

**ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES**

**POVERTY, ACCESS TO CREDIT AND
MARKETS IN RURAL ETHIOPIA: EMPIRICAL
EVIDENCE FROM COFFEE-GROWING HOUSEHOLDS**

BY

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**"Poverty, Access to Finance and Markets in Rural Ethiopia: Empirical
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ACRONYMS

CSA	Central Statistical Agency
DAD	Distributive Analysis/Analyse Distributive
ETPSA	Ethiopian Technology Policy Studies Association
GDP	Gross Domestic Product
HDI	Human Development Index
HPI	Human Poverty Index
IFAD	International Fund for Agricultural Development
LDC	Less Developed Countries
LPM	Linear Probability Model
MFI	Micro Finance Institutions
MLE	Maximum Likelihood Estimator
MoFED	Ministry of Finance and Economic Development
NGOs	Non-Governmental Organizations
PASDEP	Plan for Accelerated and Sustained Development to End Poverty
PPP	Purchasing Power Parity
ROSCAs	Rotating Saving and Credit Associations
SNNPR	Southern Nations Nationalities and Peoples' Region
SSA	Sub-Saharan Africa
UNDP	United Nations Development Program
WMS	Welfare Monitoring Survey

ABSTRACT

This paper tries to establish the link that access to credit and product markets have on the welfare status of households in five coffee growing zones of Oromia and SNNP regional states. Both descriptive (poverty profile) and regression analysis are employed. It was found that the incidence of poverty was found to be rampant in the study area with head count ratio of 0.36, a bit smaller figure than the official estimates of the incidence of poverty in rural areas. Whereas Jimma and Illubabur were found to be significantly different from West Hararge, this difference with Sidama and Illubabur were not significant. Access to credit was found to be significantly explaining the level of poverty in the sample households. Households who have an access to credit have more probability of getting out of poverty than households who don't have an access to it. Moreover, the welfare of households with nearer product markets is better than the welfare of households having distant product markets. Therefore, provision of rural credit to these households will help them finance investments and to insure against risks and thereby enhances their welfare. Making markets work for the poor is important because poor people rely on formal and informal markets to sell their products. Well-functioning markets are important in generating growth and expanding opportunities for the poor.



CHAPTER ONE

INTRODUCTION

1.1. Background

The world has deep poverty amid plenty. Of the world's 6 billion people, 2.8 billion—almost half—live on less than \$2 a day, and 1.2 billion—a fifth—live on less than \$1 a day (World Bank, 2001). Poverty and low level of welfare has been rampant particularly in Less Developed Countries (LDCs). According to Nafziger (2006), in LDCs, 3.3 billion people (63 percent of 5.3 billion) and 500-700 million poor people live in rural areas. The rural poor represent about 70 percent of \$1/day poverty [line] in LDCs. Put another way, 20-25 percent of LDCs rural people are poor, a higher percentage of poor than for the total LDC population. And in most developing countries, the agricultural population is growing, pressing on a limited arable land base. Moreover, the rural poor become urban poor as they migrate to densely populated cities in their search for employment (Nafziger, 2006).

Ethiopia is no exception in this respect. Poverty and low level of welfare is widespread in the country. According to official sources (MoFED, 2007), the incidence of rural poverty measured by the headcount index in 1995/96 was 45.5%. That is, 46% of the population was poor in 1995/1996. While this share of the poor declined to 38.5% in 2004/05 (see also Tassew et al., 2008; Bigsten et al., 2005)¹, the country is still in the lowest rank as compared to other countries based on both human development and poverty indices. For example, as

¹ Please see page # 63 for end notes

per the UNDP's 2008 reports, the Human Development Index (HDI) for Ethiopia is 0.389, which gives the country a rank of 169th out of 179 countries, with GDP per capita (in PPP) of \$700 in 2006. The Human Poverty Index (HPI-1), which focuses on the proportion of people below a threshold level in the same dimensions of human development as the HDI such as living a long and healthy life, having access to education, and a decent standard of living (based on the \$1.25 a day poverty line at PPP poverty measure) is 51.6 % ranking the country 130th among 135 developing countries for which the index has been calculated (UNDP, 2003, 2006 and 2008)².

As shown in annexes 2a and 2b, both Human Development Index and GDP per capita of Ethiopia are much lower even by LDCs and sub-Saharan Africa (SSA) standards. As shown in annex 2a, in 2001, HDI for Ethiopia was 0.359. This index has shown an improvement in 2005 to 0.406. But, these indices are much lower than the indices for LDCs (0.448 in 2001 and 0.488 in 2005) and for SSA (0.468 in 2001 and 0.493 in 2005). Annex 2b also shows that the same is true as regards GDP per capita. GDP per capita at PPP was USD810 in 2001. While it has increased to USD1055 in 2005, these figures are still low compared to the SSA average which is USD1831 and USD1998 in 2001 and 2005 respectively.

Access to credit and product markets are among the key factors leading to low level of welfare. These markets are mentioned as critically important causes to rural poverty. According to IFAD (2003), virtually all households in rural areas are both producers and consumers, buyers and sellers; and many sell agricultural produce and buy their food at different times of the year. However, rural households that, for one reason or another, are

unable to interact with markets are prevented from adopting diverse livelihood strategies; and indeed, in many parts of the world, rural poor people often say that one reason they cannot improve their living standards is that they face difficulties in accessing markets (IFAD, 2003). Moreover, the World Bank (2001) reported that markets matter for the poor because poor people rely on formal and informal markets to sell their labor and products, to finance investment and to insure against risks. Well-functioning markets are important in generating growth and expanding opportunities for poor people. To understand the determinants of poverty in all its dimensions, it helps to think in terms of people's assets, among others, physical assets and financial assets such as savings and access to credit. The returns to these assets depend on access to markets and all the global, national, and local influences on returns in these markets. But returns depend not just on the behavior of markets, but also on the performance of institutions of state and society (World Bank, 2001). The establishment of efficient and well-functioning product and financial markets are, therefore, critically important for the rural poor.

Access to markets and credits is scanty in Ethiopia. Accessibility of markets and financial services can be seen on the basis of the proximity to the nearest facility. Annexes 3a and 3b show part of the results of the Welfare Monitoring Survey (WMS) conducted by Central Statistical Agency (CSA) in 2005. Over 30% of rural households (as compared to 6.0% urban households) in the survey travel 5-9 kilometers to reach the nearest markets. According to the survey, 12% and 9% of households in the rural areas (as compared to 0.3% and 0.1% in urban areas) need to travel as far as 10-14 and 15-19 kilometers respectively to reach the nearest markets (annex 3a). Moreover, 38% of sample households in the rural area need to

travel 20 kilometers or more to access micro-financial services whereas 17% of them travel as far as 15-19 kilometers to get such financial services (annex 3a). In addition to the difficulty of accessing markets and financial services by these households, there is also a big disparity between rural and urban areas. Of these households who do not use these markets and micro-financial services, 35.3% and 21.5% reported that it is because markets and micro-financial services respectively are too far to access while 31% and 60% either have no need of these services or do not experience them (see annex 3b).

1.2. Statement of the Problem

Previous researches, based on Ethiopian data, have found evidence on the determinants of rural poverty. Household and community characteristics, whether the household is engaged in agriculture and ownership of assets such as land have an influence on the welfare status of households (Bigsten et al. 2002b and 2005; Fitsum and Holden, 2002; Bevan and Bereket, 1996; Dercon and Krishnan, 1996). Moreover, credit is an important factor in consumption smoothing and hence poverty reduction (Alemayehu et al., 2006). The role of credit was found to be important in poverty alleviation of the informal sector (Bekele, 1996; Solomon, 1996).

The existing evidence on poverty and access to credit, however, has some limitations. It is based largely on a much aggregated data set which is expected to represent the rural Ethiopia as a whole (e.g. Alemayehu et al., 2006). By using a discrete choice model, Alemayehu et al. (2006) has shown that availability of credit significantly and negatively affects the probability of being poor. It reduces the probability of being poor by around 21 per cent. The

study also found a much higher figure of reducing the probability of being poor by using instrumental variables estimation. However, this study has a hollow space which needs closer inspection. As noted above, the evidence from this study was based on aggregate data which can bypass pockets of poverty which need particular scrutiny³. The unrealistic assumption made in this study is the homogeneity of the rural sector. Average progress in human development conceals large disparities within sectors and regions and generalization about national poverty trends need to be complemented with an analysis based on a disaggregated data that reveals the large pockets of chronic poverty in rural Ethiopia.

Other studies lack a thorough and rigorous analytical tool (Solomon, 1996; Bekele, 1996). These authors tried to see the role of credit in the informal sector for poverty alleviation and showed that credit in the informal sector can promote the productive capabilities of the informal sector poor. And yet, these studies are deficient of not using a thorough and rigorous quantitative analysis to see the contribution of credit on poverty alleviation. While the role of markets is an important factor in poverty alleviation, this factor was not analyzed in all of the above studies except for a study by Solomon (1996) that marginally treated it. Moreover, and most importantly, these studies have little say on the contribution of credit availability and proximity to markets in cash-crop small holder farming households.

A case in point is the coffee sub-sector which is important both in terms of providing foreign exchange earnings for the country and its capacity for employment. This sub-sector has generated USD 530 million, 36% of the total value of exports, in 2007/08 (NBE, 2008). According to MacMillan et al. (2003) in Samuel et al. (2007), it is estimated that between 7.5

and 8 million households depend on coffee for a considerable share of their income and provides jobs for many more people in coffee related activities. The same source also estimated that the sub-sector impacts on approximately 15% of the population, and around 20% of the land area. The Ethiopian coffee is cultivated in four distinct production systems: forest coffee, semi-forest coffee, garden coffee and plantation coffee (ECX, 2009; Dejene, 2007). According to ECX (2009), garden coffee constitutes more than half of total production and is grown by smallholder farmers by inter-cropping it with cereals, fruits and vegetables, mainly in the southern and eastern regions.

Markets in such coffee dominated areas play a particular role of benefiting these small holder coffee-growing farmers through higher prices offered to their products, lower prices for their food items and making agricultural inputs available. But to buy agricultural inputs and some of their consumption food items during lower income of the year, the role of credit is undeniably critical. Examination of the role of these product and financial markets on the welfare improvement of these households is, therefore, an important endeavor. However, little has been understood about the impacts that these markets have on poverty reduction in these small holder coffee-growing farmers. Having noted the important role of product and financial markets on the livelihood of cash crop-producing households, a lack of empirical works on the link that these markets have on poverty and the aggregation problem of previous studies, this study has raised the following main research questions:

1. What is the extent of rural poverty among households in coffee-growing households?

2. Do access to product and financial markets have roles in determining the welfare status of the poor among households in coffee-growing zones? If so, how much is their contribution?

1.3. Objectives of the Study

The overall objective of this study is to examine the extent of poverty and its link with financial and product markets in cash-crop households of coffee-growing zones. The specific objectives are:

1. To examine the extent of poverty among cash-crop households in coffee-growing zones; and
2. To discover if households' proximity to product markets and access to credits have roles in determining their welfare status in coffee-growing zones.

1.4. Research Hypothesis

In accomplishing these objectives, the following working hypothesis is formulated: Proximity of households to product markets and access to credits are significant in positively affecting the welfare status of cash-crop households among coffee-growing farmers.

1.5. Significance of the Study

Establishing the nexus that proximity to product markets and access to credits have with poverty is of particular interest for policy makers to direct specific government policies aimed at improving the welfare of the target society through improving market access and

providing rural financial services to the poor. Hence, it is expected to benefit policy makers in Ethiopia and development partners of the country in their effort to reduce and/or eradicate poverty. Moreover, the paper will be an indispensable document in poverty analysis for academic purposes.

1.6. Scope of the Study

The scope of this research is limited only to two regional states of Ethiopia: Oromia and Southern Peoples, Nations and Nationalities regional states. The study focuses only on coffee-growing households in five zones of these two regions. It provides us with a snapshot understanding of the welfare conditions of these households. The fact that the data in this study covers only one period in time (a cross-sectional data) and its lack of being panel will not allow us to see the dynamism of poverty in the study area. Moreover, only one aspect of human wellbeing (i.e. poverty) is the subject of study and the study doesn't go into other measures of wellbeing such as vulnerability and inequality.

1.7. Organization of the Study

This study is organized in five chapters. After identifying the problem and specifying the objectives of the study in the first chapter, relevant theoretical and empirical literature is reviewed in the second chapter. Methodology of the study is provided in the third chapter, while estimation results and their analysis are dealt in the fourth chapter. Finally, concluding remarks and policy implications are provided in the fifth chapter.

CHAPTER TWO

THEORETICAL FRAMEWORK

The hypothesis that access to credit and proximity to product markets improve the welfare of the rural poor is supported by a myriad of theoretical and empirical literatures. The most relevant ones are reviewed in this chapter. The chapter has three sections. First, a conceptual framework of poverty (as one measure of wellbeing) with its measurement and analysis is provided. Second, the theoretical underpinnings on the nexus between poverty, access to credit and proximity to markets is reviewed. Finally, empirical findings are assessed in the last part of the chapter.

2.1. Conceptual Framework on Poverty

2.1.1. Poverty as One Aspect of Wellbeing

Various aspects of wellbeing are identified in the literature. Couduel et al. (2002) identifies three. The first of these is *poverty*: whether households or individuals possess enough resources or abilities to meet their current needs. The second aspect is *inequality*: the distribution of income, consumption, or other attributes across the population. The premise of the second aspect of wellbeing is that the relative position of individuals or households in a society is an important aspect of their welfare. The final aspect of wellbeing is *vulnerability*, defined as the probability or risk today of being in poverty—or falling deeper into poverty—at some point in the future (Couduel et al., 2002).

