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MODELLING POVERTY AND ITS DETERMINANTS IN ADDIS ABABA: A FOCUS ON MULTINOMIAL LOGIT SELECTION MODEL

Abbi Mamo Kedir*

ABSTRACT

I have used different econometric models (OLS, probit and multinomial logit selection) to analyse factors leading to poverty. The main emphasis of the study is to model determinants of standard of living in Addis Ababa using two-stage estimation technique. In the first step, a multinomial logit model is applied to distinguish between three socio-economic groups. The second stage regression, determinants of standard of living (i.e. total household expenditure per adult equivalent per month) are identified after incorporating the correction term for sample selectivity using the Lee-Heckman method. Among others, variables such as education, access to credit, employment status, gender, marital status and food shortage experience are significant determinants of welfare.

INTRODUCTION

To many, living in urban centres is considered as a better way of life. They do not seem to realise how poverty is prevalent in such areas. Urbanisation is associated with higher incomes, improved health, higher literacy and improved quality of life. Other benefits of urban life are less tangible but no less real: access to information, diversity, creativity and innovation. Yet along with the benefits of urbanisation come environmental and social ills, some of them at staggering proportions. Such problems include lack of access to basic facilities such as housing, drinking water, health and education. Most of the problems are caused by poverty and these same problems can be the cause of poverty as well. It is academically interesting and practically challenging to examine the factors that cause poverty. This study, apart from its policy significance, has a methodological motive.

* University of Nottingham, School of Economics, NG7 2RD;

E-mail: LEXBAM@LZN2.LASS.NOTTINGHAM.AC.UK. This work is a tribute to the late Mekonnen Tadesse and my wife Menbere Zemedu who had been a great source of inspiration in my life and career development. On this occasion, I would like to thank my supervisor Dr. Andrew McKay and the two anonymous referees of the article for their critical and constructive comments. The final version of this article was submitted in February 2000.

Urban poverty is pervasive in most developing countries and it is becoming increasingly urgent to raise urban incomes. Due to its peculiar features from rural poverty, studying urban poverty separately is appropriate. So far many studies focus on rural Ethiopia. But that does not imply that urban Ethiopia is affluent. Rather the depth and severity of poverty in the urban areas can be more serious. This study tries to model poverty using a probit model and the determinants of poverty in Addis Ababa using a multinomial selection logit model. The analysis is based on the first round urban household survey of the Department of Economics of Addis Ababa University which was conducted in 1994. In fact few studies dealt with determinants and those which touched upon the issue used different models such as probit or logit models (Sahn and del Ninno 1994; del Nino 1994); multinomial logit model (Coloumbe and McKay 1996) and models that capture the dynamic factors that determine changes in standard of living and the mobility of households in and out of poverty from panel data (Grootaert *et al.*, 1995; Mekonen 1997). This study adopts the multinomial logit model used by Coloumbe and McKay (1996) in their attempt to identify the determinants of poverty in Mauritania.

We study the poor themselves (i.e. characteristics of household members and economic heads). Poverty is explained by individual circumstances and/or characteristics of poor people. The study depends on case theories of poverty. Some studies focus on the macro-economy rather than focusing on the poor and that approach follows a generic theory of poverty. Though it is not the purpose of this study, poverty can also be explained by economy-wide problems.

The objectives of this research are to contribute to the understanding of poverty in Ethiopia by identifying individuals or socio-economic groups that experience poverty and why they experience it by using a different approaches; to bring the scale of the poverty problem to the attention of policy makers and to fill the research gap as few studies have already been done on poverty in Ethiopia. There is only a single study on determinants of poverty (Mekonen 1997).

The paper is organised as follows. The first section gives a general background about the Ethiopian economy and poverty studies made so far. Relevant literature is reviewed in section two. It is split into two parts: review of theory and of empirical work. The third section deals with the standard of living measure considered in this study with the rationales for doing so. Section four discusses issues related with the data. Then based on the descriptive results, section five gives the poverty situation in Addis Ababa. The sixth section is about conceptual issues involved in modelling the determinants of poverty. Section seven reviews possible methodologies that can be adopted to model poverty and its determinants. The final section discusses the results and the possible policy recommendations. Then, the paper concludes.

1. LITERATURE REVIEW

1.1. Theoretical Issues

Poverty is the outcome of complex interaction of social, economic, cultural and political factors. One of the theoretical considerations in studying poverty is to adopt an appropriate definition. The concept of absolute poverty is the working definition in this study. Details have been omitted for the sake of concise presentation. The definition of absolute poverty is consumption based. An individual or a household in absolute poverty fails to have the necessary income that can purchase the basket of goods and services that are considered very basic in the context of a given society. In other words, such an individual or household fails to attain a minimum level of income above the poverty line. Illiteracy, malnutrition and ill-health are common features of families that are entrapped in absolute poverty. (see Alcock (1993); Townsend (1979); Sen (1985); Donnison (1982) for details)

Another theoretical problem is related to the measurement of standard of living of a household. Standard of living is affected by various factors such as income, expenditure, health status, educational level, area of residence and it is difficult to summarise all of its dimensions in a single aggregate figure. Growth in per capita GNP, HDI (human development index) and measures based on income and expenditure are the conventional measures. For household-based analysis expenditure (total or per capita) is generally preferred to income in LDCs. The expenditure approach is the one applied here. There are three reasons. First, current consumption is often taken to be a better indicator of current standard of living. Besides, it is assumed that instantaneous utility depends directly on consumption, not on income per se. Second, current consumption may also be a good indicator of long-term average well-being, as it will reveal information about incomes at other dates, in the past and future. This is because incomes of the poor often vary over time in fairly predictable ways. In such circumstances, there are typically consumption smoothing and insurance opportunities available to the poor, such as through saving and community-based risk sharing. Third, in economies where most people earn their living from employment in the informal sector, the expenditure approach is more realistic than other approaches [Deaton (1992); Glewwe (1991); Coulombe and McKay (1996); Mekonen (1996); Dercon and Mekonen (1997)]. Practical considerations such as adjustment for cost of living differences and household composition are required. As we are focusing only on Addis there is no need to make cost of living adjustment but adjustments for household composition using adult equivalent scales is made.

1.2. Empirical Literature

There are different sets of poverty determinants studies for different countries such as House (1991) for Sudan; Glewwe (1991) for Cote d'Ivoire; Appleton (1995a, 1995b) for Uganda; Appleton and Mackinnon (1997) for Uganda; and McKay and

Coulombe (1993, 1996) for Mauritania. We briefly review each study focusing only on the method adopted.

Studies of poverty using household survey data from developing countries have typically concentrated on measurement issues and on describing the characteristics of the poor. This work is sometimes technically very sophisticated and is a necessary first step for evaluating interventions targeted at the poor. However, there are surprisingly few studies which are based on multivariate analysis of the determinants of poverty; of estimating what could be termed 'poverty functions'. Such poverty functions might give more insight into what type of interventions could reduce poverty. They would also permit more valid inferences about the causes of poverty than are provided by the simple-often bivariate or univariate decomposition of poverty indices presented in conventional poverty profiles. Furthermore, they can control for more than one factor at once (Appleton 1995a:1).

When we talk about determinants of poverty we need to distinguish between economy wide factors and those that relate to individual households. Household size, religion and ethnic group of the head, education and health status, region of residence...etc. relate to household characteristics; on the other hand, transfers, government services, regulation of markets, asset redistribution (e.g. land reform) relate to economy wide factors. The macro factors can affect different households in different ways. Therefore, policies can focus on either of these factors or both to reduce poverty. The econometric analyses examine the factors related to individual households.

Glewwe (1991) identified determinants of household welfare in Cote d'Ivoire by regressing total household expenditure (i.e. the measure of the standard of living) on different explanatory variables. He used the Cote d'Ivoire Living Standards Survey (CILSS) conducted in 1985. Household characteristics are identified as determinants of poverty and he restricted himself to that portion of welfare due to consumption of goods and services. He brought to attention the fact that some regressors can be endogenous (e.g. stocks of both human and physical capital).

Appleton (1995a) introduced the concept of a poverty function, modelling the shortfall of household consumption from the poverty line as a function of reduced form determinants such as human capital and land holdings. A tobit model is estimated using data from a national household survey in Uganda. The welfare measure considered is real consumption per adult equivalent, sometimes right censored and expressed in logs. Parameters from the model are found to be similar to those from consumption functions, indicating that the poor receive comparable rates of return on their assets to the non-poor. Education of both men and women appears to raise the welfare of the poor as well as the non-poor, in both urban and rural areas.

