health Research Institute (EHNRI). Therefore, a household is considered to be living in poverty provided that the percapita daily household food energy intake goes below this threshold (2300 kcal).

Though many combinations of food items could yield the required 2300 kcal, care has to be taken while selecting the bundle of food items to consider the actual consumption pattern of the poor. At this stage, one cannot know who precisely are poor and non-poor to define the reference basket as the poverty line has not yet been set. Ravallion and Bidani (1994) take the poorest fifteen percent of the population in Indonesia to construct the reference bundle for their study. In Ethiopia, Dercon and Krishnan (1998) and Bigsten et al. (2003) focus on the poorest fifty percent of their sample households to set the reference food basket for their studies. Similarly, this research takes the poorest half of the sample households in constructing the reference bundle. Following the method used in Ravallion and Bidani (1994), the research adds the non-food basket and finally the resulting bundle is converted to monetary values so as to set the poverty line.

3.3.2 The Model

Investigating the dynamics of poverty is an important way to capture the interaction between past poverty history of a household and its persistence over time. Poverty persistence may arise either due to transitory shocks, or because of unobserved characteristics, or due to state dependence of poverty. State dependence is a situation when poverty propagates itself due to the fact that households who have a long history of being poor are less likely to leave the state of poverty (Duncan et al., 1993; Biewen, 2006). Therefore, to acquire the precise measure of true state dependence, models of poverty dynamics should account for effects of transitory shocks and unobserved heterogeneity. Many empirical studies used the parametric (i.e. proportional hazard models and logistic regression) and non-parametric models (i.e. Kaplan–Meir survival function) to examine the dynamics of poverty. Even though these parametric and non-parametric models give consistent estimates of hazard rates, they are not paramount to properly model the true state dependence (Cappelari & Jenkins, 2002; Devicienti, 2003, cited in Bigsten & Shimeles, 2008). In order to explore factors that decisively affect the possibility of falling into and exiting out of poverty, this paper uses a dynamic probit model which handles the problem of unobserved heterogeneity, state dependence and serial correlation. Finally, following Stewart (2006), the latent variable specification of the model takes the following form:

$$P_{it}^* = \gamma P_{it-1} + X_{it}'\beta + \alpha_i + \varepsilon_{it}, \quad \text{for } i = 1, 2, \dots, N; t = 2, 3, \dots, T \quad (1)$$

where P_{it}^* is the latent dependent variable, P_{it} is observed binary outcome variable which is defined as:

$$P_{it} = \begin{cases} 1 & \text{if } P_{it}^* \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

and where X_{it} stands for a vector of explanatory variables (observable characteristics), β is a vector of parameters to be estimated, γ corresponds to the state dependence that shows a condition in which facing poverty in one period leads to a higher possibility of continuing to be poor, also taken as a measure of a poverty trap (Chay et al., 1998, cited in Bigsten & Shimeles,

2008), α_i represents household-specific time-invariant unobserved determinants of poverty (these might be factors like ability, intelligence, general attitude or motivation of household members), and ε_{it} is the error term with $\varepsilon_{it} \sim N(0, \sigma_\varepsilon^2)$. The subscript i indexes households and the subscript t indexes rounds of observations. Despite the serial-independence of ε_{it} , the composite error term, i.e. $u_{it} = \alpha_i + \varepsilon_{it}$, will be correlated over time due to the household-specific time-invariant terms, i.e. α_i . This implies equicorrelation between the u_{it} in any two (different) periods:

$$\lambda = \text{Corr}(u_{it}, u_{is}) = \frac{\sigma_\alpha^2}{\sigma_\alpha^2 + \sigma_\varepsilon^2} \quad t, s = 2, 3, \dots, T; t \neq s \quad (2)$$

Since P is a binary variable, for convenience, σ_ε^2 is normalized to one ($\sigma_\varepsilon^2 = 1$). Given α_i , and ε_{it} is normally distributed, the transition probability for household i at time t is then given by:

$$\Pr(P_{it} | P_{it-1}, X_{it}, \alpha_i) = \Phi\{(\gamma P_{it-1} + X'_{it}\beta + \alpha_i)(2P_{it} - 1)\} \quad (3)$$