Poverty can be said to exist in a given society when one or more persons do not attain a level of material wellbeing deemed to constitute a reasonable minimum by the standards of that society (Ravallion, 1992). Poverty is multi-dimensional, however. The most comprehensive and therefore logical starting point in an attempt to capture the concept of poverty is Sen's (Sen, 1985) capabilities and functionings theoretical framework. According to this framework what ultimately matters is the freedom of a person to choose his/her functionings. In order to function, an individual requires a minimum level of wellbeing brought about by a set of attributes. The standard way of assessing whether an individual is above or below the poverty threshold is income. The logic and rationale behind the money-metric [income] approach to poverty is that, in principle, an individual above the monetary poverty line is thought to possess the potential purchasing power to acquire the bundle of attributes yielding a level of wellbeing sufficient to function (Sen, 1985; Bigsten et al., 2005; Thorbecke, 2005). The above definitions of poverty are objective ones in the sense that poverty can be quantified meaningfully in terms of objective criteria.

Another approach of looking at poverty is the subjective wellbeing approach which rejects the objective way of defining poverty and contends that poverty can not be meaningfully quantified. Human wellbeing is measured from a subjective wellbeing approach. Subjective wellbeing approach, according to Rojas (2004) and Mekonnen (2002b), refers to the wellbeing as declared by a person. It is based on a person's answer to either a single question or a group of questions about his/her wellbeing. It is a self-reported measure of wellbeing. It is a measure of a person's wellbeing that incorporates all life events, aspirations,

achievements, failures, emotions and relations of human beings, as well as their neighboring cultural and moral environment (Rojas, 2004; Mekonnen, 2002b). This idea of subjective approach is based on the premise that people are the best judges of their own situation and their opinion will ultimately be the decisive factor in defining their welfare and level of poverty. Rojas's (2004) investigation shows that the relationship between subjective wellbeing and the traditional indicators of wellbeing such as income and consumption is weak and that subjective wellbeing has additional information, not contemplated in the traditional indicators (Rojas, 2004).

2.1.2. Measurement and Analysis of Poverty

2.1.2.1. Approaches to the Measurement and Analysis of Poverty

In the literature, there are generally two approaches of measuring and analyzing poverty: the *welfarist* approach based on social welfare functions which are themselves functions of the indirect utility functions of individual households and the *non-welfarist* approach based on the functioning/capabilities measures (Bigsten et al., 1999; Ravallion, 1994; Bigsten et al., 2002b). The welfarist approach is basically based on the marginalist approach of the neoclassical microeconomic theory which postulates that if economic actors have well defined, stable and consistent preferences over allocations of the world's resources, they maximize their utility given the constraints placed on the allocations that a person can achieve. Following Dercon (2005), Bigsten et al. (1999) & (2005) and Ravallion (1996), there are basically three steps in the welfarist approach. In the first step, a single monetary

indicator of household welfare is identified. Second, a poverty threshold is defined by setting a poverty line to distinguish the poor from the non-poor. Finally, an aggregation of the degree of poverty through average and relative deprivation is made. A series of indices can be formulated to measure some of the characteristics of poverty (Dercon, 2005; Bigsten et al., 1999; Bigsten et al., 2005; Ravallion, 1996).

The broadest approach to wellbeing (poverty) articulated by Amartya Sen focuses on the capability of the individual to function in the society. Sen argues that what ultimately matters is the freedom of a person to choose his/her functionings. Functionings are beings and doings. In order to function, an individual requires a minimum level of wellbeing brought about by a set of attributes. Wellbeing comes from capability to function in society. Thus poverty arises when people lack key capabilities, and so has inadequate income or education, or poor health, or insecurity, or low self confidence, or a sense of powerlessness, or the absence of rights such as freedom of speech. Viewed in this way, poverty is a multi-dimensional phenomenon, and less amenable to simple solutions. So, for instance, while higher average incomes will certainly help reduce poverty, these may need to be accompanied by measures to empower the poor, or insure them against risks, or to address specific weaknesses (such as inadequate availability of schools or a corrupt health service). The poor lack key capabilities, and may have inadequate income or education, or be in poor health, or feel powerless, or lack political freedoms.

2.1.2.2. The Choice of Welfare Indicator

The estimation of poverty lines and measures of poverty from the poverty lines requires one to have a monetary indicator of wellbeing. One can choose either income or consumption. Most analysts argue that, if enough information is provided, consumption gives a better indicator of living standards. Consumption is believed to vary more smoothly than income both within a given year and across the life cycle (Duclos and Araar, 2006; Couduel et al., 2002). This is in tandem with Irving Fisher's inter-temporal choice and Franco Modigliani's life-cycle hypothesis. According to Fisher's model, consumption depends on a person's lifetime income as compared to his current income (expounded by J. M. Keynes). Modigliani emphasized that income varies systematically over people's lives and that saving/borrowing allows consumers to move income from those times in life when income is high/low to those times when it is low/high. This theory predicts that consumers try to smooth their consumption across their low and high income years to equalize their marginal utility of consumption across time (Mankiw, 2006).

This erratic nature of income is more prevalent in poor agrarian economies. In these economies, incomes for rural households may fluctuate during the year according to the harvest cycle. This implies a potential difficulty for households in correctly recalling their income, in which case the information on income derived from a survey may be of low quality (Couduel et al, 2002; NEC et al., 2001). Another merit of using consumption as an indicator of wellbeing is the fact that actual consumption reflects the standard of living and the ability to meet basic needs than income does. Moreover, income is one of the elements



that allow the consumption of goods and services. So, if one uses income as an indicator of wellbeing, some non-monetary attributes can not be purchased because markets (such as for public goods) do not exist. Therefore because of this lack of access and availability, these goods are being ignored (Thorbecke, 2005; Couduel et al., 2002; Douclos and Araar, 2006; NEC et al., 2001). This analysis shows that consumption is not equal to expenditures because the value of consumption equals the sum of expenditures on goods and services purchased and consumed in a given period plus the value of goods and services consumed but not purchased such as gifts and those produced by the household itself plus the consumption of durable goods and services owned.

Still another drawback of the income approach to capture poverty is that even if it were possible to specify the minimum thresholds of each and every basic needs and put a price tag on them and aggregate across minimum thresholds to derive the monetary poverty line, there is no guarantee that individuals with incomes at or even above the poverty line would actually allocate their incomes so as to purchase the minimum basic needs bundle (Thorbecke, 2005). Therefore, the state of wellbeing is strongly correlated with the quality of life but less so with income and the literature on the measurement and analysis favors consumption as welfare indicator.

But consumption as an indicator is not far from imperfection. Consumption is the individual's free choice, an outcome which may differ across individuals of the same income and ability to consume, just like actual functionings vary across peoples of the same

capability set. One may consume less than another consumer having the same capability sets and this makes difficult welfare comparisons across individuals. Another related difficulty is the assessment of durable goods owned by individuals such as 'owner occupied housing' and the assessment of the value of non-marketed goods and services such as those provided by the government, intangible benefits such as the quality of the environment, peace and security benefits (Douclos and Araar, 2006).

However, adjustments should be made to this variable. The following basic adjustments are made before consumption is used as an indicator of wellbeing (Couduel et al., 2002; Duclos and Araar, 2006; Ravallion, 1996). First, there is a difference in the prices of consumption of goods and services across space (regions such as rural vs. urban). The more diverse the country is the more important spatial adjustments. Moreover, there are temporal differences (across time) such as whether the survey is conducted at the beginning or at the end of the survey period. This would be significant where there is high level of inflation. Adjustment mechanisms have been proposed in the literature to render consumption comparable across regions and over time. One of these is to deflate nominal consumption through regional or temporal price indices to get the real consumption level. Second, there are also adjustments for the differences of needs between households to account for the age of the household members (such as adults and children) and their sex (male or female). Moreover, we should account for the differences in sizes of households to reflect the fact that larger households may be able to purchase goods in bulk at cheaper rates and to economize on the purchase of some products. This is done through equivalence scales (adjustments of basic needs for

different age groups and by gender) and economies of scale (adjustments for household size). Other adjustments that need to be taken into account are the exclusion of expenditures on investment or agricultural inputs from consumption expenditures. imputing missing price and quantity information, adjust for rationing and underreporting.

2.1.2.3. Poverty Line

A poverty line can be defined as the monetary cost to any given person, at a given place and time, of a reference level of welfare. People who do not attain that level of welfare are deemed poor, and those who attain that level of welfare are said to be non-poor (Ravallion, 1998). The most commonly and practically used methods for setting poverty lines are food-energy-intake and cost of basic needs. The basic idea in food energy intake is to find the consumption expenditure or income level at which food energy intake is just sufficient to meet pre-determined food energy requirements. It is estimated by regressing per capita consumption expenditure on caloric intake. Then, the predicted value of the income or consumption expenditure at the predetermined food energy intake (calories per day) is the poverty line. In the cost of basic needs, the food poverty line is defined by choosing a bundle of food items consumed by the poor. This bundle is valued at local prices (or it is valued at national prices if the desire is to get a consistent poverty line across regions and groups). Then a specific allowance for the nonfood goods consistent with the spending pattern of the poor is added to the food poverty line. To account for the nonfood expenditure, the food poverty line is divided by the food share of the poorest quartile or quintile (Tassew et al., 2008; Ravallion, 1998; Thorbecke, 2005).

2.1.2.4. Poverty Indices and Axioms of Poverty Analysis

Before models for both descriptive and analytical purposes are designed, one has to have an aggregate measure of poverty. The pioneering work in this regard is Sen (1976). In his axiomatic and ordinal approach to measuring poverty, Sen (1976) proposed a new measure of poverty which avoided the shortcomings of the measures in use up until then. One of the measures during that time was the head count ratio. Given the incomes $y_1 \leq y_2 \leq \dots \leq y_q \leq z \leq y_{q+1} \dots \leq y_n$ ordered in an ascending order where z is an exogenously given poverty line below which an individual is classified as poor, we can have the head count ratio by:

$$H = \frac{q}{n}, \text{ where } q \text{ is the number of poor people below the poverty line}$$

and n is the total number of people in the population. This ratio measures the prevalence of poverty. It is the simplest and the most commonly used poverty index. It is the proportion of the population for which consumption or income (or any other indicator of wellbeing appropriately defined) is less than the poverty line, z .

This ratio is obviously a very crude index. An unchanged number of people below the poverty line may go with a sharp rise in the extent of the short-fall of income from the poverty line. The measure is also completely insensitive to the distribution of income among the poor. Pure transfers of income from the poorest poor to those who are better off will either keep H unchanged, or make it go down-surely a perverse response (Sen, 1976).

Another common poverty index used was the poverty gap which is the aggregate short fall of the income of all the poor taken together from the poverty line (normalized at the poverty line, z). This index is given by the following ratio using the above assumptions of z , y , q and n .

$$\text{Poverty Gap Index (I)} = \frac{1}{n} \sum_{i=1}^q \left[\frac{z - y_i}{z} \right]$$

The poverty gap ratio is the mean distance separating the population from the poverty line with the non-poor being given a distance of zero. It represents the depth of poverty. The poverty gap is a measure of the amount of resources that would be needed to lift all the poor out of poverty through perfectly targeted cash transfers. This measure of poverty shows the average deprivation. In his treatise, Sen (1976) also criticized this measure for if there is a pure transfer of income from a person below the poverty line to any one who is richer, this index doesn't increase.

Following his critics of these indices, Sen (1976) then proposed axioms which any measure of poverty is expected to possess. These axioms are now called Axioms of Poverty Analysis. These axioms are also found in Abebe et al. (1996), Duclos and Araar (2006) and Bigsten et al. (2002b). Among these axioms that the head-count-ratio and the poverty gap ratio failed to fulfill are:

- Monotonicity Axiom: Given other things, a reduction in the income of a person below the poverty line must increase the poverty measure.

- Transfer Axiom: Given other things, a pure transfer of income from a person below the poverty line to anyone who is richer must increase the poverty measure.

It can be shown that the head count ratio fails to fulfill the monotonicity axiom. Since this ratio is based on the number of poor (not the income short-fall), it is insensitive to any decrease or increase in the short-fall of income. The poverty gap, while it fulfils the monotonicity axiom, violates the transfer axiom.

Sen (1976) proposed an alternative poverty measure which, he thought, fulfilled the above axioms. Assume a community S of n people. The set of those people with income no higher than x is indicated by $S(x)$. $S(z)$, where z is the poverty line, is then the set of the poor. Then, the difference $g_i = z - y_i$ is the income gap of any individual i . The aggregate gap $Q(x)$ of the $S(x)$ of people with income no higher than x is a normalized weighted sum of the income gaps of everyone in $S(x)$ using non-negative weights $v_i(z, y)$. This is given by

$$Q(x) = A(z, y) \sum_{i \in S(x)} g_i v_i(z, y)$$

where the specification of the weight $v_i(z, y)$ and $A(z, y)$ will depend on the axioms above and others not mentioned here. An index of poverty, P , for a given income configuration can then be defined to be the maximum value of the aggregate gap $Q(x)$ as

$$P = \max_x Q(x)$$

Since $v_i(z, y)$ is non-negative $P = Q(z)$. Finally, Sen (1976) suggested a poverty index which satisfies some additional axioms (on top of those mentioned above) such as Ordinal

Rank Weights, Monotonic Welfare and Normalized Poverty Value Axioms. This index is given by:

$$P = H[I + (1 - I)G]$$

where I is the poverty gap normalized at the poverty line and G is the coefficient of the income distribution of the poor.

One other measure of poverty in the literature is the squared poverty gap ratio which is a measure of the severity of poverty. While the poverty gap takes into account the distance separating the poor from the poverty line, the squared poverty gap takes the square of this distance into account. Therefore, more weight is given to those further from the poverty line (i.e. to the very poor). This measure shows the *relative deprivation* among the poor (i.e. it considers inequality among the poor). It is defined as follows:

$$P_2 = \frac{1}{n} \sum_{i=1}^q \left[\frac{z - y_i}{z} \right]^2$$

Aggregate poverty indices are summary measures defined over mean income, the relevant poverty line, and the parameters characterizing income distribution and the general form is given by $P = P(\mu/z, L)$ where μ is the mean income of the population, z is the poverty line and L is parameter characterizing the income distribution measured by the Lorenz curve (Bigsten et al., 1999).