Appleton and Mackinnon (1997) analysed the survey data of 1992 collected from all districts in Uganda. They modelled poverty as discrete choice variable by using the poverty measures developed by Foster, Greer and Thorbecke (1984). Variations in consumption above the poverty line are not modelled. The focus is only on what happens to the poor. They estimated a tobit poverty function on the consumption of the poorest half of the population, with the dependent variable for the non-poor being set at the poverty line. The consumption functions are estimated for the whole population; with the same regressors as the tobit allowing for community level fixed effects. Their modelling exercise revealed that the results of modelling the determinants of poverty are fairly close to results from the simple consumption function.

The study by Coulombe and McKay (1996) focuses on the determinants (i.e. characteristics of household economic heads and households) of poverty in Mauritania using a household survey data for 1990. They provided summaries of the pattern of poverty by residence and socio-economic group and also of the relationship between the standard of living and demographic and other characteristics of households and their economic heads before the econometric estimation. They focused on the use of multivariate analysis to highlight more precisely the socio-economic determinants of living standards. To assume away with endogeneity of some variables they assumed exogeneity of some variables in the short run (e.g. household size and region of residence). However, at some level, many of the explanatory variables are endogenous. Their explanatory variables, for working households, include demographic characteristics, the sector of activity, measures of the size, permanence and formality of the enterprise and the value of its capital assets. For non-working households access to rental income, transfers, borrowing, savings, and ownership of any significant assets are taken as regressors. They used the multinomial logit selection model developed, among others, by Lee (1983). They applied a two stage estimation; the first capturing the choice of a socio-economic group (i.e. the estimation of the multinomial logit selection model) because the socio-economic group to which a household belongs is itself potentially a determinant of living standards. The second captures the determinants of the standard of living for each socio-economic group (i.e. using OLS) after correcting for sample selectivity. They did the analysis for urban and rural areas separately.

The study by House (1991) explores the nature, extent and principal determinants of income inequality (or socio-economic differentiation and relative poverty) for a sample of peasant households in Southern Sudan. He used OLS to estimate production and wage functions. House explained differences in household welfare, which is measured in terms of income per adult equivalent, in the context of the Chayanov model of peasant behaviour. He attempted to identify the causes of poverty and inequality by examining the links between income and sources of income; crops grown and sold; crop prices; socio-economic group; and household endowments along with their allocation to high or low yielding activities.

1.3. Similar Studies on Ethiopia

Why the study of determinants so important in Ethiopia? Poverty studies based on disaggregated household data have started to emerge as late as 1995 and they focused only on deriving poverty lines and calculating poverty indices. No attempt has been made except a study by Mekonen in 1997 to analyse the factors that lead to poverty. Therefore, little has been known about the nature of poverty in the country. In addition, the country has experienced a number of problems over the years and the impact of those problems on the standard of living can also be studied by identifying the determinants of poverty.

Mekonen (1997) attempted to address, simultaneously, two aspects of poverty in Ethiopia; determinants and dynamics of poverty. The study uses three rounds of urban household surveys conducted in 1994, 1995 and 1997. Consumption data was used to measure welfare and construct poverty profiles. In modelling determinants and dynamics of poverty, emphasis was placed on major socio-economic characteristics. Following Coulombe and McKay (1996) and Grooteart, *et al.*, (1995), the determinants of living standards are broadly classified into two; those that reflect household needs which includes household size and composition and those that determine the income-generating opportunities available to the household such as education, employment and ownership of assets. The study by Mekonen is different from other poverty determinants studies which are based on cross-section data. It tries to capture the factors that determine changes in standard of living and the mobility of households in and out of poverty from panel data. The model is estimated using OLS and is derived from the standard utility maximisation assumptions and uses real household expenditure per capita as money-metric measure of utility which takes into account differences in household size and relative prices. Total household expenditure per adult equivalent is used as the dependent variable with exogenously determined household characteristics as regressors.

2. THE DATA

The first round Ethiopian Urban Household Survey (EUHS) which was conducted in November 1994 in seven of the large urban areas of the country is the basis for this study. These are Addis Ababa, Awassa, Bahar Dar, Dessie, Diredawa, Jimma and Mekelle. The survey was administered by the Department of Economics of Addis Ababa University in collaboration with the University of Gotenborg, Sweden.

3. POVERTY IN ADDIS ABABA

In this section, I will discuss the situation of poverty in Addis Ababa at the household level. Some household-based studies (e.g. by the World Bank) have attempted to compute a poverty line and most of them classified households that are at the lower

end of the income distribution (i.e. 40 percent) as poor. According to the index showing incidence of poverty, Mekonen (1996) identified 47 percent of the sampled urban population in Ethiopia as poor and MEDAC (1997) showed 40.2 percent as poor. The different percentages are reflections of different poverty lines used by the different authors.

In recent years and the past, there have been many indications of declining living standards in the capital city. Scenes of increasing numbers of street dwellers and beggars, rising crime, prostitution, unemployment and inflation are common. Unemployment seems a more serious problem of all. New entrants into the labour market such as demobilised soldiers, those who are laid off from public enterprises and the civil service, increased number of school leavers (in hundreds of thousands), migrants (both permanent as well as seasonal) and refugees makes the situation even worse. Those developments will lead to increased casualisation of the labour market, with work opportunities becoming more unreliable and likely to be daily paid. Many households are engaged in female business income activities. Many households in the North and North West of Addis are engaged in weaving and pottery. Some sell local alcoholic drinks, firewood and charcoal, and home-made food items. Many individuals serve as housemaids to relatively better off families or as clothes washers. These are commonly done by school-leaving girls and female heads of households. Boys are often employed as daily labourers, assistants in garages, and engage themselves in shoe shining. In recent years, there are changes in livelihood sources for the city's dwellers. Most people are now employed as casual labourers or petty traders due to the changes related in the labour market following the economic reforms since 1991. The importance of employment in government institutions, factories and the army has declined.

Impressive strides in areas of urban infrastructure, education and health facilities, access to clean drinking water, housing, job opportunities...etc. are not observed even though one can not deny some positive developments attempted by the present government. Correspondingly, due to the presence of unemployment, poor sanitation, limited access to health facilities, there are deteriorating situations in living standards of many people living in Addis Ababa. The poor in the city have lower primary school enrolment rates (hence lower literary rates), lower access to sanitation and safe water, more sickness prevalence rates, ...etc. The main sources of drinking water are unprotected wells, rivers and lakes from where 72 percent of the national poor and 28 percent of the urban poor obtain their drinking water. Sanitation-wise, 89 and 49.9 percent of the national and the urban poor respectively use fields and forests as toilets (MEDAC, 1997).

All of the features of urban poor households discussed above have implications for living standards in the short and long term. Obviously, the absence of basic facilities and services lead to lower earning potentials (e.g. labour days lost due to illness) and perpetual poverty.

Having this background about the welfare situation of poor households in Addis, this section discusses the pattern of poverty in the city. The data used in the discussion is based on the sampled 878 households which are classified into three socio-economic groups. Demographic characteristics which involve the construction of bulky tables are omitted.

There is a country specific poverty line for Ethiopia. Specifically, for the purpose of this study the poverty line defined for Addis Ababa by Dercon and Mekonen (1997) is adopted. The objective here is to look at the pattern of poverty across different groups of households within Addis Ababa. This is done by computing the poverty indices for each group. Indeed, it can be argued that it is the choice of the poverty line which is the single most important determinant of poverty. Different poverty lines give different estimates of poverty.

Dercon and Mekonen used the approach suggested by Ravallion (1993) basically due to its transparency and wide application in developing countries. Building on Rowntree's seminal work Ravallion suggests the construction of one bundle of goods that represent the basic needs of a person. The value of this bundle is then the poverty line, under which one cannot obtain minimum basic needs. Problems remain however in how to account for differences in needs, if one is willing to consider them (Dercon and Mekonen 1997:5) In addition, there is a problem of identifying the minimum bundle.

The authors compared urban and rural poverty in Ethiopia and constructed two poverty lines; the first based on a single basket of food for all sites (i.e. assuming a representative national diet) and the second one using a separate diet for different parts of the country. The second set of poverty lines is more sensible as they take care of the differences in food culture in the country. Therefore, this study used the second set of poverty lines to look at the pattern of poverty in Addis Ababa by socio-economic group. The food poverty line for Addis Ababa is 66.25 Ethiopian Birr per adult per month and the total poverty line is 85.1 Ethiopian Birr per adult per month.

This means only about 10 to 13 US dollars per adult per month, which is far lower than the one typically recommended by World Bank of a dollar per person per day (World Bank, 1990). Therefore the poverty lines can not be compared at all with some of the international poverty figures (Dercon and Mekonen 1997:9). We also need to note that there are serious difficulties in computing the exchange rates to make the comparison. Since the focus of this study is not poverty level comparisons, we will not discuss the implications of the lines for poverty comparisons across countries. Rather the figures in terms of standard exchange rates can highlight the seriousness of poverty in Ethiopia. In fact, there is a need to consider the relatively cheap cost of living given foreign currencies. But still the amounts are not sufficient and can only enable one to purchase relatively poor and cheap types of food, which may not offer more than basic calories and a few other nutrients.