The presence of both P_{it-1} and α_i in equation (3), which in many cases is correlated, will create the “initial conditions problem”. It occurs because the start of the process (poverty) does not coincide with the start of the first observation (round one in 1994 in this case). Households found to be poor or non-poor in the first observation may be poor or non-poor due to prior history of poverty or as a result of observed and/or unobserved features affecting their poverty status. Therefore, using the standard panel probit model to estimate equation (3) will result in inconsistent estimates. So as to take care of this problem, recent empirical works suggest using other alternative estimators, i.e. Heckman (1981) two-step estimator, Orme (1997, 2001) two-step estimator, and Wooldridge (2005) conditional maximum likelihood (CML) estimator. The simulation experiments by Arulampalam and Stewart (2009) suggest that these three estimators provide similar results and none of the three estimators dominates the other two in all cases. However, among these three estimators, the Wooldridge CML estimator is straight forward to use in standard econometric software

like Stata. Therefore, the Wooldridge CML estimator is used in this paper and the way how this estimator works is elaborated as follows.

3.3.3 The Wooldridge CML Estimator

The Wooldridge CML estimator is a method that takes care of the initial conditions problem of the ordinary dynamic non-linear panel data models. It basically works through the distribution of $P_2, P_3, P_4, \dots, P_T$ conditional on exogenous variables and the initial period value P_1 . The joint density of the dependent variable is written in sequence as $f(P_T, P_{T-1}, P_{T-2}, \dots, P_2 | P_1, x, \alpha)$. Wooldridge specifies an alternative approximation for the density of the time-invariant unobserved individual specific term α_i conditional on the initial value of the dependent variable P_1 . He also integrates unobserved individual specific term α_i out from the equation and suggests the following specification:

$$\alpha_i | P_{i1}, z_i \approx N(\zeta_0 + \zeta_1 P_{i1} + z_i' \zeta, \sigma_a^2) \quad (4)$$

Where

$$\alpha_i = \zeta_0 + \zeta_1 P_{i1} + z_i' \zeta + a_i \quad (5)$$

Equation (5) avoids the correlation between the time-invariant unobserved individual specific term and the initial observation (α_i and P_{i1}) and results in a new unobservable term a_i which is uncorrelated with the initial value of the dependent variable P_{i1} .

Finally, substituting equation (5) into equation (3) gives

$$\Pr(P_{it} = 1 | P_{i1}, a_i) = \Phi\{(\gamma P_{it-1} + X_{it}' \beta + \zeta_1 P_{i1} + z_i' \zeta + a_i)(2P_{it} - 1)\} \quad (6)$$

Accordingly, the likelihood function for household i is specified as:

$$L_i = \int \left\{ \prod_{t=1}^T \Phi[(\gamma P_{it-1} + X_{it}' \beta + \zeta_1 P_{i1} + z_i' \zeta + a_i)(2P_{it} - 1)] \right\} g^*(a) da \quad (7)$$

$g^*(a)$ in equation (7) is the normal probability density function of a_i (the new unobservable term which is introduced in equation 5).

4. Results

4.1 Descriptive Statistics

The poverty status of panel households is presented in table 1 below. The proportion of households that have never been poor accounts only 12 percent in the north while it constitutes about 15 percent in the south. At the same time, it can be seen that the proportion of households who have always been poor (throughout the period under consideration) constitutes 8 percent in the north and about 6 percent in the south. The result further shows significant evidence that a great deal of households do not experience poverty continuously, they rather fall in to it for some period and exit out of it during some other periods, which makes the analysis of poverty dynamics of paramount importance. Unlike urban households who usually get their income from labour market where salary income and nominal wage increases modestly over time (Duncan, 1984), households in rural areas have fragile income since the lion share of their earning comes from agricultural produces. Agricultural production is usually affected by rainfall variability, pests and diseases, drought, flood and other factors that lead to harvest failure. Therefore, households in rural areas do often move from one income level to another over time.