2.2. Theoretical Perspectives on the Nexus between Poverty and Access to Credit and Proximity to Product Markets

2.2.1. Linking Poverty with Access to Credit

There are three arguments that access to rural finance (savings and credits) can improve the wellbeing status of the rural poor. First, credit or savings can provide capital for financing inputs, labor and equipment for income generation. Second, access to credit, liquid savings (that can be readily converted to cash), and insurance services can help households increase their capacity to bear risks or reduce cost of insurance. Third, improved financial services can potentially stabilize consumption of food and other potential goods efficiently (Zeller et al., 1997). Since the incomes of rural households in developing countries depend directly or indirectly on agriculture, they vary seasonally. Such variations in incomes of the household translate into fluctuations in consumption if these households can not fall back on savings and access to credit.

Moreover, a household's consumption standard in a specific year will depend on its ownership of assets, returns on those assets, shocks and the ability of the household to translate incomes into consumption. If the household is credit constrained, it will find it hard to cope with negative shocks and smooth consumption. The chronic component of poverty will depend on the household's lack of assets or its limited ability to translate assets into incomes. Incomes change over time by asset accumulation, changes in returns driven by savings behavior or exogenous shocks (Bigsten et al., 2004).

In developing countries, marginal customers (defined as those that are hardly reached by the market and can not have easy access to suitable financial products) represent a much larger market segment; on the one hand, it is quite common place that very poor represent a large proportion of the population; on the other, a specific typology of marginal customers is represented by those individuals who, without being extremely poor-in relative terms- are not yet able to work with banks(Dejene et al., 2007). Very poor people are marginalized by the formal market but may find satisfaction of their expectations in the informal market. Some may be very poor and demand financial services for daily financial constraints while others may have micro investment plans whose financing may be satisfied by the informal market as well as (active poor). The informal market, in fact, is normally suitable up to a certain extent; micro/small entrepreneurs demanding relatively large loans for relatively long maturities sometimes find the informal market inadequate for their financial requirements (Dejene et al., 2007). This idea of imperfect substitution of the formal and informal markets is strengthened by Diagne (1999) who found informal credits to be imperfect substitutes. In particular, formal credit, whenever available, reduces but does not completely eliminate informal borrowing. This suggests that the two forms of credit fulfill different functions in the household's inter-temporal transfer of resources (Dagne, 1999).

A distinction is made between access to formal credit and participation in these credit programs. Participation in a credit program is something that households choose to do, while access to a credit program is a limiting constraint put upon them (e.g. availability and eligibility criteria of credit programs). Participation is more of a demand-side issue related to

the potential borrower's choice of the optimal loan size [of credit], while access is more of a supply-side issue related to the potential lender's choice of the credit limit (Diagne et al., 2000; Dagne, 1999). The extent of access to credit is measured by the maximum amount a household can borrow (its credit limit). If this amount is positive, the household is said to have access. A household is credit constrained when it lacks access to credit or cannot borrow as much as it wants. Broadly speaking, there are two methodologies for measuring household access to credit and credit constraints. The first and indirect method infers the presence of credit constraints from violations of the assumptions of the life-cycle or permanent income hypothesis, while the second collects information directly from household surveys on whether households perceive themselves to be credit constrained (Diagne et al., 2000). The latter methodology of access to credit is employed in this study.

2.2.2. Poverty and Product Markets

Access to goods markets is also important determinant of the wellbeing status of the rural poor. Enabling farmers to sell their crops at their convenience provides significant benefits: when constraints are removed, farmers can earn more by specializing in crops for which they have a comparative advantage and purchase commodities that are relatively costly for them to grow. Indeed, those who produce mainly for their own consumption are the poorest, while those who are well integrated into markets and specialize in a few number of crops are better off (Minot and Hill, 2007).

Markets can be non-existent for a household as in the case of a fully enforced legal prohibition on certain transactions. However, there are some markets for some type of goods (e.g. in the underground economy). According to Sadoulet and de Janvry (1995), a market may fail for a particular household when it faces wide price margins between the low price at which it could sell a commodity and the high price at which it could buy that product. This price band may be increased by transaction costs, shallow local markets and price risks (Sadoulet and de Janvry, 1995). Transaction costs can be translated into higher transportation costs, costs of acquiring market information etc.

2.3. Empirical Evidence on the Access to Credit and Product Markets and Their Link to Poverty

There is a myriad of empirical literature on the link between poverty, access to credit and markets worldwide. In Ethiopia, the extent and prevalence of poverty in the country has attracted a growing interest in recent research agenda. However, only few studies have been made on the link between access to credit and product markets on rural poverty in Ethiopia (e.g. Alemayehu, 2006; Bekele, 1996; Solomon, 1996).

Alemayehu et al.(2006), using the data collected by the Department of Economics of Addis Ababa University in collaboration with the university of Oxford and Gutemberg University, have attempted to establish the link between credit and poverty in Ethiopia using discrete choice models and found that access to credit is an important factor in consumption smoothing and hence poverty reduction. They also found an evidence for poverty trap due to

liquidity constraints that limits the ability of rural households from consumption smoothing. By using a bi-variate discrete choice model, their study has shown that availability of credit significantly and negatively affects the probability of being poor. It reduces the probability of being poor by around 21 per cent. They also found a much higher figure of reducing the probability of being poor (47 per cent) by using instrumental variables estimation. However, this study has some hollow spaces which need closer inspection. First, the evidence from this study was based on aggregate data which can bypass pockets of poverty which need particular scrutiny. Second, the study didn't see the contribution of credit availability to coffee-growing areas. Third, the role of product markets to farming households was not touched into by this study.

Another study by Bekele (1996) tried to see the role of credit in the informal sector for poverty alleviation using descriptive analysis of data collected from the branches of the Development Bank of Ethiopia in collaboration with Grameen Bank of Bangladesh and showed that credit in the informal sector can promote the productive capabilities of the informal sector poor and enable them to satisfy better their needs through participation in their own activities. He has also found that, in the process of carrying out their business, they will be able to progressively increase their income, savings and investments through self-employment. But this study lacks quantitative analysis. In particular, the study didn't see the contribution of credit on poverty reduction using a *ceteris paribus* assumption. Moreover, the role of markets was not investigated in this study.

In a study conducted in Debre Birhan Town (North Shoa), Solomon (1996) found that credit to the poor in the study area is found to be important and households engaged in small-scale but legitimate and viable investment ventures are denied access to institutional credit due to the high collateral and antiquated lending procedures of the formal banks and are forced to 'seek refuge' in the informal financial sector. Moreover, Solomon (1996) stressed the importance of the access to markets for the rural poor. He found, there is little that credit can, on its own, do to assist poor households to uplift their living conditions. Access to credit can not compensate for inadequate non-financial infrastructure. It should be accompanied by adequate non-financial infrastructure and coordinated complementary services to make it more productive. An improvement of this study over the previous ones is that, Solomon (1996) stressed the role of markets and their complementarities in poverty alleviation. But, still, this study is culprit of not using a rigorous quantitative analysis to see the contribution of credit and markets on poverty alleviation.

CHAPTER THREE

DATA AND METHODOLOGY OF THE STUDY

In order to address the purpose of this study and test our hypothesis, it is imperative at this point to describe the data set, specify the econometric models and estimation strategies employed in the study. This chapter has two related sections. In the first section, the source, nature and sampling methodology of the data collection is described. It also provides background information of the study area. The second section deals with the method of analysis employed in the study. While the first sub-section deals with a design of the tools of descriptive analysis including the poverty profile, the second sub-section specifies a methodology for regression analysis.

3.1. Data

3.1.1. The Source and Nature of Data

This study employs a cross-sectional secondary data. The data are gathered from a survey conducted by the Ethiopian Technology Policy Studies Association (ETPSA). The survey was conducted in 2005 in five major coffee-growing administrative zones of Oromia and Southern Nations, Nationalities and People's (SNNP) regions. The sampling frame of the study is coffee-growing farmers. The five zones included in the sample are Sidamo, Jimma, Illubabur, Wolayta and West Hararge. Nine administrative woredas were selected from these zones. The sample size stands at 1033 households. Nearly 100% of the sample households are coffee growers. Of the total sample, 64% comes from Oromia region, the largest coffee-

growing regional state in Ethiopia. The rest, i.e. 36%, comes from Southern Peoples, Nations and Nationalities Regional State (SNNP), the second largest coffee-growing regional state in the country.

The sampling unit (unit of analysis) in this study is the household. The following requirements were considered in order to make the sample more representative of different groups of the samples:

- The household should, to the extent possible, be a coffee grower.
- Samples should be evenly or proportionately distributed across sub-kebeles (or *gots*) or a given enumeration unit. In this way, it could be possible to minimize bias against households located far from roads.
- Female-headed households should be included in the sample
- Samples should be drawn from different age brackets and income groups (low, middle and high) within a village.

The distribution of households in the sample is provided in annex 4. Female headed households constitute 23% while the rest (77%) is male headed households. Sidama and Jimma have equal weights in terms of the percentage shares (23%) they have from total. While Illubabur has 22% share. Wollaita and West Hararge respectively have 13% and 18% percentage share from the total sample households.



Among the principal wellbeing indicators collected were general household and community characteristics, income, consumption expenditure, information on participation of informal and semi-formal financial markets, proximity to markets, ownership of assets, utilization of productive technology and risk behavior of households.

3.1.2. Description of the Study Areas

The study areas are largely located in the highlands suitable for the cultivation of coffee. Most of these areas get ample rainfall which is typical of Ethiopian highlands. High population density is characteristic of the *woredas* selected from the southern regional state. Two religions dominate the study areas. Most of the coffee-growing farmers in the southern regional state belong to the protestant religion while the farmers in Oromia belong largely to the Muslim religion. It is only one *woreda* where Orthodox Christians constitute the majority. The most widely spoken language is Afan-Oromo in the study areas in Oromia while Sidamigna and Wolaitgna are the widely spoken languages in the study areas in the SNNP. As regards land use and landlessness, land under coffee varies widely among the study areas depending on population densities, availability of other cash crops such as *khat*, or the degree of commercialization. Maize is found to be the most important subsistence crop in the coffee-growing *kebelles* of Oromia regional state with the exception of *kebelles* in one *woreda* (where *tef* is important) while *enset* is the primary staple crop in the coffee-growing study areas of the SNNP with the exception of one *kebelle* in Sidama. Other subsistence crops include sorghum, *tef* and sweet potato. Coffee, followed by *khat*, has been found to be the most important source of incomes for the majority of the population in the study areas.

3.2. Method of Analysis

3.2.1. Descriptive Method of Analysis

Welfare Indicator: In this study, consumption is taken as an indicator of poverty for reasons explained in the previous chapter. Some adjustments were made, however, on consumption expenditure. These adjustments include differences in prices across regions at the time the survey was conducted. This was done through normalization (using spatial price indices) to obtain consumption in real terms. Another adjustment was made for differences in needs between households (demographic differences). This was done through equivalence scales and economies of scales to account for the composition and size of families. Other adjustments included imputing consumption expenditures which were underreported such as consumption for house rents, firewood and other own-produced expenditures.

The Poverty Line: The poverty line, estimated by the government of Ethiopia, was taken for granted. This estimate was based on the cost of 2,200 kcal per day per adult food consumption with an allowance for essential non-food items. The levels of real total per adult household consumption expenditure are ETB 1075.0, ETB 1343.8 and ETB 806.3 per annum for poor, moderately poor and extremely poor per adult equivalent respectively at 1995/96 national average constant prices.

Poverty Measures: Following Duclos and Araar (2006) and to be consistent with DAD's (see below) procedure of estimation of poverty indices, we denote living standards by the variable y (consumption expenditure) as an indicator of wellbeing in this study. It is assumed

that $y \geq 0$. Let P be the proportion of individuals in the population who enjoy a level of income that is less than or equal to y and is given by the function

$$P = F(y) \dots \dots \dots (4.1)$$

$F(y)$ is the cumulative distribution function of the distribution of the level of y . It is also assumed to be continuous and differentiable. Moreover, $F(0)=0$ and $F(\infty)=1$ by definition. The first derivative of the cumulative distribution function gives the density function [i.e $f(y) = F'(y)$] which is assumed strictly positive in y . Let's define a *quantile function* $Q(p)$ as the inverse distribution function such that

$$F[Q(P)] = P \Rightarrow Q(P) = F^{-1}(P) \dots \dots \dots (4.2)$$

We can thus say that the quantile distribution function $Q(p)$ indicates the living standard level below which we find a proportion p of the population. Let z denote the poverty line. The quantile distribution function censored at z is defined as.

$$Q^* (P; z) = \min [Q(P), z] \dots \dots \dots (4.3)$$

Censored quantiles are the income $Q(p)$ for those in poverty (below z) and z for those whose income exceeds the poverty line. Then, the poverty gap at percentile, p , denoted by $g (p , z)$, is the difference between the poverty line and the censored quantile at p . It is the shortfall of living standard $Q (P)$ from the poverty line. It is defined as:

$$g(P; z) = z - Q^*(P; z) = \max(z - Q(P), 0) \dots \dots \dots (4.4)$$

As Douclos and Arrar (2006) noted, censoring income at z helps give attention on poverty, since the precise value of those living standards that exceeds z is irrelevant for poverty analysis and poverty comparisons policy making at least so long as we consider absolute poverty. The area between the poverty line and p is calculated using integral calculus

$$Poverty \text{ Gap} = \int_0^1 g(p; z) dp \dots \dots \dots (4.5)$$

Equation (4.5) helps us to derive the normalized (at the poverty line, z) poverty gap given by:

$$Normalized \text{ Poverty Gap} = \int_0^1 \left(\frac{g(p; z)}{z} \right) dp \dots \dots \dots (4.6)$$

A group of poverty measures that can obey some of the desired properties (axioms) mentioned in the literature are the Foster-Greer-Thorbecke (FGT) class. They base their measure on the poverty gap derived above (equation 4.6). These measures are subsumed under the following formula.

$$P(z; \alpha) = \int_0^1 \left(\frac{g(p; z)}{z} \right)^\alpha dp \dots \dots \dots (4.7)$$

Alpha (α) in equation (4.7) is an ethical parameter which is considered to be greater than or equal to zero. For $\alpha = 0$, it is the head count ratio, for $\alpha = 1$, it is the poverty gap and for $\alpha = 2$, it is the squared poverty gap⁴.