Using the food expenditure per capita data and the food poverty line adopted above, three poverty measures following Foster, Greer, and Thorbecke (1984) are derived for each of the socio-economic groups identified in Addis Ababa. These indices have a characteristics of being decomposable. Therefore, we can look at the contribution of each of the socio-economic groups to the total poverty in Addis Ababa. The calculation of the indices and their decomposition is explained in the Annex.

Table 3.1. Descriptive statistics, Poverty Indices and Decomposition of the indices by Socio-economic Group

Socio-economic group	Sample share	Average Standard of living*	St. Dev.	P0 (Incidence)	P1 (Poverty gap)	P2	C0	C1	C2
Wage-employed Households (445)	0.51	84.97	73.4	0.49	0.41	0.23	0.46	0.46	0.47
Self-employed households (274)	0.31	78.98	70.5	0.58	0.45	0.26	0.33	0.32	0.32
Unemployed Households (159)	0.18	78.76	73.2	0.59	0.46	0.27	0.20	0.19	0.20
All (878)	1.00	80.90	72.40	0.55	0.44	0.25	0.39	0.39	0.39

Note: * = The average standard of living is given in terms of the national currency (the Ethiopian Birr).

According to the summary statistics in the above table, the average standard of living is not significantly different among the socio-economic groups considered. The self-employed and the unemployed have fairly similar average living standards. Wage-employed households have the highest welfare according to the mean value (i.e. 84.97), which is also above the average for all households. But both self-employed and unemployed households with 78.98 and 78.76 fall short of the total average: 80.9. The standard deviation in column four shows that there is more inequality among wage-employed and unemployed households than self-employed ones.

The table also tries to indicate the pattern of poverty in Addis Ababa. The P_α measures were calculated for each socio-economic group and for all households considered in this study. P_0 indicates the incidence of poverty, the highest being for unemployed households followed by self and wage-employed households. According to the incidence index, 55 percent of the sampled households are classified as poor. A similar pattern exists when we consider P_1 and P_2 measures. For all the three values of α , the unemployed households are the poorest and the wage-employed are the least hit by poverty while the self-employed remain in between.

The depth of poverty, measured as P_1/P_0 , is more serious in wage-employed households than the other two groups of households. In other words, the ratio can be interpreted as the average income gap for the group of households that are below the poverty line. The average income of wage employed households below the poverty line is 17 percent of the poverty line income level. For self-employed and

unemployed households we have 24 and 22 percent respectively. These are surprisingly low figures.

The contribution of each of the socio-economic groups to total poverty is computed for each of the poverty indices. With respect to the contribution to total poverty in Addis Ababa by different groups, we see that the wage-employed households contribute the most. In fact, this is partly due to the large sample share that this group of households got. Self-employed and unemployed households seem to contribute to poverty slightly higher than their population share. Their contribution is 0.33 and 0.20 respectively. Correspondingly, the wage-employed households contribute slightly lower than their population share even if their contribution to the total poverty is higher than the other two groups. There is no significant variation in the contribution of poverty by each socio-economic group as alpha increases or as emphasis is placed on the poorest among the poor.

It is not surprising to note that unemployed households are the worst hit by poverty as we can see from the indices calculated. This group of households constitutes a heterogeneous group of households that are more likely to have lower living standards. They include pension and remittance receiving households, households with inactive and active unemployed, handicapped members...etc.

The above results showed the pattern of poverty in Addis Ababa. The major objective of the research is to model determinants of poverty. Thus, the following section will focus on the methods used in this study.

4. METHOD OF ANALYSIS

4.1. General

The regression results are based on different models. The first set of results pertains to the model of OLS, which is estimated taking the standard of living measure as a continuous dependent variable. The estimates are generated for two alternative standard of living measures viz. food expenditure per adult equivalent per month (PCF) and total expenditure per adult equivalent per month (PCT). The latter measure is used in the final regression since it is a more sensible measure of the standard of living of a household. In addition, using PCT has improved the overall fit of the model.

The second set of results relate to a probit analysis in an attempt to model poverty per se. The probit results reported are based on the poverty line defined for Addis Ababa. Poverty is modeled by defining the poverty index (i.e. incidence of poverty) as a binary dependent variable. The third set of results is based on the multinomial logit selection model.

4.2. The Probit Model

One of the objectives of this study is to determine the socio-economic factors causing poverty. The focus is on socio-economic factors since the survey data used here has a lot of information about socio-economic characteristics of households and individuals. The households surveyed were classified into different socio-economic groups depending on their major source of income. Then the variables that pertain to all groups in general and to each group in particular were identified. A probit analysis based on a poverty line defined for urban Ethiopia is attempted. The idea is to model poverty per se instead of modeling standard of living. The coefficients of the estimated model give the factors that more likely make households poor. Before discussing the results of the model, I have briefly reviewed the theoretical outline of the model.

The probit model is useful to model the behavior of a dichotomous dependent variable and uses the normal distribution (see Maddala 1983; Gujarati 1995; Greene 1997). In each case, we can construct models that link the decision or outcome to a set of factors in using regression. One approach will be to analyze each of the choices (whether one is poor or not is relevant here) in the general framework of probability models;

$$\text{Prob}(\text{event } j \text{ occurs}) = \text{Prob}(Y = j) = F[\text{relevant effects: parameters}] \quad [4.1]$$

The great majority of recent empirical work in economics has used models of binomial choice. For illustration, consider a model of labor force participation. The respondent either works or seeks work ($Y = 1$) or doesn't ($Y = 0$). A set of factors, such as age, marital status, education, work history, and so on, gathered in a vector X could explain the decision, so that

$$\text{Prob}(Y = 1) = F(X' \beta)$$

$$\text{Prob}(Y = 0) = 1 - F(X' \beta) \quad [4.2]$$

The set of parameters β reflects the impact of changes in X on the probability of participating in the labor force (Greene 1997:873). Similarly, the set of parameter estimates show the impact of changes in X (say household and individual specific characteristics) on the probability of being poor.

Thus, for a given regressor vector, we would expect

$$\begin{aligned} \lim_{\beta'X \rightarrow +\infty} \text{Prob}(Y = 1) &= 1 \\ \lim_{\beta'X \rightarrow -\infty} \text{Prob}(Y = 0) &= 0 \end{aligned} \quad [4.3]$$

The normal distribution gives rise to the probit model,

$$\text{Prob}(Y = 1) = \int \phi(t) dt = \Phi(\beta'X) \quad [4.4]$$

The function $\Phi(\cdot)$ is a commonly used notation for the standard normal distribution.

4.3. Modeling Poverty

Total household expenditure per capita or total household food expenditure of the i th household (E_i) can be modeled in a reduced form as a function of demographic characteristics of the head (such as age, gender, religion, ethnic group, marital status) D_i ; and other members (percentage of children and old people, household size) O_i ; education and health status of the head, EH_i ; other variables such as access to credit, remittance, pension, farming activity, tenancy, and vulnerability,...etc. R_i .

$$E_i = b_1 D_i + b_2 O_i + b_3 EH_i + b_4 R_i + U_i \quad [4.5]$$

This is one simple regression of real expenditure with U_i as the error term. It allows one to identify those observable factors which are correlated with household welfare and suggests casual inferences. This equation is the basis for the OLS results of the next chapter. However, caution must be exercised in making inferences due to the possibility of simultaneous or reverse causation (Appleton and Mackinnon 1997).

Modeling the welfare of the whole population is not the same as modeling poverty per se. A probit model is estimated to model poverty itself in Addis Ababa. In particular, if one is solely interested in poverty, then variations in the welfare of the non-poor are irrelevant. Hence, factors which affect poverty should be separated from the processes determining the consumption of the non-poor. In stead of using the consumption of all as the dependent variable one could take the measure of household poverty, P_i , suggested in the P_{90} measure (Foster *et al.*, 1984). For instance, Coulombe and McKay (1993) used a probit model to analyze what

determines whether a household is poor or not. That means the P_i measure is defined as a binary discrete variable. It takes the value of one when the total expenditure per capita (E_i) is below the defined poverty line (e.g. 66.25 Ethiopian Birr per month) and a value of zero otherwise. Or

$$\begin{aligned} P_i &= 1 && \text{if } E_i \leq PL(\text{the poverty line}) \\ P_i &= 0 && \text{otherwise} \end{aligned} \quad [4.6]$$

4.4. Modeling Standard of Living

In this study, three socio-economic groups are identified and they fall in the category of unordered choices in the context of the econometric literature of qualitative and limited dependent variable models. Both multinomial probit and logit models can be used for the study of ordered and unordered multiple choices. The multinomial probit model is computationally more complicated than the multinomial logit model but it is less restrictive. It requires much more computer time per iteration than the logit model. Other discrete choice models include nested logit and conditional logit models. Under multinomial logit model, there is a single vector of characteristics, which describes the individual or the household and a set of parameter vectors. In the case of nested logit model, these are essentially reversed. The set of parameters is each characterized by a set of attributes. Thus for my purpose, I can not use the nested logit model to model the standard of living of households. In addition, conditional logit is irrelevant because it is appropriate only when the data consist of choice-specific attributes instead of individual-specific characteristics. However, the conditional logit model is more or less the same as the multinomial logit (Greene 1997:917). Since I have individual or household specific characteristics as determinants of standard of living the multinomial selection model is appropriate and it is adopted in this study. In the literature review part, it is mentioned that the same methodology is used by Coulombe and McKay for Mauritania. The details of the model are outlined below.