Table 1. Percentage of households by poverty status: 1994-2009

Region	Poverty status						
	Never poor	Once poor	Twice poor	Thrice poor	Four times poor	Five times poor	Always poor
North	12.32	18.12	20.25	17.11	13.13	11.24	7.83
South	14.82	19.95	19.46	16.22	12.53	10.66	6.36

Source: Author's computation

Table 2 and 3 present the demographic and socioeconomic characteristics of households by poverty status. Some variables show distinct differences among households, especially between households who have always been poor and those who have never been poor.

For example in northern Ethiopia, the mean household size for households who have never been poor is only 5.2, while it rises to 7.8 for households who have been always poor. Other demographic variables like age of household head and mean age of the household show distinct differences between households. Similarly, socioeconomic variables unveil significant differences among households across poverty status. For instance, there is 1.5 hectare differential on the average land size between households who have never been poor and who have been always poor. Ownership of oxen and other tropical livestock units (TLU) show distinct differences between households.

Table 2. Descriptive statistics for rural households (Northern Ethiopia): 1994-2009

Variable	Never poor	Once poor	Twice poor	Thrice poor	Four times poor	Five times poor	Always poor
Household size	5.2	6.2	6.4	6.5	6.9	7.3	7.8
Age of household head	42	44	45	48	48	49	49
Mean age	26.83	22.61	21.52	18.22	17.45	15.96	15.28
Female headed (%)	11	19	18	16	14	12	10
Land size (hectare)	2	1.8	1.6	1.2	1	0.7	0.5
Asset value (Eth. birr)	375	322	315	281	242	185	166
Off-farm employment (%)	36	41	35	24	26	22	18
Cash crop production (%)	10	8	6	6	4	2	2
TLU	4.5	2.8	2.4	1.8	1.6	1	0.6
Number of oxen owned	2.1	1.4	1.2	0.8	0.7	0.6	0.4

Source: Author's computation

In the case of southern Ethiopia, households under different poverty status do not have big differences in household size and age of household head unlike the households in northern Ethiopia, but the striking difference in the south is on cash crop production. 76 percent of households under the 'never poor' category produce cash crops while this figure is only 6 percent for households under the 'always poor' category. Similarly, land size, TLU and ownership of oxen show distinct differences across categories.

Table 3. Descriptive statistics for rural households (Southern Ethiopia): 1994–2009

Variable	Never poor	Once poor	Twice poor	Thrice poor	Four times poor	Five times poor	Always poor
Household size	6.3	6.6	6.8	6.7	7.1	6.9	7.2
Age of household head	44	43	45	44	47	48	48
Mean age	27.22	24.51	22.84	21.21	19.54	16.21	16.16
Female headed (%)	17	16	19	15	13	11	9
Land size (hectare)	2.3	2.1	1.8	1.6	1.2	0.8	0.6
Asset value (Eth. birr)	411	374	342	305	261	196	170
Off-farm employment (%)	32	36	33	26	22	24	18
Cash crop production (%)	76	49	31	18	10	8	6
TLU	4.2	3.4	2.3	1.6	1.2	0.9	0.4
Number of oxen owned	2	1.6	1.2	0.7	0.6	0.4	0.2

Source: Author's computation

The result shows some evidence on the relationship between variables and poverty status in rural Ethiopia. One can also note from this result that factors that explain the poor are not one and the same across the country. There are some significantly different characteristics among households in the north and in the south.

4.2 Regression Result

The econometric model specified in section (3.3.2) is estimated to analyse the nature of poverty dynamics in rural Ethiopia. The key variables included to model the probability of falling into poverty are household size, age of the household head, mean age of the household and its square, gender of the household head, land size, total value of household asset, participation in off-farm employment, cash crop production, tropical livestock units, number of oxen owned, drought and access to market as potential determinants of poverty.