Estimation of Indices: A specialized software package is used to estimate the models employed in this study, namely, DAD, which stands for “Distributive Analysis/Analyse Distributive”. It is designed to facilitate the analysis and comparison of social welfare, inequality and poverty using a micro data. Its application includes, among others, estimating indices of poverty. We estimate our poverty indices using this software package.

Hypothesis Tests: After these poverty indices are estimated based on the different groups (by area of residence, access to product markets and access to credit), poverty comparisons are made and correlates of poverty are identified based on the characteristics. However, due to the assumptions involved in poverty measurement, it is important to test whether the differences in comparisons are statistically significant. We used the fact that any of the poverty indices and the associated test statistics estimated by DAD in this chapter is asymptotically normally distributed (see Duclos and Araar et al., 2006). As a result, we used t-statistics to test these differences.

3.2.2. Econometric Method of Analysis

The descriptive analytical tool developed in the previous section is an insightful tool. It allows us to make poverty comparisons across groups of households. Poverty comparisons help for policy design and the evaluation of poverty reduction. They allow a ranking of various household groups in terms of their level of poverty. It also provides key and pertinent information on the correlates of poverty.

However, it is to be noted that the robustness of a poverty profile depends on, among other things, the selection of a particular welfare indicator, the estimated poverty line, the type of data available and the poverty index chosen (Abebe and Bereket, 1996; Ravallion, 1994). But even if these criteria are fulfilled, this way of poverty analysis is a bi-variate analysis which compares the poverty status of households to each of the selected characteristics of households at a time. This exercise doesn't hold the *ceteris paribus* assumption of how a particular variable affects poverty conditional on other potential determinants. Moreover, correlation doesn't imply causality (Couduel et al., 2002; Fitsum and Holden, 2002; NEC et al., 2001; Ravallion, 1994). We want to see the probability of being poor when a household has access to credit relative to a household having no access to credit. We also want to see the probability that households are poor relative to the probability that they are not when households are proximate to product markets. This sort of analysis can be done by a conditional multivariate binary outcome regression model.

3.2.2.1. Specification of Binary Outcome Models

An increasingly common approach is to construct a regression model of some poverty measure against a variety of household and community characteristics (Alemayehu et al., 2005; Alemayehu et al., 2006; Ravallion, 1996; Couduel et al., 2002; Bigsten et al., 2002b; Bigsten et al., 2005). Following these authors, a binary outcome model is specified using the latent variable approach where the probability of a household to be poor is determined by some underlying latent variable, y_i/z_i , that captures the true economic status of the household and where y_i is consumption level, and z_i is an exogenously given poverty line.

This variable is then a function of a vector of observed household characteristics defined in linear form as $y_i/z = X' \beta + \varepsilon_i$.

While we ‘pretend’ not to observe this variable directly, we do observe a binary outcome w_i such that $w_i = 0$ if $y_i/z < 1$ [i.e. $y_i < z$] and $w_i = 1$ otherwise. We then define for the variable $w_i = 0$ if the individual is poor (i.e. $y_i < z$) and $w_i = 1$ if non-poor. The general binary outcome models can then be written as the conditional probability to be non-poor, i.e. $p(w_i = 1/x_i)$, as follows⁵,

$$p(w_i = 1/crt_i, mppty_i, x_i) = E(w_i/crt_i, mppty_i, x_i) = F(crt_i, mppty_i, \chi_i, \beta) \dots \dots \dots (4.8)$$

In (4.8), crt_i and $mppty_i$ stand for access to credit and market proximity respectively while the χ_i ’s are a host of other explanatory control variables to be described below.

Ordinary Least Squares (OLS) regression of w_i on $crt_i, mppty_i$ and χ_i ’s (i.e. Linear Probability Model-LPM) ignores the discreteness of the dependent variables and doesn’t constrain predicted probabilities to be between 1 and 0 and assumes a linear relationship between dependent and independent variables. Moreover, the distribution of the error term of LPM is non-normal and heteroskedastic which can of course be repaired (Woolderidge, 2002, Cameron and Trivedi, 2005). Rather, by specifying an appropriate distribution for ε , we can derive appropriate models for $F(crt_i, mppty_i, \chi_i, \beta)$. We assume that ε is independent of $crt_i, mppty_i$ and χ_i ’s. In particular, we assume that it is distributed

standard normally. If we define the logistic function $\Lambda(z) = \frac{\exp(z)}{1 + \exp(z)}$, we can get the

following logit model,

$$F(\text{crt}_i, \text{mpxy}_i, \chi_i, \beta) = \Lambda((\text{crt}_i, \text{mpxy}_i, \chi_i)' \beta) \dots \dots \dots (4.9)$$

If, on the other hand, we define the cumulative standard normal distribution, $\Phi(z) = \int_{-\infty}^z \phi(t) dt$, where $\phi(t) = (2\pi)^{-1/2} \exp(-t^2/2)$, we can also have the following probit model,

$$F(\text{crt}_i, \text{mpxy}_i, \chi_i, \beta) = \Phi((\text{crt}_i, \text{mpxy}_i, \chi_i)' \beta) \dots \dots \dots (4.10)$$

In these two models, there is a non-linear relationship between the independent and dependent variables. This property makes them superior to other linear models such as the LPM in poverty analysis. Moreover, these models have well-defined probabilities because $F(\text{crt}_i, \text{mpxy}_i, \chi_i, \beta) \rightarrow 0$ as $(\text{crt}_i, \text{mpxy}_i, \chi_i)' \beta_i \rightarrow -\infty$ and $F(\text{crt}_i, \text{mpxy}_i, \chi_i, \beta) \rightarrow 1$ as $(\text{crt}_i, \text{mpxy}_i, \chi_i)' \beta_i \rightarrow \infty$.

The standard normality assumption is favored by economists. In addition, several specification problems are most easily analyzed using this model because of properties of the normal distribution (Woodridge, 2000; Cameron and Trivedi, 2005; Green, 2003). However, the logit model has a relatively simple form for its first order conditions and asymptotic distributions. Moreover, the interpretation of coefficients in terms of log-odds ratio is an attraction of this model (Cameron and Trivedi, 2005). In practice, however, either of these

models can be used empirically and there is little statistical difference between predicted probabilities of the models. This difference is greatest in the tails where probabilities are close to 0 or 1. The difference is much less if interest lies only in marginal effects averaged over the sample (with which this study is concerned) rather than for each individual sample. (Cameron and Trivedi, 2005). As a result, the coefficients, marginal effects and odds ratios of only the logit model will be estimated in this study.

Selection of Variables: The criteria for the identification of the determinants of poverty are guided purely by the general economic theory, correlates in the poverty profile and exogeneity of variables in the model. Moreover, in specifying the regression models we allow for zonal disparity in welfare status (a dummy for each zone). The logic behind the regional disparity in poverty is the fact that in areas characterized by geographical isolation, a low resource base, low rainfall, and other inhospitable climatic conditions, poverty tends to be higher.

Dependent Variable: As noted above, consumption is the dependent variable in this study after adjustments are made to it. This variable is binary denoted by $w_i = 0$ if a household is poor (those households below the poverty line) and $w_i = 1$ if the household is non-poor (those above the poverty line).

Independent Variables: Only exogenous variables are selected as explanatory variables along with proxy for product markets and access to credit in modeling the determinants of rural poverty model, because our objective is to infer causality of the welfare level of a

household by the different characteristics of the household. Annex 5 provides the list, description and expected signs of explanatory variables (see also annex 7 for a descriptive statistics of some of the variables in this study).

3.2.2.2. Estimation Methodologies

A Maximum Likelihood Estimation (MLE) is applied for the above model. The MLE procedure essentially solves for parameter vector β which is most likely to have generated the data. For any vector β , the probability of observing the outcomes w_i conditional on the data $crt_i, mppty_i, \chi_i$ is,

$$L(\beta / crt_i, mppty_i, \chi_i) = \prod_{i=1}^n \Pr(w_i / crt_i, mppty_i, \chi_i; \beta) = \left\{ \prod_{i=1}^n \Pr(w_i = 0 / crt_i, mppty_i, \chi_i; \beta)^{1-w_i} \right\} \times \left\{ \prod_{i=1}^n \Pr(w_i = 1 / crt_i, mppty_i, \chi_i; \beta)^{w_i} \right\} \dots\dots\dots 4.11$$

The log-likelihood function would be $\ln (\beta / crt_i, mppty_i, \chi_i)$ which is equal to

$$\sum_{i=1}^n [(1 - w_i) \cdot \ln \Pr(w_i = 0 / crt_i, mppty_i, \chi_i; \beta) + w_i \cdot \ln \Pr(w_i = 1 / crt_i, mppty_i, \chi_i; \beta)] \dots\dots (4.12)$$

In this model, the probability that a household is poor is $\Pr (w_i = 0 / crt_i, mppty_i, \chi_i; \beta) = \Lambda ((crt_i, mppty_i, \chi_i)' \beta)$ and the probability of being non-poor is $\Pr(w_i = 1 / crt_i, mppty_i, \chi_i; \beta) = 1 - \Lambda((crt_i, mppty_i, \chi_i)' \beta)$. After a series of first order conditions to equation (4.12), the coefficients, the β_i 's, are estimated. In this

study, we are not only interested in the sign of the parameters but also in their magnitudes. The most common measure used in binary choice models is the marginal effects on the probability evaluated at the sample average of regressors. The marginal effects of the model is,

$$\frac{\partial \Pr(y_i = 1/crty_i, mpxy_i, \chi_i; \beta)}{\partial \chi_{ij}} = \frac{\exp((crty_i, mpxy_i, \chi_i)' \beta)}{[1 + \exp((crty_i, mpxy_i, \chi_i)' \beta)]^2} \cdot \beta_j \dots \dots \dots (4.12)$$

We also make use of the marginal effects on the odds ratio. Let the probability of being non-poor, p , is given by,

$$p = \Lambda[(crty_i, mpxy_i, X_i) \beta_i] = \frac{\exp[(crty_i, mpxy_i, X_i) \beta_i]}{1 + \exp[(crty_i, mpxy_i, X_i) \beta_i]} \Rightarrow \frac{p}{1-p} = \exp[(crty_i, mpxy_i, X_i) \beta_i] \Rightarrow \ln\left(\frac{p}{1-p}\right) = (crty_i, mpxy_i, \chi_i)' \beta_i \dots \dots \dots (4.13)$$

Odds ratio measures the probability of the household being non-poor relative to the probability of the household to be poor.

3.2.2.3. Hypothesis Testing

Any of the three tests from general MLE analysis—the Wald, Likelihood Ratio (LR), or Lagrangian Multiplier (LM) tests—can be used to test hypotheses of overall significance in binary response contexts. Since the tests are all asymptotically equivalent under local alternatives, the choice of statistic usually depends on computational simplicity (Wooldridge, 2002). As a result, the LR and Wald test are employed for this study. Moreover, we will use

the standard normal table for critical points to test for single restriction and pseudo- R^2 to test the goodness of fit.

Diagnostic tests on heteroskedasticity will be made using a graphical method of plotting the square of predicted error term and predicted value of the dependent variable. Tests for multicollinearity will be made on correlation of the explanatory variables and the variance inflation factor (VIF). Test of endogeneity is made following Wooldridge (2002) by regressing suspected endogenous variables on all other explanatory variables including variables that are candidates for instrumental variables. The predicted residual is then included in equation (4.8). If this error term is significantly the dependent variable, then there is endogeneity problem, otherwise the suspected variable is not endogenous (see chapter four for more on this and annex 10 for the procedures of this test). Linear probability model (LPM) was used to make diagnostic tests as well as for other exploration of data as recommended by Cameron and Trivedi, 2005.

3.2.2.4. Specifying Semi-log Model

This model of binary choice variable is indispensable in the analysis of poverty. The model enables us to see the probability that households are non-poor relative to the probability that they are poor when households are proximate to product markets (the odds ratio). However, as noted by Couduel et al. (2002) and Ravallion (1996), this model uses an artificial construct as the endogenous variable. Unlike the usual binary response models, the continuous latent variable is not latent at all. Much of the information about the actual relationship between consumption and determining factors is lost. Moreover, these regression models are much

more sensitive to specification errors than linear regressions. The parameters can be directly estimated by regressing $w_i = \frac{y_i}{z}$ on $crt_i, mpxy_i, \chi_i$ (which is relevant and can be consistently estimable under weaker assumptions about the distribution of the error (Couduel et al., 2002; Ravallion, 1996). Moreover, for prediction purposes, linear regression should be used instead (Couduel et al., 2002; Ravallion, 1996).

Following the arguments suggested above, we construct our log-linear model. Following Fitsum and Holden (2002) and NEC et al. (2001) let the welfare indicator, w_i , be given as

$$w_i = \frac{y_i}{z}$$

where z is the poverty line and y_i is the consumption expenditure. Denoting by X the vector of explanatory variables, the following semi-log regression could be estimated using Ordinary List Squares (OLS).

$$\text{Log}(w_i) = (crt_i, mpxy_i, \chi_i)' \beta + \varepsilon_i \dots \dots \dots (4.12)$$

In this model, the logarithm of the ratio of consumption and the poverty line is taken as dependent variable and the same explanatory variables used in the above section are also used here. Taking the logarithm of w_i is to try to fulfill the normality assumption and interpretation simplicity. Hypothesis testing is made based on the t and F distribution for simple and overall significance respectively.

CHAPTER FOUR

ESTIMATION RESULTS, ANALYSIS AND INTERPRETATION

In the previous chapters, it was hypothesized that access to credit and proximity to product markets have an effect on, and improve the welfare status of, households. In this chapter, this hypothesis is confronted with a cross-sectional data collected from selected five zones of Oromia region (West Hararge, Illubabur and Jimma) and SNNP region (Sidama and Wollaita).