4.5. The Multinomial Logit Model

The choice of a socio-economic group by a given household is considered as endogenous. But as argued above, it is difficult to conclude that this choice is purely endogenous. This endogeneity is taken care of by adopting a two-stage modeling following Lee (1983).

In a framework of discrete choice models, one observes the attributes of the choices (i.e. that of the socio-economic groups in this case). The probability of each

household (i) being in j (where j is the socio-economic group) is given as (Maddala 1983);

$$P_{i,j} = \exp(X_i' \beta_j) / 1 + \sum_{k=1}^{m-1} \exp(X_i' \beta_k) \quad [4.7]$$

where $j = 1, \dots, m-1$.

K = sum over all other choices

β = vector of unknown parameters associated with the vector of regressors X which are assumed to be exogenous. The X's are characteristics of the observed households and their members.

$$P_{i,m} = 1 / 1 + \sum_{k=1}^{m-1} \exp(X_i' \beta_k) \quad [4.8]$$

where $\sum_{j=1}^m P_{i,j} = 1$ is the sum of all individual probabilities.

The probability of each outcome (i.e. the choice of the socio-economic group) is a function of X. Equation 4.7 above is referred to as the multinomial logit model.

The model implies that one can compute j log odds-ratios which can be given as

$$\ln P_{i,j} / P_{i,0} = X_i' \beta_j$$

One could normalize on any other probability as well and obtain

$$\ln P_{i,j} / P_{i,k} = X_i' (\beta_j - \beta_k). \quad [4.9]$$

From the point of view of estimation, it is useful that the odds ratio, P_j / P_k , does not depend on the other choices. This follows from the independence of disturbances in the original model (Greene 1997:915).

I shall now consider the estimation of this equation based on sample size of n. In the present context, n is the number of households. Each of the n households will fall into one of the categories (i.e. the socioeconomic groups) with the probabilities of falling in a specific group given by equation [4.7]. Then the probabilities $P_{i,j}$ and $P_{i,m}$ for the ith household are obtained.

I also defined a set of dummy variables such that

$$Y_{i,j} = 1 \text{ if the } i\text{th household falls in the } j\text{th socioeconomic group.}$$

$$Y_{i,j} = 0 \text{ otherwise}$$

Then the likelihood function for the multinomial logit model can be written as

$$L = \prod_{i=1}^n P_{i,1}^{Y_{i,1}} \cdot P_{i,2}^{Y_{i,2}} \cdot \dots \cdot P_{i,m}^{Y_{i,m}} \quad [4.10]$$

A simple monotonic transformation of (7.10) gives us the log likelihood as:

$$\log L = \sum_{i=1}^n \sum_{j=1}^m Y_{i,j} \log P_{i,j} \quad [4.11]$$

Differentiating equation [4.11] numerically w.r.t the parameters (β_k), we get the maximum likelihood estimates of the model. Methods such as the Newton-Raphson iteration method are employed due to the non-linear characteristics of equations [4.7] and [4.8].

The second derivatives of the log likelihood are negative which guarantees the existence of a unique maximum and the iteration procedure converges to the maximum. In the next section, based on the above general exposition of multinomial logit models I will discuss the multinomial logit selection model.

4.6. The Multinomial Logit Selection Model

Multinomial logit models can be viewed as special cases of a general model of utility maximization. They are applied to many situations such as the choice of occupation (Schmidt and Strauss 1975); selection of sector of employment (Krishnan et al., 1998); choice of socioeconomic groups (Coulombe and McKay 1996) and choice of transport modes (Theil 1969). In this study, a similar exercise as that of Coulombe and McKay is attempted for Addis Ababa.

Three socio-economic groups are identified and I am interested in analyzing the implications of being in one of them. Such an analysis is important because one's welfare or living standard depends on the socioeconomic group that one belongs to. For instance, being in self-employment, more likely, may make a household poor. This may be due to factors such as irregularity of income, lack of initial capital to set up businesses due to credit market imperfections, the high probability of this group to be out of employment for a long period time...etc.

Let the selection function is denoted by Y . Let Y_j be a discrete choice variable which takes on the value j if the household i is in group j ($j = 0, 1, 2, \dots, k$), k can be considered as the last socioeconomic group we have. Y_j^* is the latent variable of the model denoting, say, the indirect utility associated with being in group j . It is unobservable. But Y_j is a polychotomous observable realization. Let Z_j is a vector of characteristics of the head and other characteristics of the household and u_j is the error term which is independently and identically distributed (iid). Similarly X_s is a matrix of explanatory variables for households in group s and η_s is the error term independent of X_s . γ_s and β_s are group-specific coefficients. All right hand side variables are exogenous.

The relationship between the variables is expressed as:

$$Y_j = j \text{ if } Y_j^* = \text{Max} (Y_{j1}^*, Y_{j2}^*, \dots, Y_{jk}^*) \\ Y_j = 0 \text{ otherwise}$$

where

$$Y_j^* = Z_j \gamma_j + \eta_j \quad [4.12]$$

$$Y_s = X_s \beta_s + \sigma_s u \quad [4.13]$$

Household i ($i = 1, 2, \dots, N$) selects group j if and only if :-

$$Y_{ij}^* > \text{Max}_k Y_{ik}^* \quad \forall s \neq k$$

This might be interpreted as saying that they obtain a higher level of welfare (or utility as proxied by the total consumption expenditure per capita) from that group than any other. One will be better off and will be in a certain group if the group can generate higher utility or higher purchasing power.

Equation (4.12) is modeled as a function of household-specific explanatory variables, estimated as a multinomial logit and considers the same variables across all households (Coulombe and McKay 1996). Therefore, the subscripts on the X's can be dropped.

What is the log likelihood function for this polychotomous choice model?

Let i be a polychotomous variable with values 1 to M and denote $i = s$ if category s is chosen. Equivalently,

$$i = s \text{ if and only if } Z_i \gamma_s > \varepsilon_i \quad [4.14]$$

where

$$\varepsilon_s = \text{Max } Y_{is}^* - \eta_s \quad [4.15]$$

$$s = 1, \dots, M$$

For each pair (u_s, ε_s) where u_s is the error term specified in socioeconomic group specific equation below. Suppose the specified marginal distribution of u_s is $G_s(u)$ and the implied marginal distribution of ε_s is $F_s(\varepsilon)$. Let $g_s(\cdot)$ be the density function of $G_s(\cdot)$. Define dummy variables D_{is} , $s=1, \dots, M$ such that

$$D_{is} = 1 \text{ if and only if } i = s$$

$$D_{is} = 0 \text{ otherwise}$$

The log likelihood function for this polychotomous choice model with random samples of size N is

$$\ln L = \sum_{i=1}^n \sum_{s=1}^m \{ D_{is} \ln g_s((Y_{is} - X_{is} \beta_s) / \sigma_s) - D_{is} \ln \sigma_s + D_{is} \ln \Phi((J_{1s}(Z_{is} \gamma_s) - \rho_s J_{2s}(Y_{is} - X_{is} \beta_s)) / (1 - \rho_s^2)^{1/2}) \} \quad [4.16]$$

where $J_{1s} = \Phi_s^{-1} F_s$ and $J_{2s} = \Phi_s^{-1} G_s$,

ρ_s = the correlation coefficient between u and ε .

When the marginal distributions of u_s are normally distributed $N(0,1)$ (the assumption which we use here), two stage technique can be used to estimate the equations;

$$Y_{is} = X_{is} \beta_s - \sigma_s \rho_s \phi(J_{1s}(Z_{is} \gamma_s)) / F_s(Z_{is} \gamma_s) + \eta_{is} \quad [4.17]$$

If the polychotomous choice model is multinomial logit model (as in this case), and the marginal distributions of the potential outcome functions Y_{is} are normal, we have a multinomial logit-OLS two-stage estimation method (Lee 1983:511).