I start the estimation with a simple static probit model that takes the binary outcome dependent variable (being in poverty or not) as a function of a number of regressors [column 1]. I then estimate a dynamic model with

random effects probit estimator [column 2]. Finally, I used the Wooldridge (2005) conditional maximum likelihood estimator that controls for state dependence, unobserved household heterogeneity and serial correlation [column 3]. In fact, both models in column 1 and 2 simplify the determination of initial states and at the same time assume that the unobserved household-specific characteristics are independent of the other observed correlates. Consequently, the coefficients estimated in these models are inconsistent for reasons stated in Section (3.3.2). I still report the results so as to compare with the model in column 3 that deals with those problems and show the magnitude of the bias. The results for the north and the south are reported separately.

Column 1 in table 4 below presents the simple static probit model estimates for households in northern Ethiopia. Having larger household size, being headed by female and drought raises the probability of falling into poverty. On the other hand, having less dependents, land size, participation on off-farm employment, ownership of oxen and other livestock and access to market reduces the probability of falling in to poverty. Age of the household head and elderly members have very small effects though both are statistically significant.

Columns 2 present the results from the random effects dynamic probit model where the state dependence (lagged dependent variable) is included as part of the explanatory variables discussed above. The estimated true state dependence (lagged dependent variable) is statistically and economically significant. As compared with the results from the static probit model in column 1, the results of the dynamic random effects model in column 2 show the inclusion of the lagged dependent variable has a significant effect on other covariates as well. For instance the estimated coefficients for off-farm employment and tropical livestock units have declined by almost 50%. On the other hand, the estimated coefficients for number of oxen and drought are more than doubled.

Finally, column 3 reports the results from the Wooldridge CML estimator. This is the result which is relatively compelling since the model controls for state dependence, unobserved household heterogeneity and serial correlation. It also shows a remarkable improvement in the fit of the model, as indicated by the log likelihood. One of the important features of the results is that the coefficient of the true state dependence (lagged dependent variable) rose significantly once I controlled for the persistence of the error term, also sometimes referred to as transitory shocks. The implication is that the magnitude of the state dependence would have been understated because of the effects of transitory shocks as well as measurement errors. Positive and statistically significant coefficient of true state dependence implies that even after controlling for observed household specific characteristics and unobserved time-invariant terms, past experience was associated with a higher risk of future poverty. This means that households who have been poor in the previous year have higher risk of staying in poverty than other households who were not poor in the preceding year. The marginal effects⁵ computed for the Wooldridge CML estimator, for example, show that being poor in the preceding round increases the probability of falling in to poverty in the subsequent round by about 36 percentage points.

Among the demographic characteristics of households in northern Ethiopia, household size and presence of elderly members raises the probability of falling into poverty. However, the magnitude of the effect of household size is declined as compared to other estimators (column 1 and 2). The effect of the mean age within the household is rather higher and significant in this case (column 3). It is also evidenced that households headed by female have higher chance of falling into poverty. The computed marginal effect shows that being headed by females increases the probability of falling in to poverty by about 11 percentage points.

⁵ One cannot interpret the coefficients of a probit regression in any standard way. It is necessary to interpret the marginal effects of the regressors, i.e. how much the probability of the dependent variable changes when the value of a regressor changes, holding all other regressors constant at their mean or median. The marginal effect for the Wooldridge CML estimator is presented in the appendix.

Table 4. Regression result (North)

	Simple Static Probit estimator [1]		RE Dynamic Probit estimator [2]		Wooldridge's CML estimator [3]	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Lagged poverty	-	-	0.385**	0.000	0.462**	0.000
Household size	0.125**	0.000	0.162**	0.000	0.048*	0.032
Age of household head	0.001*	0.030	0.012*	0.042	0.003	0.150
Mean age	-0.015	0.162	-0.023	0.080	-0.148**	0.000
Mean age sq.	0.003**	0.000	0.012**	0.000	0.069**	0.000
Female headed	0.028**	0.001	0.015*	0.060	0.132*	0.020
Land size	-0.210*	0.012	-0.184**	0.000	-0.231**	0.000
Asset	-0.044**	0.000	-0.012*	0.018	-0.052	0.083
Off-farm employment	-0.141	0.152	-0.071	0.098	-0.063*	0.040
Cash crop production	-0.008	0.125	-0.011*	0.033	-0.002*	0.012
TLU	-0.215*	0.032	-0.105*	0.021	-0.198**	0.000
Oxen	-0.112**	0.000	-0.251*	0.012	-0.253**	0.000
Drought	0.121**	0.000	0.325**	0.000	0.195**	0.000
Access to market	-0.152*	0.011	-0.009**	0.000	-0.004*	0.045
Constant	-1.520*	0.014	-0.665**	0.000	-0.651	0.115
λ	-		0.000		0.025	0.054
AR 1					-0.392*	0.032
Number of observation	3720		3720		3720	
Log Likelihood	-1462		-1435		-1421	