The chapter has two related sections. In the first section, a descriptive analysis is made by using simple statistical summaries and a poverty profile about the extent of poverty and the situation of access to rural credit, household's proximity and integration to the nearest product markets in the study areas. In the second section, an econometric analysis is made. Coefficients/marginal effects of access to credit and proximity to product markets in both the linear and non-linear models are estimated and analyzed.

The findings in both of these two sections will not only provide us with a rich information set on the subject both for cognitive knowledge and for analytical understanding of the major determinants of the welfare of households in the study area, it will also help us to draw policy implications in the next chapter.

4.1. Descriptive Analysis

4.1.1. Rural Poverty in Coffee-growing Households

Poverty is prevalent in coffee-growing households of SNNP and Oromia regions as in any other regions of the country. Table 4.1 shows the percentage of the moderately poor, poor and extremely poor from the total sample in the study area. Different poverty lines were set to classify households into this different poverty status. As the table below shows, of the total sample, 36% of the households are poor. While the extreme poor constitute 14% of households in the sample, the moderately poor are 54% of the total households.

Table 4.1: Prevalence of Poverty in Coffee-growing Households

	Moderately poor	Poor	Extremely Poor
Percentage of poor	53.5%	35.9%	14.4%
Poverty lines	1343.8	1075.0	806.3

Sample size: 1033; Poverty lines estimated by MoFED (MoDED, 2007)

As can be seen in table 4.1, there is a high poverty incidence in the sample households (35.9%). However, this figure seems to be smaller than the rural and national estimates of the incidence of poverty which were 39.3% and 38.7% respectively (See below for an in-depth comparison). Table 4.2 shows the incidence ($\alpha = 0$), depth ($\alpha = 1$) and severity ($\alpha = 2$) of poverty with their standard errors. As we have just seen above, 36% of the total sample is below the poverty line of ETB 1075. The poverty gap ratio, which represents the depth of poverty, or the average deprivation, is 0.08. This measure captures the mean aggregate consumption shortfall relative to the poverty line across the whole population. The squared poverty gap, which takes into account the relative distance separating the poor from the poverty line, is 0.03.

Table 4.2: Prevalence, Depth and Severity of Poverty

FGT	Estimated value	Standard error
$\alpha = 0$	0.36	0.0149
$\alpha = 1$	0.08	0.0044
$\alpha = 2$	0.03	0.0019

Sample size: 1033; Poverty line= ETB 1075

Table 4.3 shows a comparison of the results of poverty estimates of this study with the official estimates of poverty indices. Since the survey for the official results was conducted in the same year as the survey of this study and both of these estimates are based on the same poverty line, it seems logical to compare these results. The head count ratio of this study ($P_0=0.36$) is clearly lower than MoFED's estimate of 0.39 for the rural areas. While the squared poverty gap ratios of both estimates are the same, the poverty gap ratio of this study (0.08) seems a little bit lower than the officially reported estimate of 0.09. To see whether these differences of the headcount and squared poverty gap ratios are statistically different, we used the fact that any of the poverty indices and the associated test statistics estimated by DAD in this chapter is asymptotically normally distributed.

Table 4.3: A Comparison of Poverty: Study Area versus Rural and National Estimates

FGT	Study Area*	Rural (MoFED)**	National (MoFED)	P-Value
$\alpha = 0$	0.36	0.39	0.39	0.0388
$\alpha = 1$	0.08	0.09	0.08	0.0864
$\alpha = 2$	0.03	0.03	0.03	0.1192

* The survey for this study was conducted in 2005

**The source for the national and rural measures of poverty is MoFED (MoFED, 2007)

It is hypothesized that the FGT indices are not different from the officially reported measures [i.e. the null hypothesis, $H_0 =$ officially reported estimates]. As can be seen in the 5th column of table 4.3, the p-values are found to be less than the 5% significance level for the headcount index. As a result, the null hypothesis that the estimates are equal can be rejected and the difference between these estimates is found to be statistically significant. While the poverty gap ratio can be rejected at 10% significance level, the squared poverty gap is insignificant.

4.1.2. Poverty Comparison Across Zones

We can make spatial poverty comparison across zones. By comparing the prevalence, depth and severity of poverty across zones, we can have some idea of policy direction as to which area needs more policy attention than others. As shown in table 4.4, we can see that head count ratio for Jimma is the lowest as compared to other zones. Only 20% of sample households in Jimma are below the poverty line. While Sidama follows Jimma with head count ratio of 0.33, Wollaita and West Hararge are the highest in terms of the share of the poor below the poverty line which is 0.44 and 0.45 respectively. Their numerical inter-zonal difference is clear from the table, but we have to test whether they are statistically different from each other. This test is made in annex 6 which uses estimated values and their standard errors from table 4.4. Note that only the head count ratios are compared in annex 6. The p-values and the result of the tests are reported. As can be seen clearly, the estimates of most of these estimates are statistically different. There are exceptions however: the estimates of the indices for West Hararge compared with those of Wollaita and Illubabur are not statistically

different. Moreover, headcount estimates between Wollaita and Illubabur are not statistically different.

Table 4.4: Prevalence, Depth and Severity of Poverty: Inter-zone Comparison

FGT	Po		P1		P2	
Zone	Estimated value	Standard error	Estimated value	Standard error	Estimated value	Standard error
Sidama	0.33	0.0306	0.08	0.0091	0.03	0.0041
Jimma	0.20	0.0259	0.04	0.0063	0.01	0.0024
Illubabur	0.43	0.0325	0.10	0.0105	0.04	0.0048
Wollaita	0.44	0.0433	0.11	0.0133	0.03	0.0058
West Hararge	0.45	0.0362	0.10	0.0108	0.03	0.0047

Sample Size: Sidama=238, Jimma=241, Illubabur=232, Wollaita=132, W. Hararge=191

What can we make use of this analysis? The fact that there is a big disparity in the incidence of poverty across zones provides us with information as regards which zones need more policy attention than other zones. Moreover, residential difference affects households status of welfare means that, the different zonal disparity can be taken as an important correlates of poverty. This difference is quantified and is more articulated using econometric model in section 4.2.

4.1.3. Rural Finance, Access to Credits and Poverty

Rural finance and its access to the poor are critical for the livelihood of the poor in rural areas of coffee-growing households. As shown in table 4.5 below, households who borrowed from micro-finance institutions (MFIs) during the year constitute only 7.7% of the total sample. While the majority of households in the sample (77.2%) are members of *iddirs* (a traditional insurance schemes), only 8.5% of the total households in the sample are members of *iqqubs*

(informal/traditional saving and lending financial institutions-an Ethiopian name for ROSCAs). Households were asked if they have borrowed at least ETB 20 birr (or more) during the year either from informal and semi-formal financial institutions. A significant number of households (493) have borrowed from either source.

Tables 4.5: Distribution of Households' Membership in Financial Institutions and Access to Borrowing

Source of Finance		Number	Share from Total (%)
Informal	Member in <i>Iqqub</i>	88	8.5
	Member in <i>Iddir</i>	797	77.2
Semiformal	Those borrowed from MFI	80	7.7
Those who have borrowed at least ETB 20 birr during the year from both formal and semi formal institutions.		493	47.7

Sample Size: 1033

This constitutes 47% from the total households in the sample. In an area where there are no formal banking system providing loans to the poor households, this means that 40% of households utilize the informal channel of getting credit.

We have seen that there is meager access to credit in the study areas. We can have an insight into the contribution of access to credit to the amelioration of the welfare status of households. Table 4.6 shows the incidence, depth and severity of poverty by classifying households based on their access to rural credit. Measured in terms of the headcount, poverty is more prevalent (0.38) with those households who do not access financial services than with those who access them (0.34). While poverty gap and squared poverty gap ratios are the

same in the two groups, the incidence of poverty is different even statistically at 10% level of significance.

Table 4.6: Prevalence, Depth and Severity of Poverty and Access to Credit

Correlate	Households Having no credit access		Households having access to Credit		P-Values
	Estimated value	Standard error	Estimated value	Standard error	
$\alpha = 0$	0.38	0.0209	0.34	0.0213	0.0698
$\alpha = 1$	0.08	0.0061	0.08	0.0065	0.4364
$\alpha = 2$	0.03	0.0027	0.03	0.0029	0.9509

Sample Size: 1033

This result is consistent with the literature that households' access to credit helps improve their wellbeing. But this result should be interpreted with care. This is simply a bi-variate analysis with no ceteris paribus assumption. Moreover, this difference might have come from an endogeneity problem of finance in the sense that households' access to credit happens just because they are rich and hence credit worthy; not because they are rich because credit is available. These caveats will be more articulated and solved using a regression analysis in section 4.2.

4.1.4. Proximity to Product Markets and Rural Poverty

Table 4.7 shows a summary of households' proximity to product markets. Measured in terms of the cost that households pay to take a quintal of coffee to the nearest product market, the average cost across households is ETB 5.2 with minimum and maximum cost being ETB1.0 and ETB 30.0 respectively. The average time taken (in hours) to transport their product to the nearest markets (on foot) across households is 1.8 hrs. The maximum time taken is 10 hrs.

Tables 4.7: Summary Statistics of Households Proximity to Product Markets

Variable	Average	Standard Error	Min	Max
Cost to the nearest product market place (in ETB)	5.2	0.11	1.0	30.0
Time taken to reach to the nearest product market place (in hours).	1.8	0.08	0.0	10.0

Sample Size: 1033

From the total sample of households, 723 (70%) of them pay less than the average cost per quintal (ETB 5.15) to transport their product while the rest (30%) pay more than this average cost to take their product to their nearest market places (see table 4.8). Moreover, households who need to travel less than the average travel time to reach the nearest product markets constitute 75% while the rest (25%) need to travel more than the sample average time taken.

It is interesting to see that the mean consumption of households differs (in absolute terms) across groups and there seems to be a negative correlation with time taken and cost paid. While the mean consumption of households who pay less than the average cost of transporting coffee is ETB 1611, the mean consumption of households who pay more than this average is ETB1557. Moreover, the mean consumption of households who travel less than the average of all households to their nearest product markets is ETB1636 while the mean consumption of those who travel more than this average time is ETB 1475 (see table 4.8). But we will see whether these differences are statistically valid differences in the next few paragraphs and in the next section.

Tables 4.8: Summary Statistics of Households Proximity to Product Markets

	No. of Households	Mean Consumption
Households who paid less than the average cost per quintal (<average)	723	1610.9
Households who paid more than the average cost per quintal (>average)	310	1557.3
Households who travel less than the average travel time taken (<average)	771	1635.5
Households who travel more than the average travel time taken (>average)	262	1475.1

Sample Size: 1033

Even with a simplest descriptive statistical tool, we can have an idea of the correlation between the proximity to product markets and welfare status of households. Table 4.9 provides us with the incidence, poverty gap and severity of poverty in the two groups classified based on households' proximity to the nearest product markets. It can be seen that there is a big difference in the counts of the poor in the two groups.

Table 4.9: Incidence, Depth and Severity of Poverty and Access to Markets

Correlate	Households nearer to Markets		Households further from markets		P-Value
	Estimated value	Standard error	Estimated value	Standard error	
$\alpha = 0$	0.33	0.0166	0.46	0.0328	0.0001
$\alpha = 1$	0.08	0.0049	0.10	0.0101	0.0051
$\alpha = 2$	0.02	0.0021	0.03	0.0048	0.0382

*Hypothesis testing: H_0 : parameter = 0.33(0.08) (0.02) vs H_1 : parameter \neq 0.46 (0.10) (0.03)

While the headcount ratio in those households that are nearer to product markets is 0.33, this index for households who are further from product markets is 0.46. This difference is statistically significant even at 1% level of significance. This result can provide the evidence that markets matter for the poor because poor people rely on formal and informal markets to sell their products. We will see later in the chapter, with more strict assumptions (including *ceteris paribus*), whether households nearer to markets are statistically significantly better off than those households further from markets.

In this section, we have seen the extent of poverty in the study area. With the simplest model of poverty analysis (save for its limitations), we have found that there is a big difference in the incidence of poverty across zones. Moreover, access to credit and proximity to product markets significantly affects the welfare of households.

4.2. Econometric Analysis

The poverty profile that we have just seen in the above section is a very descriptive and an insightful tool that allowed us to make poverty comparisons across groups of households with some characteristics. It provided us with key information on the correlates of poverty. But this way of analysis is limited for reasons given in the methodology of this study and elsewhere in the previous chapters. In this section, an econometric analysis is made.

4.2.1. Determinants of Poverty in Coffee-growing Households

Examination of the contribution of the availability of credit and households' proximity to markets to poverty alleviation of the poor requires us to control for other potential factors that influence the poverty status of households. This calls for a determinant-of-poverty analysis. Table 4.10 provides us with econometric estimation results of the determinants of poverty using two models: non-linear and log-linear.

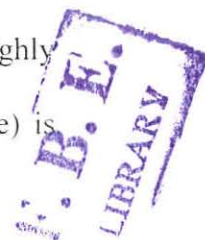
However, before going directly to the results, we made some diagnostic tests. A test on heteroskedasticity of the error term was made. The square of the predicted error term was plotted against predicted dependent variable (see annex 8). It seemed that there is some form of correlation between these two predicted variables indicating that there is indeed some form of heteroskedasticity. To avoid this problem, we used robust standard errors. Moreover, there is low correlation between explanatory variables (the maximum partial correlation coefficient is 0.3 between the dummies for Jimma and Sidama). The variance inflation factor (VIF) is 1.09 with mean VIF of 1.43 which is much lower than the rule of thumb of VIF=10 (Gujarati, 2004). See annex 9 for VIF of explanatory variables.