As indicated in equation [4.17], after the selection of the socio-economic groups, we also estimate equations that are specified as linear functions for each socio-

economic group separately. These equations give the living standards of the household as a function of relevant explanatory variables. The regressors now vary across the socio-economic groups since I have included variables that are group specific. For instance, the dummy variable which asks whether the economic head is employed in the public or private sector is relevant to wage employed households not to self-employed households. In addition, regressors that are common to all socio-economic groups can have different degree of importance from group to group. The education, ethnic group and credit dummies are cases in point. Education might be more important to determine whether a given household belongs to wage employment than it determines whether the household belongs to the self-employed or unemployed households. Ethnicity also matters. Some ethnic groups (e.g. the Gurages) tend to be engaged more in self-employment.

It is also important to note that equation [4.13] can be rewritten as;

$$Y_w = \beta X_w + \varepsilon_w \quad [4.18]$$

$$Y_{se} = \beta X_{se} + \varepsilon_{se} \quad [4.19]$$

$$Y_u = \beta X_u + \varepsilon_u \quad [4.20]$$

where Y_w , Y_{se} and Y_u , respectively, represent the standard of living for the wage-employed(w), self-employed(se) and unemployed(u) households.

X_w , X_{se} and X_u are group-specific regressors.

ε_w , ε_{se} and ε_u are group-specific disturbances or heterogeneity terms.

An explanation of the living standards of households in the short run potentially requires an explanation of the socioeconomic group to which a household belongs and conditional on that choice, an explanation of the determinants of the household's living standard within that group. If the first is indeed endogenous, then a selectivity bias would arise in considering the second only. In such a case, the two elements need to be explained jointly. Meaning equations [4.12] and [4.13] must be considered jointly. They can be estimated using a two-stage procedure as long as a Heckman-like selectivity term (Maddala 1983), derived from the multinomial logit estimation equation [4.12], is included in equation [4.13]. Having included this term in equation [4.13], it may then be estimated by OLS to get consistent estimates (Coulombe and McKay 1996).

4.7. Estimation: Selectivity and Heckman Two-Stage Technique

Selectivity concerns the presence of some characteristics of the treatment (or control) group that is both associated with receipt of the treatment and associated

with the outcome so as to lead to a false attribution of causality regarding treatment and outcomes (Johnston 1997:447). The idea in the econometric exercise of modeling standard of living involves an explanation of the socioeconomic group to which a household belongs and conditional on that choice, an explanation of the determinants of the household's living standard within that group. In previous discussions, I have noted that the choice of a socioeconomic group is endogenous. Thus selectivity bias would arise only in considering the second. The simplest way to account for this is to run separate regressions. For instance, one could have different standard of living equations for each socioeconomic group. If allocation into the different groups is not random, however, our estimates in each equation may be contaminated by selectivity bias. One of Heckman's insights was that it is sometimes possible to control for this. He suggested a two-step method. This method is often used in situations where selectivity bias may present.

Due to the presence of a selectivity bias, the two-stage procedure is adopted in this study. The first equation captures the choice of socioeconomic group. The choice becomes an endogenous factor in the second equation: i.e. standard of living equation for each socioeconomic group. Some dummy variables (e.g. from the set of education dummy variables) are omitted to avoid the problem of linear dependence during estimation. The second equation then applies only to those households belonging to a certain group and gives the living standard of each of the households as a function of relevant regressors. As mentioned above, because of the selectivity problem the two equations must be considered jointly (Johnston 1997; Maddala 1983; Coulombe and McKay 1996). In other words the problems of selectivity bias refers to the fact that if equation [4.13] is estimated by OLS without the selectivity term, we get inconsistent estimates of the parameters.

There are obvious limits to how much can be inferred about the determinants of welfare and poverty from household level cross sectional survey data, even when employing multivariate analysis. Both the range of possible causation which can be explored and the confidence which can be placed in any inferences is restricted (Appleton 1995a:3).

5. RESULTS

The regression results below are based on probit and multinomial logit models. The multinomial logit selection model has been estimated before the selectivity corrected OLS model. Meaning a two-stage estimation technique was used. The logit model which is estimated at the first stage related to socioeconomic group choice. Using the Heckman-like selectivity term from the first stage, in the second stage OLS is used to arrive at consistent estimates for each of the socioeconomic groups identified.

5.1. Probit Results

Following the theoretical discussion, a probit model is estimated for each of the socioeconomic groups and all households taken together. The results are presented in Table 5.1. The magnitude of the coefficients obtained from the probit model estimation can be taken as measures of the relative influence of the different explanatory variables on the probability that the household is poor. The larger the coefficient, the greater is the effect of the explanatory variable on the probability that the household is poor.

Most of the probit results are consistent with OLS results which are estimated for the sake of comparison but not reported here. But inconsistencies can also be observed given the sensitivity of the dependent variable under probit to the poverty line adopted. Age reduces the likelihood of being poor while age squared does increase it. The older the head of the household, it is less likely for the household to be poor. Being in any of the ethnic groups increases the probability of being poor for all households and socioeconomic groups. There are different social and economic explanations why some ethnic groups seem to achieve a higher level of welfare than others. Obviously, dependency increases the risk of being poor. Farm and/or livestock ownership has the same impact and this is in direct contrast to the OLS results. We may argue that keeping livestock or having a farm is more expensive in Addis than other urban centers. This is due to the high cost of animal feed (mostly imported) and high cost of land which makes households net debtors. Ownership of livestock and farm can reduce the risk of poverty in the long run but in the short run the opposite effect might dominate as we can gather from this one shot cross-sectional analysis. Besides, households with farm and livestock ownership are very small in number in the sample considered and the positive impact of such a variable might have been taken care of by other regressors. Another inconsistent result with the OLS results relates to credit. For self-employed and unemployed households, it reduces the probability of being poor but increases it for the wage-employed households and all households taken together. But for the latter set of households the coefficients are statistically significant and hence the results are more credible. Therefore, on balance, taking loans increases the probability of being poor.

Receiving remittances increase the likelihood of being poor except for self-employed and wage-employed households. Transfers exist among the poor in poor communities owing to strong family ties. These transfers may reduce inequality among the poor but not the incidence of poverty. Except in the case of unemployed households, if the economic head is male, the household is more likely to be non-poor. For unemployed households, whether the household is female headed or not, it is equally more likely to be poor. The result supports the widely held view that female-headedness is related to being poor. But it is difficult to be that conclusive as the other two regressions tell us a different story. Illness contributes positively to the chance of being poor for self-employed and unemployed households. The result is statistically significant for wage-employed and for all households in the groups. This

may suggest that household welfare analysis based only on the health status of the head may be misleading. Rather a better picture could have been observed if the health status of all household members (at least the economically active ones) is considered. However, it is difficult to define health status. If the head is married, it is more likely for the household to be poor and households which have migrated are less likely to be poor. Given the probit results, religious difference (unlike expectations) does not seem to matter in affecting the probability of being poor. Households with heads who have no education and only primary level of schooling are more likely to be poor. For wage employed households attaining, at least, primary education makes it more likely for them to be non-poor. Many individuals are employed in low level public sector employment in the city earning 105 Ethiopian Birr which is the recent minimum wage and above the poverty line defined here. But for self-employed households, even tertiary education (except vocational and technical training) increases the probability of being poor.

Table 5.1. Probit Results

Regressor	Wage Employed	Self-employed	Unemployed	All
Age	-0.024(-4.2)	-0.001(-0.2)	-0.02(-2.50)	-0.0205(-6.5)
Age Square	0.001(14.3)	0.001(7.9)	0.0002(3.0)	0.001(24.0)
Amhara	0.036(1.9)	0.129(4.7)	0.050(1.10)	0.127(6.9)
Child	0.051(1.0)	0.50276(7.8)	0.066(0.64)	-0.136(-3.5)
Credit	0.025(1.2)	-0.0458(-1.73)	-0.0001(-0.02)	0.03498(2.3)
Farm	0.094(1.7)	0.214(5.12)	0.00332(0.04)	0.0041(-0.2)
Gift	-0.009(-0.3)	0.006(0.11)	0.060(0.6)	0.009(0.5)
Gurage	0.079(2.0)	0.0023(0.1)	0.095(0.9)	0.103(4.0)
Head	-0.002(-0.1)	-0.019(-0.5)	0.645(1.1)	-0.025(-1.4)
Health	-0.037(-1.6)	0.034(1.3)	0.041(1.0)	-0.142(-8.8)
Married	0.115(4.8)	0.028(0.9)	-0.029(-0.5)	0.072(4.0)
Migrant	-0.113(-3.6)	-0.245(-4.9)	-0.019(-0.3)	-0.036(-1.8)
Muslim	-0.129(-2.1)	-0.830(-12.5)	0.769(3.2)	0.065(0.4)
Noed	0.039(1.2)	0.97(6.2)	-	0.676(9.5)
Old	0.941(10.8)	2.43(15.5)	0.008(0.04)	0.806(12.8)
Orthodox	-0.109(-3.5)	-0.911(-16.2)	0.738(3.4)	0.001(0.01)
Pension	-0.069(-2.3)	0.133(2.8)	0.061(1.3)	0.086(4.9)
Pred	-0.070(-2.4)	1.019(6.6)	0.012(0.2)	0.66279(9.7)
Public	0.021(1.08)	-	-	-
Remit	-0.004(-0.14)	-0.148(-4.4)	0.123(2.6)	0.071(4.4)
Retrench	0.076(1.7)	-0.22(-2.7)	0.14(1.4)	-0.07(-2.1)
Sped	-0.057(-2.1)	0.835(5.3)	-0.768(-1.0)	0.679(10.3)
Size	-0.036(-9.1)	0.832(-5.7)	-0.0003(-0.04)	-0.044(-15.31)
Tenancy	-0.001(-0.1)	0.211(7.9)	-0.01(-0.2)	-0.11(-7.5)
Ter2ed	-0.031(-1.0)	1.1172(6.4)	-	0.73(10.4)
Tered	-0.013(-0.3)	-0.42(-1.4)	0.17(-1.1)	0.57(7.3)
Vulner	-0.022(-1.1)	0.097(2.2)	0.062(1.5)	0.121(7.20)
Oromo	-	-	-	0.0487(4.6)
Tigre	-	-	-0.023(-0.2)	0.155(5.4)
Other	-	-	-	0.094(0.5)
Tred	-	0.899(5.7)	-	0.687(9.6)
Hafba	-	-0.007(0.2)	0.070(1.1)	-
Constant	-1.32(-10.0)	-2.34(-9.8)	-1.905(-6.3)	-2.36(-11.4)