Source: Author's computation ** significance at 1% * significance at 5%

The other interesting result that appears from socioeconomic variables is the role of land size, oxen and other tropical livestock units in reducing the probability of falling in to poverty. Holding all other regressors constant at their mean, an increase in land holding by one hectare reduces the chance of falling into poverty by 25 percent. Off-farm employment, cash crop production and ownership of durable assets have less effect though they are statistically significant. Drought is the other factor that significantly affects households in northern Ethiopia. Agricultural households are often mainly vulnerable, since weather shocks like climate change and rainfall variability

can destroy their farm and wipe out a large proportion of their annual income. Finally, the coefficient of the serially correlated auto regressive error term is less than unity (-0.392) and statistically significant implying that even after controlling for first order state dependence and unobserved heterogeneity, there is a negative transitory shock that affect poverty persistency which stay longer than one year but its effect deteriorate over time.

Similar regression techniques are applied for the households in southern Ethiopia. The results are reported in Table 5 below. As was the case with sample households in northern Ethiopia, the results for the south show that the coefficient of the true state dependence (lagged dependent variable) increased significantly once I controlled for the persistence of the error term, also sometimes referred to as transitory shocks. Nevertheless, the results show that households in southern Ethiopia display a smaller degree of true state dependence than households in the north. This indicates that a household in the north that experienced poverty in the preceding year faces higher risk (about twofold) of staying in poverty than a household in the south.

In the case of the Wooldridge CML estimator that controls for state dependence, unobserved household heterogeneity and serial correlation, one of the striking features of the results for the south is that demographic variables like having larger household size, age of the household head and being headed by female are less important and statistically insignificant. However, the effect of the mean age within the household is higher and significant implying that the higher the mean age of the household, the smaller the number of dependents and the lower will be the chance of falling into poverty. On the other hand, land size, participation on off-farm employment, ownership of oxen and other livestock units and access to market reduces the probability of falling in to poverty.

Table 5. Regression result (South)

	Simple Static Probit estimator [1]		RE Dynamic Probit estimator [2]		Wooldridge's CML estimator [3]	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Lagged poverty	-	-	0.196**	0.000	0.213**	0.000
Household size	0.001**	0.002	0.023*	0.011	0.005	0.091
Age of household head	0.005*	0.030	0.002*	0.042	0.001	0.150
Mean age	-0.005	0.322	-0.013	0.130	-0.101*	0.042
Mean age sq.	0.011	0.240	0.174	0.412	0.041*	0.049
Female headed	0.008*	0.021	0.054	0.100	0.006	0.118
Land size	-0.112*	0.045	-0.184**	0.000	-0.211**	0.000
Asset	-0.052**	0.000	-0.074*	0.022	-0.058	0.083
Off-farm employment	-0.184	0.141	-0.062	0.114	-0.054*	0.010
Cash crop production	-0.158**	0.000	-0.251**	0.000	-0.345**	0.000
TLU	-0.285*	0.042	-0.239*	0.011	-0.192**	0.000
Oxen	-0.188**	0.001	-0.147*	0.022	-0.185*	0.020
Drought	0.008	0.120	0.015	0.099	0.052	0.125
Access to market	-0.184*	0.041	-0.059**	0.000	-0.096*	0.015
Constant	-1.852	0.521	-0.710**	0.000	-0.395*	0.022
λ	-	-	0.000	-	0.031	0.065
AR 1	-	-	-	-	-0.311*	0.025
Number of observation	5040	-	5040	-	5040	-
Log Likelihood	-2481	-	-2462	-	-2458	-