A test was made if there is a problem of endogenous variable. Our general model is

$$p(w_i = 1 / crt_i, mpxty_i, \chi_i) = F(crt_i, mpxty_i, \chi_i) \quad \text{where } crt_i \quad \text{and}$$

$mpxy_i$ stand for access to credit and market proximity respectively while the χ_i 's are a host of other explanatory control variables. A case in suspect is access to credit which can be endogenous in the sense that the probability of being poor declines with credit availability on

one hand and availability of credit is determined by the poverty status of the household. Annexes 10a through 10c show us the procedure of this test. Following Wooldridge (2001), an OLS regression was made between access to credit (a suspect of endogeneity) and all other exogenous variables including variables which can be candidates of instrumental variables (annex 10a). The predicted error term from this regression is then included into our original model (annex 10b). It can be seen that predicted error term (residual) is highly significant (even at 1%). This shows us there is an endogeneity problem. In finding an instrumental variable for credit availability, we identify three candidates: number of total livestock, total number of coffee trees and total income from coffee sales because they show the repayment capacity of the household (see for e.g. Alemayehu et al. 2006). It can be seen that total number of coffee trees has little association with availability of credit (see annex 10a) even at 10% significant level. Moreover, income from sales of coffee is correlated with the dependent variable (annex 10c). Total number of livestock is highly correlated with the availability of credit and poorly correlated with the dependent variable (see annexes 10a and 10c). Our criterion of selecting instrumental variable (i.e. the variable should be highly correlated with the independent variable and uncorrelated with the dependent variable) is fulfilled if we assume livestock and the error term are uncorrelated.



Having considered all these diagnostic and endogeneity tests in the model, we can make analysis on the econometric results. We can see that factors strongly associated with the probability of being poor include access to credit, proximity to markets, household size, age of the household, literacy of the household head, and characteristic of zones. The bigger the household, the greater is the incidence of poverty. The coefficient for age of the household is

positive and is significant at 1 per cent, which means it increases the probability of getting out of poverty which declines with age. Literacy of the household head is highly significantly (at 1 per cent). It increases the probability of getting out of poverty. Literate households are less likely to be poor than those who are not literate. The odds of getting out of poverty for households who are literate are 1.6 times the odds of households who are not literate.

4.2.2. Differences in Zones as Determinants of Poverty

Differences in zones have different probabilities of being poor and non-poor. The benchmark group is West Hararge. Jimma and Illubabur are significantly different from West Hararge, Wollaita and Sidama were not found to be significantly different from West Hararge. The difference in the effects on household welfare might be ascribed to the location-specific endowment of an area in terms of, among others, soil fertility, climate and access to natural resources. The results in this section are a little bit different from what was found in our descriptive analysis. But, for any policy implication drawn in the next section, we trust the regression results. This is not surprising if we remember the assumption we made in the two analyses. *Ceteris paribus* assumption is held in this section while we didn't account for that in the previous analysis.

Table 4.10: Estimation Results of Econometric Models (Logit and Log-linear)

	Logit		Marginal effects	Log-linear
	Coefficient	Odds ratio		Coefficients
Availability of Credit	0.0599 [3.51]***	1.0617 [3.51]***	0.0133 [3.52]***	0.0128 [3.99]***
Distance to markets	-0.0417 [-1.83]*	0.9591 [-1.83]*	-0.0093 [-1.83]*	-0.0118 [-2.45]**
Household Size	-0.2464 [-3.08]***	0.7816 [-3.08]***	-0.0549 [-3.1]***	-0.1877 [-6.75]***
Square of household size	0.0098 [2.09]**	1.0098 [2.09]**	0.0022 [2.09]**	0.0083 [5.65]***
Age of household head	0.0677 [3.35]***	1.0701 [3.35]***	0.0151 [3.37]***	0.0209 [4.32]***
Square of the age	-0.0006 [-3.09]***	0.9994 [-3.09]***	-0.0001 [-3.11]***	-0.0002 [-3.45]***
Sex of household head	-0.3949 [-2.02]**	0.6738 [-2.02]**	-0.0840 [-2.13]	0.0328 [0.65]
Literacy	0.4966 [3.44]***	1.6431 [3.44]***	0.1106 [3.43]***	0.1155 [3.31]***
Total cultivated land	-0.0964 [-1.69]*	0.9081 [-1.69]*	-0.0215 [-1.69]*	0.0091 [0.75]
Number of coffee trees	0.0002 [2.24]**	1.0002 [2.24]**	0.0000 [2.28]**	0.0000 [2.01]**
Farming Technology	-0.2168 [-1.43]	0.8051 [-1.43]	-0.0487 [-1.42]	-0.0640 [-1.79]*
Sidama	0.3234 [1.47]	1.3818 [1.47]	0.0698 [1.52]	0.1249 [2.48]**
Jimma	0.6279 [2.26]**	1.8737 [2.26]**	0.1309 [2.43]**	0.3468 [6.49]***
Illubabur	-0.6693 [-2.79]***	0.5121 [-2.79]***	-0.1560 [-2.75]***	-0.0839 [-1.52]
Wollaita	-0.0515 [-0.21]	0.9498 [-0.21]	-0.0115 [-0.21]	-0.0027 [-0.05]
Constant term	-0.2818 [-0.47]			0.2306 [1.52]
	No of Obs.=1033		Pr(y)(predict)	F(15, 1017)
	Wald chi2(15) =89.17	Wald chi2(15) =89.17	=0.66526355	=13.83
	Prob > chi2=0.0000	Prob > chi2=0.0000		Prob > F= 0.0000
	Log pseudo-likelihood = -616.5	Log pseudo-LH= -616.5		R-squared=0.2143
	Pseudo-R ² =0.0860	Pseudo-R ² = 0.086		Root MSE=0.52383
	Robust z (logit) and t (log-linear) statistics in parentheses			
	* significant at 10%; **significant at 5%; *** significant at 1%			

4.2.3. Rural Credit and Poverty in Coffee-growing Households

When we come to our objective of examining the contribution of credit availability to household's welfare, we see availability of credit significantly (at 1% significance level) affecting the probability of a household getting out of poverty. The marginal effects of the availability of credit were estimated (fourth column of table 4.10) which were evaluated based on the mean of explanatory variables. It is highly significant (1% significant level). Therefore, households who have an access to credit have 1.3% more probability of getting out of poverty than households who don't have an access to it. The same table also shows estimates of the odds ratio of the probability of getting out of poverty against the probability of being poor. The odds of getting out of poverty for households who have an access to credit are 1.1 times that of the probability of getting out of poverty for those households having no access to credit. Although, it is economically insignificant, the high statistical significance shows that access to credit is important in the improvement of the welfare of households. It can also be said that the difference in log (per adult household annual consumption) between a households to whom credit is available and those households to whom credit is not available is 0.013 (fifth column of table 4.10). This means that a household having an access to credit is predicted to consume 1.3% more, holding other factors including proximity to product markets fixed.

The above results can be explained by the fact that credit can provide capital for financing inputs, labor and equipment for income generation. Moreover, they can help households increase their capacity to bear risks or reduce cost of insurance and finally these financial

services can potentially stabilize consumption of food and other potential goods efficiently (see for e.g. Zeller et al., 1997; Bigsten et al., 2004). It can also be explained by the fact that credit in the informal sector can promote the productive capabilities of the informal sector poor and enable them to satisfy better their needs through participation in their own activities (Bekele, 1996; Solomon, 1996).

4.2.4. Access to Product Markets and Poverty

Similarly, we can also see that proximity to product markets has a strong negative association with poverty (table 4.10). The fact that cash crop households are further from markets makes these households poorer because they pay higher prices to their food items and get lower prices to their products. The negative sign of the coefficient of market access variable shows that the more distant product markets are from households, the worse is the welfare of households and this is significant at. This is explained by the fact that farmers face numerous marketing constraints that raise marketing costs. High marketing costs often stem from poor transportation networks, including transportation costs, lack of market information, and—sometimes—lack of competitiveness of markets (see for e.g. Minot and Hill, 2007).

The marginal effect was evaluated at the mean of the time taken to take a quintal of coffee to the nearest markets (which is 1.8 hours). Households nearer to product markets have more probability of getting out of poverty than those who are further from these markets holding other factors including availability of credit constant. Although this difference in probability is economically small, it is still highly significant showing that markets matter for the poor.

The difference in log (per adult household annual consumption) between a households who are nearer to product markets and those households who are further from these markets is 0.012. This means that a household one hour further from a product market relative to a house hold nearer to these markets is predicted to consume 1.2% more, keeping other factors including the availability of credit constant. That is, the more distant households have lower welfare as far as market proximity is concerned. This can be explained by the presence of transaction costs translated into higher transportation costs and costs of acquiring market information for isolated households (see Sadoulet and de Janvry, 1995).

CHAPTER FIVE

CONCLUSION AND POLICY IMPLICATIONS

5.1. Concluding Remarks

A myriad of researches have been conducted on poverty analysis and related issues by using data collected from rural Ethiopia. Most of them have shown that the incidence and prevalence of poverty is high in rural areas. One problem with the previous studies is that they based their analysis largely on an aggregated data which, they claim, represents the rural areas of the country by assuming the homogeneity of the rural sector. Generalization about national poverty trends should have been complemented with an analysis based on a disaggregated data that reveals the large pockets of chronic poverty. Moreover, while the key factors to reduce poverty, mentioned in the literature, are making product and financial markets accessible to the rural poor, these issues were neglected and passed untouched in most of the studies.

With this backdrop, this study had the objective of trying to see whether households who are proximate to markets and who have an access to rural credit are better off than those who don't have such markets. The study used both descriptive and econometric analysis to accomplish its objectives. Despite their relative differences of market proximity and credit availability in affecting the welfare of the poor, the results in this study confirm our prior hypothesis. The results also supported earlier researches that lack of financial and product markets can be bottlenecks for poverty reduction in small holder farming system.

It was found that 36% of the households in the study area are poor. However, this is much lower than the national estimates of the incidence of poverty. It was found that there existed a significant difference between the incidences of poverty across zones. Illubabur and Jimma were found to have a significant different incidence of poverty compared with West Hararge. Residents in Sidama and Wollaita were found to be less likely to be poor than West Hararge.

The study has also found that, the incidence of poverty in households who have access to credit is significantly lower than in households who don't have credit facility. In terms of probability, households who have an access to credit are more likely to get out of poverty than households who don't have an access to it. The odds of getting out of poverty for households who have an access to credit are greater than the odds of those who do not have access to credit. It was also found that there is significant difference consumption between these groups. A household having an access to credit is predicted to consume 1.4% more. Quite similar results were found as regards proximity to product markets. The incidence of poverty in households who are nearer to product markets is 0.33 while this index for households who are further from product markets is 0.46. Households nearer to product markets have more probability of getting out of poverty than those who are further from these markets. A household one hour further from a product market relative to a household nearer to these markets is predicted to consume 1.2% more than households who are further from these households.

5.2. Policy Implications

We can draw some policy implications based on the above empirical evidences. Our comparative analysis on the incidence of poverty between zones has shown us that it matters whether households live in different areas as far as poverty is concerned. The fact that there is a big disparity in the incidence of poverty among these zones under study means that policy should pay attention to areas where poverty is more prevalent. This study found Jimma and Illubabur significantly different from West Hararge. Policies for poverty reduction efforts should be directed towards West Hararge.

Moreover, availability of credit was found critical. Those having access to rural credit are better off than those who don't have access to it. Making credit accessible to the poor makes households finance the purchase of agricultural inputs and smooth their consumption on times of low agricultural income. This improves the welfare of households. Making credit accessible to the small holder farming households can be done through microfinance-bank linkages. To increase the efficiency, capacity and coverage of micro financial institutions, banks may participate in MFIs through credit or equity contributions. Banks may also outsource retail operations to MFIs. Providing infrastructure and systems and other back office processing to the MFIs, and sharing or renting facilities of MFIs with banks are other ways of increasing the financial strength and clientele coverage of micro finance institutions.

Markets are places where agricultural households sell their products at a higher price and buy inputs at competitive price. Making markets work for the poor can be done by investing in

market institutions. Grades and standards become increasingly important with the development of high-value coffee markets; they can be set by private companies and trader associations. A case in point is the Ethiopian Commodity Exchange (ECX). When common standards are absent the public sector is required to develop them. Once standards have been set, the public sector can also encourage their widespread adoption by providing information and infrastructure. We have indicated in our analysis that, one of the marketing costs farmers face is the cost of transporting goods. Building roads and improving the surface of existing roads reduces both the time and cost of getting produce to their nearest product markets.

END NOTES

1. The data sets used by MoFED and Tassew et al. (2008) was the Welfare Monitoring Survey (WMS) and Household Income and Consumption Expenditure Survey (HICES) while the data used by Bigsten et al. (2005) was generated by the Department of Economics of Addis Ababa University in collaboration with the University of Oxford, Center for the Study of African Economies (CSAE) and Gutemberg University. See annexes 1(a) and 1(b) for the results. According to these authors, poverty is higher in rural areas with 47.5% and 39.3% of the poor below poverty line in 1995/1996 and 2004/2005 respectively than in urban areas (33.2% and 35.1% respectively). As can be seen from the annex 1(a), there is a substantial decline in rural poverty all in terms of the headcount, poverty gap and poverty severity indices which were lower by 17.1%, 37.8% and 48.3% respectively compared to 5.9% increase in the first index and 22.1% and 38.2% decline in the latter two indices in urban poverty for the period elapsed 1995/1996-2004/2005. These differences were found statistically significant at 1 per cent significant level as shown at the bottom of the table. Similarly, Bigsten et al. (2005) also found the same trend using different data sets and time periods and showed (see annex 1(b)) the incidence of poverty was virtually as high in the urban as in the rural areas. The study also showed that the headcount measure of poverty was 41% nationally for 1994 (42% rural and 40% urban), declining to 36% in 1997 (for both rural and urban).
2. While the Human Poverty Index (HPI-1) takes the same variables that are used to calculate Human Development Index (HDI): living long and healthy life, access to education and command over resources for decent living; the formulas used the index differ from that of the HDI. It is given by the following formula.

$$HPI-1 = \left[\frac{1}{3} (P_1 + P_2 + P_3) \right]^{\frac{1}{3}}$$

where P_1 is probability at birth of not surviving to age 40 (for e.g.) which reflects living long and healthy life, P_2 is adult illiteracy rate reflecting access to education and P_3 is un-weighted average of population without sustainable access to an improved water source and children under weight for age which reflects the command over resources for decent living.