Note: Coefficients for some regressors are not reported due to two factors. One if the regressor considered is group specific and two the software rejected them during iterations. The figures in the parentheses are t-ratios.

This might have important policy implication to the education curriculum of the country which will be discussed in the policy section below. Only household heads with vocational and technical training have a lower chance of being poor. Households with pensioner heads are more likely to be poor. This is consistent with the small amount of pension income that pensioners receive and the limited social security benefits they get from the government. Wage-employed households that work in the public sector and that have retrenched economic heads are less likely to be non-poor. In addition, unemployed households with laid off heads are more likely to be poor and this strengthens the fact that households which are more likely to be poor are those which have heads who become unemployed due to reforms. This group of households might constitute what are recently termed as the newly poor.

If the household owns dwellings and has a large family size, it is less likely for it to become poor. This is true for all except for self employed households. Except for the sample of households studied here, the results can not be bases for generalizations. This is because the type of the majority of the housing units owned by households are low quality dwellings which are mostly not conducive for the welfare of family members. Therefore, ownership of a dwelling unit does not necessarily contribute to the probability of being non-poor. Besides, the result related to family size is not consistent with the OLS, logit and the selectivity corrected OLS results. Except for wage-employed households, those who experienced food shortages are more likely to be poor. Food shortage families do not have savings and any food reserves to fall back on in times of disaster. This has implication for a food security policy. Among self-employed households those households whose heads are engaged in female business activities are more likely to be poor.

5.3. Multinomial Logit Results

The multinomial logit selection model which was discussed in the previous section is estimated for the selection of the three socioeconomic groups identified in this study. Conditional on the socioeconomic group to which a household belongs, living standards are modeled as a function of relevant factors for each of the three groups. The final regressors considered are based on the discussion in the previous section and on the above OLS and probit results. The results of the two-stage estimation technique are reported in Tables 5.2 and 5.3. The former gives the first stage results of the regression show the marginal effects of the multinomial logit model and the latter gives the second stage results of the regression give the selectivity corrected OLS estimation results. Variables such as TRED and TERED are omitted from the education dummies defined to avoid the problem of perfect linear dependence among the variables.

The marginal effects reported show the influence of the regressors considered on the probability that a particular household belongs to the socioeconomic group in question.

Table 5.2. Marginal Effects, Part I, Multinomial Logit Results

Variable	Wage Employed	Self-employed	Unemployed
Constant	0.1949(0.368)	-0.389(0.000)	0.0000(1.000)
Noed	-0.1571(0.024)	0.3142(0.000)	0.026(0.000)
Prod	-0.1574(0.009)	0.3148(0.000)	-0.019(0.000)
Scod	0.0063(0.926)	-0.0126(0.639)	-0.020(0.000)
Tered	0.0747(0.424)	-0.149(0.000)	0.0008(0.864)
Age	-0.0015(0.878)	0.0029(0.434)	0.0094(0.000)
Age Squared	-0.00003(0.810)	0.0001(0.232)	-0.0002(0.000)
Head	0.0277(0.589)	-0.0554(0.008)	-0.0000(0.998)
Married	0.0215(0.685)	-0.0429(0.043)	0.0035(0.178)
Size	-0.0004(0.962)	0.0007(0.807)	0.0027(0.000)
Log Likelihood(unrestricted) = -730.9			
Log Likelihood(restricted; slopes=0) = -893.7			

Note: Figures in parentheses are probability values.

Among all the variables considered, education seems to be a significant factor influencing the choice of socioeconomic group. If the head of the household has no education, it is not likely for the household to be in the group of wage-employed households. Instead, it is more likely for it to be self-employed and unemployed. Likewise, primary level of schooling has a negative influence for households to be in wage-employment and unemployed. But it has a positive influence for them to be self-employed. Secondary and tertiary level education have positive influence for households to be wage-employed but negative influence to be self-employed. Households are less likely to be unemployed if their heads have secondary education. If the household is male-headed, it is more likely to be wage-employed but not self-employed and unemployed. If the head is married, it has a positive influence on the probability of being in the group of wage employed and unemployed households but a negative influence on the probability of being in self-employment. Large family size has a positive influence on being unemployed and self-employed and a negative influence on being wage employed. This can be related to the education variable result. The smaller the size of the family, the greater the opportunity for it to support the schooling of its members and hence the greater the chance for it to be wage-employed. In addition, families with large numbers of members are more likely to be engaged in self-employment and often children from such families participate in children business activity to support their family and cover their subsistence and schooling expenses. Consistently, wage employed households have relatively fewer family members and better living standards than self-employed and unemployed households. Herein below we discuss the selectivity corrected OLS results.

Based on Table 5.3, for each of the socioeconomic group equations, λ is reported before the constant term. It represents the Heckman-type selectivity correction term in the regression. It is significant for wage-employed and self-employed households.

For wage-employed households education has a positive impact on living standards. To make estimation possible (or to avoid perfect linear dependence) TERED and TRED are omitted from the education dummies. Quite surprisingly, even having no education has a positive impact. This might be due to existence of other factors (such as inheritance, ownership of profitable small enterprises, remittances) which raise living standards. These factors do not necessarily require attainment of a certain level of education. It is possible for the rich to be illiterate and it is so in many parts of the country, Addis Ababa being not an exception. For self-employed and unemployed households, if the heads have no education or only primary education, living standards are negatively affected. At higher levels of education beyond the primary level, these groups have higher levels of welfare. Age contributes positively to the welfare of all households. However, it has negative contribution to self-employed and unemployed households respectively. Except in the case of unemployed households, having male heads is associated with lower living standards. Therefore, contrary to popular convictions, we can say that (at least for Addis Ababa) families with female heads are not necessarily poor. In all the groups, family size and credit have significant negative impacts on standard of living. Access to credit may not be an indicator of better production and welfare-enhancing opportunities for urban households as it is for their rural counterparts. This may be the reason for the negative association between loans and living standards in the capital.

Table 5.3. Model of Determinants of Standard of Living
OLS Results (Part Two of the Two-Stage Procedure)

Variable	Wage Employed	Self-employed	Unemployed
Dependent Variable	PCT	PCT	PCT
Lambda	-254.26(0.006)	-154.20(0.013)	-112.77(0.303)
Constant	171.72(0.002)	424.26(0.001)	331.4(0.196)
Noed	147.96(0.015)	95.412(0.006)	-56.913(0.053)
Pred	164.08(0.007)	-50.264(0.124)	-18.333(0.681)
Scod	35.74(0.001)	56.722(0.017)	5.8190(0.846)
Ter2ed	54.373(0.002)	191.70(0.00001)	138.00(0.0003)
Age	3.648(0.087)	-1.9609(0.451)	1.2153(0.727)
Age Squared	0.016(0.612)	0.019(0.499)	-0.029(0.215)
Head	-38.014(0.041)	-16.881(0.228)	7.3766(0.877)
Size	-12.110(0.000)	-5.559(0.0141)	-9.209(0.089)
Married	-11.219(0.337)	0.281(0.984)	7.133(0.738)
Credit	-12.359(0.141)	-13.522(0.206)	-12.75(0.409)
Tenancy	6.867(0.403)	20.820(0.065)	30.785(0.051)
Muslim	25.981(0.262)	-2.163(0.935)	70.426(0.159)
Orthodox	-12.927(0.349)	-32.321(0.167)	-20.685(0.611)
Child	-50.021(0.019)	-73.305(0.007)	-2.515(0.944)
Amhara	0.734(0.929)	25.566(0.061)	-6.208(0.686)
Gurage	-8.866(0.523)	6.157(0.654)	1.987(0.944)
Sample	444	275	159
R Squared	0.30	0.22	0.31
Adjusted R Squared	0.28	0.17	0.23
F-Statistic	10.52	4.22	3.72
Prob Value	0.0000	0.0000	0.00001

Note: The figures in parentheses are probability values. All results are generated using a software of limited dependent variable models; Limdep Version 7.0.