Source: Author's computation ** significance at 1% * significance at 5%

The other striking features of the result are the remarkable role played by cash crop production and the negligible influence of drought in southern Ethiopia. Cash crop production, though statistically significant, plays very little role in reducing poverty in the north. However, cash crop production, especially coffee and khat, plays substantial role in the south. The computed marginal effect shows that, holding all other regressors constant at their mean, being cash crop producer decreases the probability of falling in to poverty by about 35 percentage points. Finally, the coefficient of the serially correlated auto regressive error term is less than unity (-0.311) implying

that there is considerable effect of negative transitory shocks in poverty persistency. As compared to the north, the effect of transitory shocks in poverty persistency is less strong in southern Ethiopia.

4.3 Discussion

The finding shows that the likelihood of falling in to poverty in any round is a direct function of previous experience in poverty, in both northern and southern regions of Ethiopia, suggesting that individuals who experience poverty are more likely to experience poverty in future periods. This means that households with the experience of poverty in the previous year have higher risk of staying in poverty than other households who were not poor in the preceding year. There are various mechanisms that might explain such a relationship between past experience of poverty and present state of being poor. One explanation is that low earnings from farm and non-farm activities by a rural household may possibly be associated with adverse incentives which make it worthless for the household to be engaged in any income generating activities. The other mechanism through which past poverty history may increase the risk of experiencing poverty is through depreciation of human capital, loss of motivation or demoralization. These phenomena may lead to engaging in less productive agricultural activities and a series of low quality jobs which in turn increases the risk of staying in or returning back to poverty. Besides, experiencing poverty and depressed socioeconomic conditions weaken the welfare of households and leads to health problems. Rural households who typically live from harvest to harvest do not have much room for health and other unfavourable shocks. The cost of medication, if they opt for it, takes part of their income. Most importantly, there might be a significant loss in the household income if the workforce is particularly the victim of the health problem.

The finding also provides strong evidence on the role of demographic characteristics of households. Among the demographic characteristics of households in northern Ethiopia, household size, mean age and being headed by females raises the probability of falling into poverty. This means

that people living in larger and younger families are typically poorer. The higher the mean age of the household, the smaller the number of dependents and the lower will be the chance of falling into poverty, and vice versa. The result also shows that households head by females in northern Ethiopia have higher chance of facing poverty. The structures of the female headed households usually differ in predictable ways from the male headed household. For example, female headed households have fewer people in their households due to the absence of the spouse caused by widowhood or divorce. Female headed households are typically disadvantaged regarding the access to productive resources. They are also discriminated against by cultural norms and suffering from high dependency burdens and economic immobility. However, in the southern part, most of the demographic characteristics like household size, age of household head and being headed by females are rather less important and statistically insignificant. Nonetheless, the effect of the mean age within the household is higher and significant implying that the higher the mean age of the household the lower will be the chance of falling into poverty. Therefore, what matters most is not the size; it is rather the number of children and elderly dependents.

Socioeconomic variables like land size, oxen and other tropical livestock units have tremendous role in reducing the probability of falling in to poverty. These are factors that commonly affect households throughout the country. Since the livelihood of rural households in Ethiopia is mainly dependent on agriculture, land is one of the most important inputs in explaining the welfare of the people. Other things remained the same, the higher the size of cultivated land the higher will be the output. Households with bigger plots of land have an option to cultivate varieties of crops which in turn help them diversify the risk in periods of crop failure. Besides, livestock ownership plays an important role in reducing poverty. They provide important services like ploughing and hauling. Especially, oxen are used for ploughing land and its ownership creates significant differences among households in the study area. Moreover, livestock serves as a source

of food (e.g., meat, milk and eggs), and a means of saving and generating additional income especially in periods of shocks and harvest failure.