3. The data used by Alemayehu et al. (2006) was generated by the Department of Economics of Addis Ababa University in collaboration with the University of Oxford, Center for the Study of African Economies (CSAE) and Gutenberg University.

4. The discrete variable counterpart for equation 4.7 can be derived as follows. Given the variable of interest (consumption) incomes $y_1 \leq y_2 \leq \dots \leq y_q \leq z \leq y_{q+1} \dots \leq y_n$ ordered in an ascending order where z is an exogenously given poverty line below which an individual is classified as

poor, we can have the following ratio. $P_n = \frac{1}{n} \sum_{i=1}^q \left[\frac{z - y_i}{z} \right]^n$ where q is the number of poor people below the poverty line, n is the total number of people in the population, z is the poverty line and

y is consumption level. Therefore the head count ration becomes $P_n = \frac{1}{n} \sum_{i=1}^q \left[\frac{z - y_i}{z} \right]^n = \frac{1}{n} \sum_{i=1}^q 1 = \frac{q}{n}$ and the poverty gap ration and the squared poverty gap ratios

become $P_1 = \frac{1}{n} \sum_{i=1}^q \left[\frac{z - y_i}{z} \right]^1 = \frac{1}{n} \sum_{i=1}^q \left[\frac{z - y_i}{z} \right]$ and $P_2 = \frac{1}{n} \sum_{i=1}^q \left[\frac{z - y_i}{z} \right]^2$ respectively.

5. Contrary to the conventional notation $w_i = 1$ for poor and $w_i = 0$ for non-poor, the opposite notation is followed in this study for the simple reason of making the sign of the coefficients of the logit model the same as that of the log-linear model. This will make the comparison of the direction of coefficients in the two models straightforward.

REFERENCES

Abebe Shimelis, Bereket Kebede (1996). Issues in the Measurement and Dynamics of Poverty: A Survey., Proceedings of the Fifth Annual Conference on the Ethiopian Economy, Edited by Bereket Kebede and Mekonnen Tadesse, December 1996. Addis Ababa.

Alemayehu Geda, Abebe Shimelis and Daniel Zerfu (2006). Finance and Poverty in Ethiopia: A Household level Analysis. World Institute for Development Economics Resarch (WIDER), United Nations University.

Alemayehu Geda, De Jong, N., Kimenyi, M. S., Mwabu G. (2005). Determinants of Poverty in Kenya: A Household Level Analysis, Department of Economics, University of Connecticut, Economics Working Papers.

Bekele Tilahun (1996). The Role of Credit in the Informal Sector for Poverty Alleviation. Proceedings of the Fifth Annual Conference on the Ethiopian Economy. Edited by Bereket Kebede and Mekonnen Tadesse. December 1996. Addis Ababa.

Bevan, F., Bereket Kebede (1996). Measuring Wealth and Poverty in Rural Etheiopia: A data Based Discussion. Proceedings of the Fifth Annual Conference on the Ethiopian Economy. Edited by Bereket Kebede and Mekonnen Tadesse. December 1996. Addis Ababa.

Bigsten, A. Abebe Shimeles and Bereket Kebede (2005). Poverty Income Distribution and Labor Markets in Ethiopia. NORDISKA AFRICA INSTITUTE.

Bigsten A., Bereket Kebede, Abebe Shimeles and Mekonnen Tadesse (1999). Poverty and Welfare in Ethiopia: Profile and Determinants. Ethiopian. Journal of Economics, Volume VIII, Number 1, April. 1999.

Bigsten A., Abebe Shimeles and Mekonnen Tadesse (2004). Dynamics of Poverty in Ethiopia. World Institute for Development Economics (WIDER). United Nations University

Bigsten A., Bereket Kebede, Abebe Shimeles and Mekonnen Tadesse (2002b). Poverty and Welfare in Ethiopia: Profile and Determinants. Proceedings of the Fifth Annual Conference on the Ethiopian Economy. Edited by Bereket Kebede and Mekonnen Tadesse. December 1996. Addis Ababa.

Cameron, A., Trivedi, P. (2005). Micro econometrics: Methods and Applications. Cambridge University Press, New York.

Central Statistical Agency (CSA) (2004). Welfare Monitoring Survey Analytical Report. June 2004. Addis Ababa.

Coudouel, A., Hentschel, Jesko S. and Wodon, Quentin T. (2002). Poverty Analysis. World Bank, PovertyNet.

Dejene A., Vigano, L., Bonomo, L, Tsegaye, W. (2007). Risk Management, Financial Innovation and Institutional Development in Rural Areas: Evidence from the Coffee Sector in Ethiopia. Bergamo University Press, Sestante Edizioni, 2007.

Dercon S. (2005). Poverty measurement. in Clark D. A. (ed.), The Elgar Companion to Development Studies.

Dercon, S., Krishnan, P. (1996). A Consumption-Based Measure of Poverty for Rural Ethiopia in 1989 and 1994. Proceedings of the Fifth Annual Conference on the Ethiopian Economy. Edited by Bereket Kebede and Mekonnen Tadesse. December 1996. Addis Ababa.

Diagne A. (1999). Determinants of Household Access to and Participation in Formal and Informal Credit Markets in Malawi. International Food Policy Research Institute (IFPRI).

Diagne, A., Zeller, M. and Sharma, M. (2000). Empirical Measurement of Households' Access to Credit and Credit Constraints in Developing Countries: Methodological Issues and Evidence. International Food Policy Research Institute. Washington, D.C. 20006 U.S.A.

Domodar, Gujarati (2004): Basic Econometrics, The McGraw-Hill Companies, 2004.

Duclos Jean-Yves and Araar A. (2006). Poverty and Equity: Measurement, Policy and Estimation with DAD, International Development Research Center.

Ethiopian Commodity Exchange-ECX (2009).What is in a Bean: ECX and the Specialty Coffee Market. ECX Discussion Note 2, December, 2008.

Fitsum Hagos, Holden, S. (2002). Rural Household Poverty Dynamics in Northern Ethiopia 1997-2000: Analysis of Determinants of Poverty. Department of Economics and Social Sciences, Norway

Green, William H. (2003). Econometric Analysis, Fifth Edition, New York University. Prentice Hall, 2003.

IFAD (2003). Promoting Market Access for the Rural Poor in order to Achieve the Millennium Development Goals. Roundtable Discussion Paper for the Twenty-Fifth Anniversary Session of IFAD's Governing Council February 2003

Mankiw, G. (2002). Macroeconomics. Fifth edition, 2002. Worth Publishers

Mekonnen Tadesse (2002b). Determinants and Dynamics of Urban Poverty in Ethiopia. Proceedings of the Fifth Annual Conference on the Ethiopian Economy. Edited by Bereket Kebede and Mekonnen Tadesse. December 1996. Addis Ababa.

Minot N., V. Hill, R (2007). Developing and Connecting Markets for Poor Farmers. International Food Policy Research Institute

MoFED (2007). Ethiopia: Building on Progress: A Plan for Accelerated and Sustained Development to End Poverty (PASDEP), Annual Progress Report 2006/2007. Ministry of Finance and Economic Development (MoFED). Addis Ababa.

Nafziger, E. W. (2006). Economic Development, Fourth Edition, Cambridge University Press.

National Bank of Ethiopia-NBE (2008). National Bank Of Ethiopia: Annual Report, 2007/08. National Bank of Ethiopia, Addis Ababa.

National Economic Council (NEC), Malawi, National Statistical Office (NSO), Malawi, and International Food Policy Research Institute (IFPRI) (2001). Washington D.C. (2001) The determinants of Poverty in Malawi, 1988: An analysis of the Malawi Integrated Household Survey, 1997-98.

Ravallion, M. (1996). Issues in Measuring and Modeling Poverty. The World Bank, Policy Research Department. Poverty and Human Resource Division.

_____ **(1998).** Poverty Lines in Theory and Practice. LSMS Working Paper, No. 133. 1998. The World Bank, Washington D.C.

_____ **(1992).** Poverty Comparisons-A guide to Concepts and Methods. LSMS Working Paper, No. 88, The World Bank, Washington D.C.

_____ **(1994).** How robust is poverty profile. World Bank Economic Review, V.5.

Rojas, R. (2004). Well-being and the Complexity of Poverty: A Subjective Well-being Approach. United Nations University. World Institute for Development Economics Research (WIDER), 2004.

Sadoulet, E., de Janvry, A. (1995). Quantitative Development Policy Analysis. The John Hopkins University Press, Baltimore and London.

Samuel Gebresilassie and Eva Ludi (2007). Agricultural Commercialization in Coffee Growing Areas of Ethiopia. Ethiopian Journal of Economics, Volume XVI, Number 1, April, 2007.

Sen, A. (1976). Poverty: An Ordinal Approach to Measurement. *Econometrica*, Vol.44, No.2 (March, 1976), 219-231

Sen, A. (1985). Commodities and Capabilities, Amsterdam, North Holland

Solomon Damte (1996). Credit to Poor Households: The Case of Financing Micro-Enterprises in the Debre Berhan Town, North Shoa, Ethiopia. Proceedings of the Fifth Annual Conference on the Ethiopian Economy. Edited by Bereket Kebede and Mekonnen Tadesse. December 1996. Addis Ababa.

Tassew Woldehanna, Hoddinot, J. and Darcon, S. (2008). Poverty and Inequality in Ethiopia: 1995/96-2004/05. May, 2008. Addis Ababa University, International Food Policy Institute and University of Oxford.

Thorbecke, E. (2005). Multi-dimensional Poverty: Conceptual and Measurement Issues Cornell University, UNDP International Poverty Centre, Brasilia.

UNDP(2003). Human Development Report. Millennium Development Goals: A Compact Among Nations to End Poverty. New York, Oxford University Press, 2003.

UNDP (2006). Human Development Report. Beyond Scarcity: Power, Poverty and the Global Water Crisis, Palgrave Macmillan, 2006.

UNDP (2007/08). Human Development Report. Fighting Climate Change: Human Solidarity in a Divided World, Palgrave Macmillan, 2008.

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

Wooldridge, Jeffery M. (2001). Econometric Analysis of Cross Section and Panel Data. The MIT Press, Cambridge. First Edition October 2001.

Wooldridge, Jeffrey M. (2002). Introductory Econometrics: A Modern Approach. South-Western College Pub; 2 edition. July, 2002.

Zeller, M., Schrieder, G., Von Braun, J. Heidhues, F. (1997). Rural Finance for Food Security. Implications for Research and Policy. Food Policy Research Institute (IFPRI).

ANNEXES

Annex 1: Poverty Dynamics

Annex 1a: Dynamics of the prevalence, depth and severity of poverty in Ethiopia: a comparison between the national, rural and urban sectors from 1995/96-2004/05

Year	National			Rural			Urban		
	P ₀	P ₁	P ₂	P ₀	P ₁	P ₂	P ₀	P ₁	P ₂
	Level								
1995/1996	0.455	0.129	0.051	0.475	0.134	0.053	0.332	0.099	0.041
1999/2000	0.442	0.119	0.045	0.454	0.122	0.046	0.369	0.101	0.039
2004/2005	0.387	0.083	0.027	0.393	0.085	0.027	0.351	0.077	0.026
Percentage Change									
1995/1996-1999/2000	-2.7	-7.7*	-12.2**	-4.3*	-8.9**	-12.9**	11.1	2.0	-7.1
1999/2000-2004/2004	12.4***	30.0***	39.8***	-13.4***	30.8***	40.6***	-4.7	23.6***	-33.5***
1995/1996-2004/2005	14.8***	35.4***	-47.1	-17.1***	37.0***	48.3***	5.9	22.1***	-38.2***

*** Significant at 1 per cent; ** significant at 5 per cent; * significant at 1 per cent

Source: Tassew et al., 2008 and MoFED, 2006.

Annex 1b: Evolution of Poverty in Ethiopia

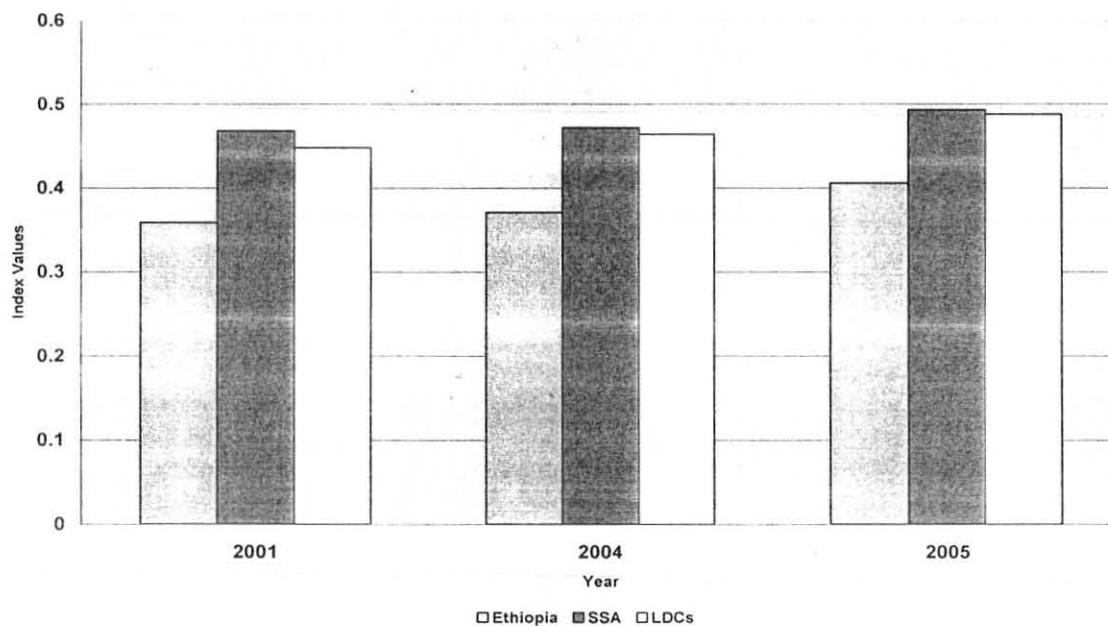
Region	1994			1995			1997		
	P ₀	P ₁	P ₂	P ₀	P ₁	P ₂	P ₀	P ₁	P ₂
Rural	42	16	8	37	16	9	36	13	6
Urban	40	15	8	38	15	8	36	15	9
National	41	16	8	37	16	9	36	13	6