The result is consistent with a study made in Cote d'Ivoire (Glewwe 1991) and inconsistent to the finding of a study made for Mauritania (Coulombe and McKay 1996). It is not clear whether the result reflects the fact that poor households are less creditworthy, or that non-poor households are not poor because they did not take out loans. Generally the result should not imply that credit for the urban poor is not essential to improve living standards. Group lending for self-help groups and loans granted to set up micro-enterprises are essential channels of assistance to the majority of poor people in the developing world. For wage-employed households, marriage has a negative impact on welfare while it has a weak positive impact on the welfare of self-employed and unemployed households. In all groups, ownership of dwellings has a positive impact on standard of living. Owning a house may give households the chance to rent it out to somebody else and get some money to live on. Most households do this in the capital, especially for migrants, but often at a very low monthly rent. The standard of living that we are talking about can be very low and the positive impact of owning the dwelling unit might be a slight improvement from this very low level of living standard. Being a Muslim is related to higher welfare except in the case of self-employed households, which is statistically insignificant. For all groups of households whose head is an orthodox Christian have lower living standards. This is in line with expectations. Consistent with all regressions, dependency has a negative impact on household welfare. For wage employed and self-employed households, having a head from the Amhara ethnic group has a positive impact on welfare but a negative impact for unemployed households. If the head is a Gurage, this has a positive welfare impact on self-employed and unemployed households and a negative impact on wage employed households. The Gurages are often engaged in small and large scale trading and are rarely engaged in wage employment.

6. RECOMMENDATIONS

Based on the above discussion of the regression results, the following major and priority policy areas have been recommended. The recommendations should not be considered as conclusive and the reader should recognize that they emerge from a single case study based only on Addis Ababa. They are context sensitive.

Education seems a key factor throughout in this study in affecting the living standards of households. Increasing enrollment at the primary level can be an area of priority. Ethiopia's enrollment ratio is one of the lowest in the world. The costs of expanding the provision of education and restoring quality in the educational sector are considerable. Improving quality and expanding services for the growing population of Ethiopia would remain in the hands of the government. Investment in education is generally recognized to be essential for long-term economic and social development (Mulat 1997). According to our results, households who have at least primary schooling are more likely to be self-employed if not wage-employed. Emphasis on improving the content of the curriculum may bring a substantial benefit.

It is more appropriate and beneficial if it focuses more on topics with substantial practical orientation. In the era of adjustment, the movement from formal to informal sector of employment is common (Pramila *et al.*; 1998) and education can be a good mechanism to enable households better survivors in the informal sector. Some individuals even with good higher education background could not be able to do nothing more than the office routine which can be mastered by anyone. They lack the practical aspect of educational training that enables one to be creative and engage oneself in self-supporting activities. So the content of the curriculum is crucial and need to be revised in light of current labor market demands.

In Ethiopia, like in many other developing nations, well-developed pensions, public transfers and social assistance (safety net) schemes are lacking. The population instead has to rely on traditional practices. We have seen that the probability of being poor has not been reduced due to the existence of transfers among households in the sample. This is often due to the fact that it is the poor who make the transfers to/from the poor. In addition, pensioners are relatively poorer than other groups of society. This requires increased government responsibility in providing some social security (e.g. increased pension payments in line with rising inflation rates, new social benefit schemes, etc.). Providing social assistance by the government has benefits beyond improving household welfare. For instance, the absence of any meaningful social security system in the country is one of the most responsible factors for high fertility rates because parents do not have any support in old age and they resort to the decision of having more children for old-age insurance purposes. Therefore, it is possible to change the attitude of households towards having large families by improving the social security schemes that are in place now.

Family composition and size are important variables in the analysis of poverty in a country such as Ethiopia, which is the second most populated nation in Sub-Saharan Africa. The regression results reaffirm their importance and the need for appropriate attention and urgent action by the government to deal with them. A combination of policy measures (e.g. education and population policies together) can have a series of positive results. Educating mothers can reduce fertility and hence family size, which will lead to better living standards. Thus, more education means not only more employment opportunities but also it means limited family size and better welfare.

Food shortage is a common problem in Ethiopia and all households surveyed with prior food shortage experience have a higher probability of being poor. Thus, the government can reduce the incidence of poverty in the nation by ensuring food access to households. For urban households this can be achieved by providing food at subsidized prices especially by focusing on food items that are commonly consumed by the poor.

Poverty in Addis is to some extent a result of rural-urban migration. Most migrants come to Addis in search of a better life. All those who migrate to the city do not have better living conditions and some even are worse off by making the decision to leave

their original place of residence. The government can reduce the extent of the influx of migrants by creating similar facilities and living opportunities in other parts of the country. Lip-service to all these policy recommendations is futile and self-defeating. What matters is their implementation for which the government has to commit itself in no time.

CONCLUSION

The following list briefly summarises the study.

A.) Three different approaches (OLS, Probit, Multinomial logit and selectivity corrected OLS) are used to model poverty and its causes in urban Ethiopia. All the approaches were previously used by different authors for two countries in different times. For Cote d'Ivoire, Glewwe (1991) has estimated a reduced model (OLS) to derive estimates of household welfare, and for Mauritania, Coulombe and McKay have estimated a probit and OLS models in 1993 to examine the causes of poverty and a multinomial selection logit model in 1996.

All the results (with few exceptions) that are generated in this study using the approaches are consistent and hence the results obtained can be considered as credible. The multinomial logit model is preferred to the other two because it disaggregates households into different groupings instead of considering them as similar. And based on that socio economic choice, the determinants of the standard of living are identified. The OLS focuses both on the poor and the non-poor and in some way similar with the selectivity corrected OLS. But if the focus is only to examine the welfare of only the poor, the probit is better.

Instead of comparing the pros and cons of the approaches, an interesting result emerges which is the consistency of most of the results under the different approaches. It seems that methodological differences do not lead to significantly different conclusions. The results of the study are consistent with a similar study (with a different methodology) for urban Ethiopia (Mekonen 1997).

B.) Education matters a lot for the welfare of households in Addis Ababa. Households with better level of education are relatively richer. But this does not mean that all economic heads with better income have better education.

C.) Urban poverty is a serious problem in Ethiopia and need to be treated separately since it has unique features.

D.) Female-headedness is not necessarily related to lower standards of living.

E.) Married households are not necessarily better off than divorced, separated and widowed households.

F.) Food shortage significantly contributes to lower household welfare.

G.) Unemployment and poverty are positively correlated in Addis Ababa.

H.) Credit access is negatively correlated with living standards.

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ANNEX

A. Poverty and Decomposition Indices

The discussion of the P_α measures is based on the formula described below. They are computed for the poverty line defined in this study. These measures are the head count index (P_0), the poverty gap index (P_1) and a measure of poverty intensity (P_2). As discussed in the text, two aspects are of interest: incidence and the depth of poverty. The former is conveniently summarised as the proportion of households in the populations of interest who are poor, and, the latter by the mean proportion by which the welfare level of the poor falls short of the poverty line. Both of these may be derived as special cases of the widely used P_α indices of poverty proposed by Foster, Greer and Thorbecke (1984) and defined as follows;

$$P_\alpha = 1/n \sum_{i=1}^q (z - y_i/z)^\alpha.$$

where

n = the total number of households

q = the number of households identified as poor

z = the poverty line

y_i = the standard of living measure of the household identified as poor^{*}

α = a non-negative parameter reflecting the relative weight given to the poorest among the poor.

Individuals have been ranked from the poorest ($i = 1$) to the richest ($i = n$). In the special case in which $\alpha = 0$, the index reduces to a measure of the incidence of poverty;

$$P_0 = q/n$$

This index takes into account the number of poor people, but not the depth of their poverty. In the case in which $\alpha = 1$, the index may be written as follows;

$$P_1 = q/n * Z - \mu_p / Z$$

where μ_p is the mean income of the poor.

The index P_1 is thus the product of the index P_0 and a measure of the average amount by which poor households fall below the poverty line; in other words, P_1 takes account of both the incidence and the depth of poverty. It is not, however, sensitive to a mean preserving redistribution among the poor. For higher values of α ,

increased weight is placed on the poorest of the poor; the P_2 index, for example, takes account not only of the incidence and depth of poverty, but also of the distribution among the poor.