The other feature of the result is on the role played by cash crop production and the influence of drought in the country. The major cash crops which are produced by small holder farmers in southern Ethiopia (especially coffee and Khat) are not common in the northern part mainly due to the unsuitable rainfall pattern and the nature of agro ecological zones. Although cash crop production has negligible effect in reducing poverty in the north, it plays a remarkable role in the south. Cash crop production allows farmers to earn more money in order to fulfil their needs and thus enhance their capacity to achieve food security. Additionally, producing cash crops enables households to acquire resources for other purposes than cash crop production. For example, making money by producing cash crops opens up access to inputs for use on other food crops. With constrained access to farm credit, intensifying food crop production may depend on participation of households in cash crop schemes. Participation in commercialized crop scheme allows the use of improved seed, pesticides, fertilizer, herbicides and machine services for both cash crops as well as food crop production.

Drought is a factor that severely affects households in northern Ethiopia. Agricultural households are often vulnerable, since weather shocks like climate change and rainfall variability can destroy their farm and wipe out a large proportion of their annual income. A reduction in agricultural products usually results in increased prices for food and high unemployment. Drought aggravates the death of livestock which are in some cases a means of production, i.e. oxen used for ploughing, and a source of additional income especially in periods of shocks and harvest failure. Therefore, apart from reducing agricultural outputs, drought in one period will have prolonged impact on household wellbeing during the subsequent years.

As far as the correlates of poverty are concerned, the results discussed above shows important distinctions between the north and south. This peculiarity across regions may arise due to a number of reasons. It could be

due to geographical differences that result in differences with agro ecological zones, rainfall distribution and soil fertility that lead to different farming systems. It could also be due to differences in ethnicity and culture with different set of skills, values and beliefs that are socially created within each region. Knowing precisely why factors that affect the probability of falling into poverty vary across regions needs further investigation and has considerable scope for further research. What is very important at this stage is to recognize that a “one-fits-all” approach in designing poverty alleviation strategies and overall policy setting does not help much.

5. Conclusion and Policy Implication

This paper investigates the dynamics of poverty in rural Ethiopia during the period from 1994 to 2009. In order to explore factors that decisively affect the possibility of falling into and exiting out of poverty, the paper uses six rounds of data and employs alternative dynamic probit model which handles the problems of serial correlation, unobserved individual heterogeneity, state dependence and the initial conditions problem.

The estimation result shows that the likelihood of falling in to poverty in any round is a direct function of previous experience in poverty, in both northern and southern regions of Ethiopia, suggesting strong evidence for the existence of true state dependence. This means that households with the experience of poverty in the previous year have higher risk of staying in poverty than other households who were not poor in the preceding year. Nevertheless, households in the south display a smaller degree of true state dependence than households in the north. This indicates that a household in the north that experienced poverty in the preceding year faces higher risk of staying in poverty than a household in the south.

The result also provides strong evidence on the role of demographic characteristics like household size, higher dependency ratio and being headed by females in northern Ethiopia. Socioeconomic factors that have tremendous role in reducing the probability of falling in to poverty are land size, ownership of oxen and other tropical livestock units. The other striking

feature of the result is on the role played by cash crop production and the influence of drought in the country. Although cash crop production has negligible effect in reducing poverty in the north, it plays a remarkable role in the south. Drought is severe in the north and rural households are mainly vulnerable, since weather shocks like climate change and rainfall variability can destroy their farm and wipe out a large proportion of their annual income. Additionally, the result confirms the presence of considerable effect of negative transitory shocks in poverty persistency in both regions.

Even though identifying the various factors that affect the probability of falling into poverty does not in itself assist in its alleviation, it gives a framework upon which poverty alleviation strategies may be implemented to address poverty from different perspectives. For this reason, based on the findings of the paper, important policy implications can be drawn to highlight a direction for policy making and enlighten appropriate intervention areas. First, the existence of true state dependence in both regions has a key message that past history of poverty determines its future path. This implies that protecting households from falling into poverty is an important prevention strategy in dealing with both short-term and long-term poverty in the country. Thus, it is essential to pay attention for effective poverty reduction strategies like providing income-generating schemes, insurance schemes, safety net programs, and other interventions targeted at the poor. Second, the fact that cash crop production plays a positive role in poverty reduction in southern Ethiopia appears to be useful for policy makers to design scaling-up strategies and other interventions like providing inputs, extension services, and creating and facilitating market opportunities. Finally, the findings that drought is an important factor that affect the likelihood of falling into poverty in northern Ethiopia implies that the region requires special attention from policy makers. It needs policy responses targeted at agricultural adaptation, such as adoption of drought resistant varieties and enhancing small-scale irrigation projects that can avoid reliance on rain-fed agriculture.