Source: Bigsten et al., 2005

Annex 2: Human Development Index and GDP per capita: Ethiopia, LDCs and SSA

Annex 2a: Human Development Index for Ethiopia, LDCs and SSA

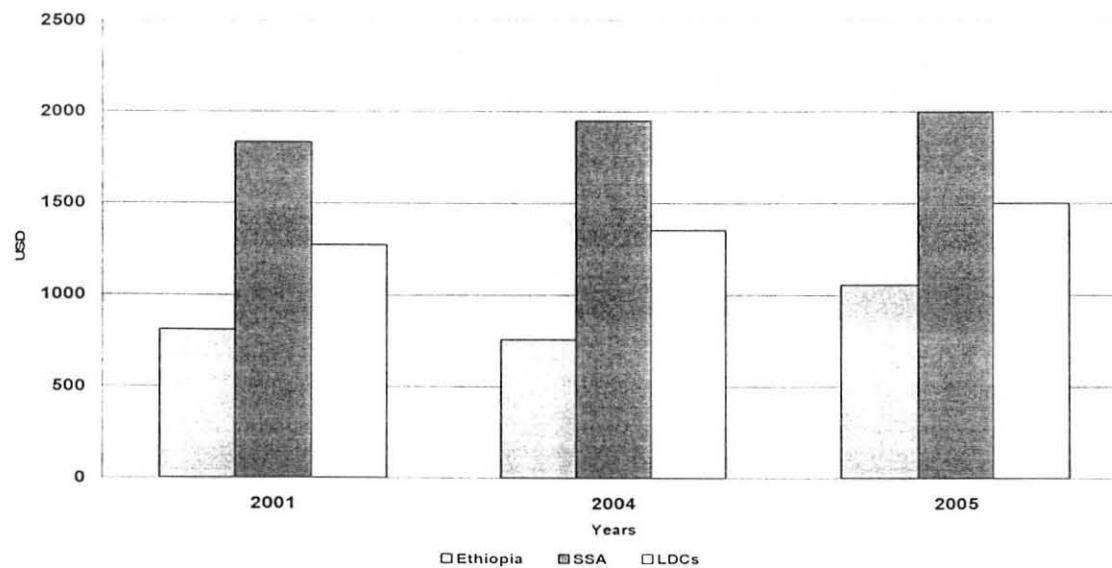
Chart 1: Human Development Index for Ethiopia, LDCs and SSA



Source: UNDP, 2003, 2006, 2007/08 and <http://hdr.undp.org>

Annex 2b: GDP per capita at PPP in USD for Ethiopia, LDCs and SSA

Chart 2: GDP Per Capita at PPP in USD for Ethiopia, SSA and LDCs



Source: UNDP, 2003, 2006, 2007/08 and <http://hdr.undp.org>

Annex 3: Access to Markets and Financial Services

Annex 3a: Percentage Distribution of Households by Distance in Kilometers to the Nearest Market or Financial Service

Distance in KM	Region	Markets	Microfinance
Under 1km	Rural	17.1	11.2
	Urban	43.2	28.4
	National	21.2	21.2
1-4	Rural	26.9	5.4
	Urban	49.8	49.0
	National	30.5	30.5
5-9	Rural	30.6	14.3
	Urban	6.3	6.1
	National	26.8	26.8
10-14	Rural	12	10.9
	Urban	0.3	0.4
	National	10.2	10.2
15-19	Rural	9.1	17.0
	Urban	0.1	1.8
	National	7.7	7.7
20 and above	Rural	4.3	37.7
	Urban	0.2	8.7
	National	3.7	3.7

n=13,412,479 for Markets and n=13,384,926 for Micro finance

Source: Central Statistical Agency, Welfare Monitoring Survey, 2004, Analytical Report

Annex 3b: Percentage Distribution of Households by Reason for not using the Nearest Market or Financial Services and Place of Residence

Distance in KM	Region	Markets	Microfinance
Too Far	Rural	35.3	21.5
	Urban	12.0	6.3
	National	31.6	19.2
Expensive	Rural	17.0	7.4
	Urban	16.2	3.3
	National	16.9	6.8
Poor Quality service	Rural	9.8	2.4
	Urban	5.4	1.6
	National	9.1	2.3
Lack of Staff/Equipment	Rural	1.3	1.4
	Urban	1.4	0.6
	National	1.3	1.2
Facility Doesn't Offer Full service	Rural	19.2	6.2
	Urban	7.8	2.8
	National	17.4	5.7
Have no need of it No experience	Rural	30.7	60.3
	Urban	34.8	63.0
	National	56.6	78.6
Other Reason	Rural	5.3	9.7
	Urban	6.8	6.8
	National	5.5	9.3

n=13,412,479 for Markets and n=13,384,926 for Micro finance

Source: Central Statistical Agency, Welfare Monitoring Survey, 2004, Analytical Report

Annex 4: Distribution of Households by zones and gender of the household head

Zone	Male	Female	Total	Share from Total
Sidama	191	47	238	23
Jimma	188	53	241	23
Illubabur	172	60	232	22
Wollaita	98	34	132	13
West Hararghe	145	45	190	18
Total	794	239	1033	100
Share from Total	77	23	100	

Annex 5: List, Symbol, Description and Expected Sign of Independent Variables

No	Symbol	Explanatory Variables	Expected Sign
1	Crt	Access to Rural Credit: Whether households borrowed from informal and semi-formal sources (Yes=1 and No=0)	(+)
2	mpxty	Proximity and Access to product market: Length of the travel time to a market place to sell their product	(-)
3	Hhs	Size of the household	(-)
4	hhss	The square of the size of the household	(+)
5	hha	Age of the household	(+)
6	hhaa	Square of Age of the Household head	(-)
7	hhx	Sex of the household head (1= if male and 0=Female)	(+)
8	lcy	Literacy of the household head(1= if literate and 0=illiterate)	(+)
9	lnd	Total cultivated land	(+)
10	tech	Technology: whether households use farming technologies	(+)
11	agrzon	Area of Agro-ecological zones: 1=if household is in Sidama (SD) and=0 otherwise; 1=if household is in Jimma (JM) and 0=otherwise; 1=if household is in Illubabur (IL) and 0=otherwise; 1=if household is in Wollaita (WL) and 0=1 otherwise. West Hararge is taken as the base group.	

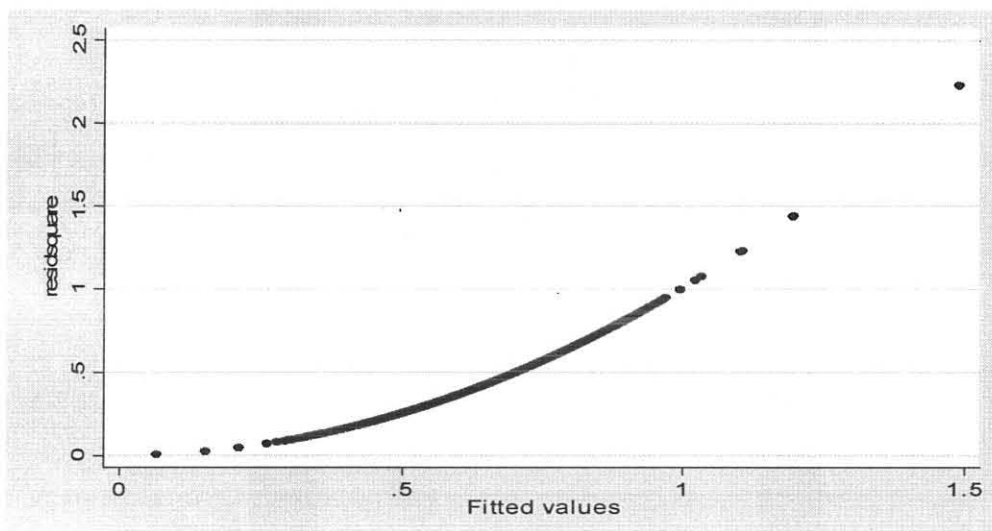
Annex 6: Significance Tests of Inter-Zonal Poverty Differences

Zone	Sidama		Jimma		Illubabour		Wollaita	
	P-Value	Result of test	P-Value	Result of test	P-Value	Result of test	P-Value	Result of test
Sidama			0.0000	H ₀ is rejected	0.0019	H ₀ is rejected	0.0004	H ₀ is rejected
Jimma	0.0000	H ₀ is rejected			0.0000	H ₀ is rejected	0.0000	H ₀ is rejected
Illubabur	0.0019	H ₀ is rejected	0.0000	H ₀ is rejected			0.6970	H ₀ is not rejected
Wollaita	0.0004	H ₀ is rejected	0.0000	H ₀ is rejected	0.6970	H ₀ is not rejected		
West Hararge	0.0001	H ₀ is rejected	0.0000	H ₀ is rejected	0.4259	H ₀ is not rejected	0.7602	H ₀ is not rejected

Annex 7: Descriptive Statistics of Dependent and Some of the explanatory variables in the study

Variable	Mean	Std.Dev.	Min	Max
Total Consumption	1726.35	1762.82	364.12	22596.96
Time taken to reach the nearest markets	1.84	2.84	0.02	24.00
Household size	6.54	2.98	1.00	20.00
Age	45.19	14.59	15.00	130.00
Total land holding	1.19	1.30	0.10	18.00
No of coffee trees	1178.51	3159.99	1.00	73000.00

Annex 8: Test of Heteroskedasticity



Annex 9: Test of Multi-collinearity
(Variance Inflation Factor)

Variable	VIF	1/VIF
Ilubabur	2.09	0.479447
Jimma	2.04	0.489795
Sidama	1.96	0.509122
Wollaita	1.6	0.625673
Credit	1.39	0.719535
Household Size	1.37	0.730349
Total land holding	1.31	0.763294
Sex of household head	1.18	0.846592
Literacy	1.16	0.860575
No. of Coffee trees	1.14	0.878303
Technology	1.13	0.884174
Age	1.1	0.906699
Market	1.05	0.948137
Mean VIF	1.43	

Annex 10: Test of Endogeneity Problem

Annex 10a: Estimates of suspected endogenous variable (access to credit) on all exogenous variables including candidates for instrumental variables

Dependent Var: Availability of Credit	Coefficients	Strd Errors	t-value	P> t
Distance to markets	-0.008	0.006	-1.360	0.174
Household Size	0.042	0.018	2.390	0.017
Square of household Size	-0.002	0.001	-1.640	0.101
Age of household head	0.000	0.005	0.080	0.932
Square of the age of household head	0.000	0.000	-0.580	0.565
Sex of household head	0.041	0.043	0.950	0.342
Literacy of household head	-0.029	0.033	-0.880	0.377
Total cultivated land	-0.014	0.014	-1.000	0.317
Farming Technology	0.024	0.034	0.720	0.470
Sidama	-0.075	0.051	-1.460	0.144
Jimma	-0.095	0.052	-1.820	0.069
Ilubabur	-0.114	0.053	-2.170	0.031
Wollaita	-0.001	0.058	-0.010	0.990
<i>Number of Coffee trees</i>	<i>0.000</i>	<i>0.000</i>	<i>1.620</i>	<i>0.105</i>
<i>Total number of livestock</i>	<i>-0.009</i>	<i>0.003</i>	<i>-2.960</i>	<i>0.003</i>
<i>Income from sales of coffee</i>	<i>0.000</i>	<i>0.000</i>	<i>-2.100</i>	<i>0.036</i>
Constant Term	0.450	0.140	3.210	0.001

Number of obs. =1033; F (16, 1016)= 3.53; Prob > F=0.000; R-squared=0.0526

Annex 10b: Estimates of binary outcome for poverty on its determinants including suspected endogenous variable and the predicted error term

Dependent Variable: Poor=0, non-poor=1	Coefficients	Strd Errors	t-value	P> t
Availability of Credit	0.041	0.029	1.420	0.157
Distance to markets	-0.020	0.005	-3.630	0.000
Household Size	0.010	0.018	0.540	0.588
Square of household Size	0.000	0.001	-0.300	0.761
Age of household head	0.013	0.004	2.860	0.004
Square of the age of household head	0.000	0.000	-3.300	0.001
Sex of household head	-0.028	0.040	-0.680	0.494
Literacy of household head	0.062	0.032	1.970	0.049
Total cultivated land	-0.037	0.013	-2.770	0.006
Farming Technology	-0.005	0.032	-0.150	0.878
Sidama	-0.027	0.049	-0.540	0.587
Jimma	0.047	0.050	0.940	0.347
Illubabur	-0.249	0.056	-4.460	0.000
Wollaita	-0.015	0.054	-0.280	0.783
<i>Predicted residual</i>	<i>-1.516</i>	<i>0.221</i>	<i>-6.850</i>	<i>0.000</i>
Constant Term	1.122	0.167	6.720	0.000

Source	SS	Df.	MS	Number of obs.	1033
Model	27.7	15.0	1.8	F(16, 1016)	8.96
Residual	210.0	1017.0	0.2	Prob. > F	0
Total	255.9	1032.0	2.1	R-squared	0.1167

Annex 10c: Partial correlation coefficient between candidates of instrumental variables and binary outcome of poverty

	Poor=0;non-poor=1	Number of Coffee trees	Total number of livestock	Income from sales of coffee
Poor=0;non-poor=1	1			
Number of Coffee trees	0.1001	1		
Total number of livestock	0.0664	0.1644	1	
Income from sales of coffee	0.2678	0.2755	0.302	1

Number of Observation=1033


Declaration

I, the undersigned, declare that this thesis is my original work and has not been presented for a degree in any other university, and that all source of materials used for the thesis have been duly acknowledged.

The examiners' comments have been dully incorporated.

Declared by:

Name: Getachen Ammed

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Date: 24-06-2009

Confirmed by Advisor:

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Signature: 

Date: 24/06/09

Place and date of submission: _____