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Appendix

Table A1. Characteristics of the sample sites

Survey site	Location	Region	Main Crops	Rainfall (mm)
Haresaw	Tigray	Tigray	Cereals	558
Geblen	Tigray	Tigray	Cereals	504
Dinki	North Shoa	Amhara	Millet, teff	1664
Debre Berhan	North Shoa	Amhara	Teff, barley, beans	919
Yetmen	Gojam	Amhara	Teff, wheat, beans	1241
Shumsha	North Wollo	Amhara	Cereals	654
Sirbana Godeti	Shoa	Oromia	Teff	672
Adele Keke	Hararghe	Oromia	Millet, maize, coffee, khat	748
Korodegaga	Arsi	Oromia	Cereals	874
Turfe Kechemane	South Shoa	Oromia	Wheat, barley, teff, potatoes	812
Imdibir	Shoa (Gurage)	SNNP	Enset, khat, coffee, maize	2205
Aze Deboa	Shoa (Kambata)	SNNP	Enset, coffee, maize, teff	1509
Addado	Sidamo (Dilla)	SNNP	Coffee, Enset	1417
Gara Godo	Sidamo (Wolayta)	SNNP	Barley, Enset	1245
Doma	Gamo Gofa	SNNP	Enset, maize	1150

Source: Dercon and Krishnan (1998)

Table A2. Food basket composition used for poverty lines (per month)

Items	Quantity	Measurement unit
Teff	1.70	kg
Barley	4.85	kg
Wheat	3.15	kg
Maize	4.48	kg
Sorghum	2.67	kg
Horse beans	1.29	kg
Cow peas	0.23	kg
Chick peas	0.69	kg
Milk	0.55	litres
Coffee	0.10	kg
Sugar	0.10	kg
Salt	0.70	kg
Oil	0.15	litres
Spices	0.25	birr
Potatoes	1.51	kg
Enset	0.19	kg
Onions	0.20	kg
Cabbage	0.38	kg

Source: Dercon and Krishnan (1998)

Table A3. Nutrition (calorie) based equivalence scales

Age range (years)	Men	Women
0-1	0.33	0.33
1-2	0.46	0.46
2-3	0.54	0.54
3-5	0.62	0.62
5-7	0.74	0.70
7-10	0.84	0.72
10-12	0.88	0.78
12-14	0.96	0.84
14-16	1.06	0.86
16-18	1.14	0.86
18-30	1.04	0.80
30-60	1.00	0.82
60 +	0.84	0.74

Source: Dercon and Krishnan (1998)

Table A1. Marginal effects of the Wooldridge CML estimator

Variable	North		South	
	dy/dx	p> z	dy/dx	p> z
Lagged poverty	0.358	0.045	0.172	0.031
Household size	0.036	0.002	0.001	0.145
Age of household head	0.001	0.395	0.002	0.251
Mean age	-0.198	0.033	-0.121	0.004
Mean age sq.	0.041	0.007	0.008	0.015
Female headed	0.112	0.030	0.004	0.325
Land size	-0.255	0.000	-0.202	0.044
Asset	-0.001	0.075	-0.002	0.225
Off-farm employment	-0.027	0.040	-0.024	0.020
Cash crop production	-0.003	0.012	-0.351	0.000
TLU	-0.214	0.042	-0.208	0.018
Oxen	-0.282	0.011	-0.198	0.035
Drought	0.192	0.034	0.001	0.425
Access to market	-0.002	0.041	-0.018	0.036

Source: Author's computation