Apart from their ability to capture the different dimensions of poverty, another useful feature of the P_α class of indices is their property of decomposability. This means that, if the population can be divided into m mutually exclusive and exhaustive subgroups (as it has been done here), then the value of the index for the population as a whole can be written as the weighted sum of the values of the poverty indices relating to the subgroups ($P_{\alpha j}$, where $j = 1, \dots, m$), where the weights are the population shares of the subgroups (X_j);

$$P_\alpha = \sum_{j=1}^m X_j P_{\alpha j}$$

Given this decomposition, the contribution of group j to national poverty or total poverty in a particular region/city can be calculated as

$$C_j = X_j P_{\alpha j} / P_\alpha$$

In this study, the contribution of each of the socio-economic groups to the poverty in Addis Ababa is examined.

B. Adult Equivalent Scales

To arrive at the per capita figures of the living standards measure, we use household size. The size of the household is defined in adult equivalents. Because, children consume less than adults, they are given less weight in the adjusted measure of household size. We need to note also the differences in consumption among the sexes. There is no any scale developed for Ethiopia. Calculation of Adult Equivalent Scales (AES) for each household is cumbersome and it is not an ideal alternative. Therefore, I have used scales used by a study in Ethiopia in 1997 with some modifications. The scale is more disaggregated and takes into account the differences in consumption between males and females. I have modified the scales since some of the original scales seem unreasonable. Initially equal weights were given to a baby less than 1 year old and to a 6-year-old child. I have, then disaggregated the lower scales into three groups based on a scale used in a study for Uganda following Ravallion and Bidani (1994).

Age	Male	Female
<1 year	0.25	0.25
1-4 years	0.40	0.40
5-6	0.56	0.56
7-8	0.64	0.64
9-10	0.76	0.76
11-12	0.80	0.88
13-14	1.00	1.00
15-18	1.2	1.00
19-59	1.0	0.88
>60	0.88	0.72

C. The Socioeconomic Classification

It is important to know households or group of households which are experiencing poverty and more (or less) likely to suffer from it. It is often assumed that risk of poverty is related to class status such as working (wage or non-wage employment) or non-working...etc. Initially the idea was to have four groups of households but the number of groups was eventually reduced to three because of small sample sizes. Using the source of income of households as an indicator, the following three socio-economics groups are identified;

1. Wage-employed Households

This group consists of households (445) that obtain wage/salary from employment in the public and private sectors, casual work, international organizations, and producer and/or service cooperatives.

Few people are employed in the private sector which is believed to be well paying. Next to the public sector, casual work is an important source of wage income for households. This fact is important and need to be recognized when we analyze the regression results on the standard of living of wage employed households. More dependence on casual employment, for instance, implies more dependence on irregular income source which makes households more likely to be poor.

A rough inspection of the data showed that wage employment in the private sector is not accompanied by higher wages despite expectations. In most of the cases, the wages are similar or even less than the ones in the public sector employment except in some cases. The number of households is not as large as those employed in the public sector employment. Therefore, comparison is not possible and the idea of splitting the wage-employed households into two distinct socio-economic groups, viz. those employed in the public and the private sector is abandoned.

2. Self-employed Households

These households (274) generate their income from various activities such as small businesses (run by individuals as employers or own account workers), female and children business activity. 294 individuals own small businesses; 241 individuals are engaged in female business activity and only 52 children (the data which I very much suspect to be underreported) contribute to household income by participating in children business activity.

Almost all of the households owning businesses have participated in commercial and service giving activities. For instance, 49 individuals own shops; 43 undertake textile preparing/manufacturing; and 39 participate in food preparing. Other activities in order of importance include handicrafts (non-wood)-37; running a restaurant/bar/hotel-30; *gullit* (a local term which refers to an open and small market-place where small items such as vegetables, fruits and roasted grain is sold)-28; and transport-25.

Female-headed households are more likely to participate in female business activity than other types of self-employment activities. Those activities are survival mechanisms for most of Ethiopian women. Those who are divorced and who became female heads for various reasons invest in small household business activities to live on the insignificant profit that may accrue. The most important female business activities, in order of importance, are:

- making/selling *tella/areqi* (local alcoholic drinks)
- making/selling *injera/dabo/kolo*(local names for a traditional pancake which is a staple food all over the country except few areas/bread/roasted grain)
- selling other food items
- making/selling handicraft/pottery
- selling vegetables/fruits
- collecting/selling firewood/dung-cakes

Households which are engaged in any farming or any agricultural activity (e.g. households that own livestock/poultry) are included within self-employed households. These are insignificant since we are looking at the most urbanized center of Ethiopia;- Addis Ababa (the capital). This activity is more common in the other urban centers.

3. Unemployed Households

This is a residual group and an aggregate of different types of households. This group of households (159) consists of households with one or more individuals receiving different types of remittance (domestic and/or abroad), gifts (in cash and/or in-kind), food aid, inheritance and pension and the economically inactive (children,

the elderly, handicapped....etc.) and those who are economically active but who are unable to find any employment.

Generally, we can see how the above classification involves a high degree of aggregation. This might hide some important facts about the standard of living of some households or individuals that we could have gathered otherwise. For instance, the case of separate treatment of households receiving remittance and pension from unemployed households, or the separate treatment of inactive households from those with economically active family members could have been more insightful. Even if the data allows it we suffer from small sample size if we use a disaggregated classification. So for purposes of reasonable analysis given the data, the above classifications are the ones to be used in this study.

The above classification is based on income source; that is the highest income earning activity determines the socio-economic group of the household. The socio-economic classification picks only the source with the greatest contributions and neglects other income sources. In reality, for some households, income sources are diversified and are very limited for some others. To capture these differences, different dummy variables such as RETRENCH, PENSION, HHFBA, AND PUBLIC are defined (see variable definition below).

D. A Note on the Econometric Estimation

The data is stored in SPSS/PC+ form and the estimation using limdep could not be carried out without converting the data files into an earlier version of excel files which is acceptable to limdep. The OLS regression results in chapter eight are generated using SPSS 7.5 for windows while the probit and the multinomial logit models are estimated using LIMDEP Version 7.0.

Both results of probit and logit models are identical in the sense that in both models the least square results are used for the starting values. After estimating the logit model, the marginal effects had to be calculated since we are interested to examine whether the regressors chosen for this purpose have a positive or negative influence on being in one of the socio-economic groups we have defined. Theoretically, the model has no fit and there should be no significant coefficients.

To calculate the marginal effects, a programme listed on pages 479 and 480 of the manual for LIMDEP Version 6.0 was used with some modifications such as setting up the NAMELIST for X and the CREATE for the dependent variable at the top of the routine.

The second set of regressions performed using LIMDEP Version 7.0 include the estimation of the selectivity corrected OLS after estimating the multinomial logit selection model. Essentially, the estimation is made at two stages. Unlike the probit

estimation technique, λ (the selectivity term) is not computed using $\beta'X$. Rather we use a transformed variable. The model command for the two-stage estimation was taken from pages 621 and 622 of the manual for LIMDEP Version 6.0. The command requires the user to do programming to define subvectors of α , to compute the predicted probabilities for the logit model, to make the sample selection, compute lambda and delta and to define the regressor vector for the primary equation. After a failure of a number of attempts the results which are reported and discussed in chapter eight were obtained.

E. Definition of Variables

Based on the available data the following dependent variables and regressors were identified. Only variables that are believed to be more influential as determinants of standard of living and those that can be obtained from the data are defined.

Dependent Variable(s)

PCT= Total household expenditure per adult equivalent per month.
PCF= Food expenditure per adult equivalent per month.

Education Variables (defined for the economic head)

Noed= 1 if the head has never attended any schooling; 0 otherwise.

Tred= 1 if the head has attended traditional/religious school only; 0 otherwise.

Pred= 1 if the head completed primary school; 0 otherwise.

Sced= 1 if the head completed secondary school; 0 otherwise.

Tered= 1 if the head completed technical/vocational training; 0 otherwise.

Ter2ed= 1 if head completed college or university level training; 0 otherwise.

Other Characteristics of the Head

age= in years

orthodox=1 if head is orthodox Christian; 0 otherwise

other=1 if head is other Christian (Protestant, catholic...etc.); 0 otherwise

muslim=1 if head is Muslim; 0 otherwise

Head= 1 if head is a male; 0 otherwise

married= 1 if the head is married; 0 otherwise

Amhara= 1 if the head is Amhara; 0 otherwise

Oromo= 1 if the head is Oromo; 0 otherwise

Tigre= 1 if the head is Tigre; 0 otherwise

Gurage= 1 if the head is Gurage; 0 otherwise

Health= 1 if the head suffers any illness; 0 otherwise

Demographic Variables

Size= Number of household members

% child= proportion of household members aged less than 15 years

% old= proportion of household members aged more than 65 years

migrant= 1 if household migrated during the last ten years, 0 otherwise

Other Variables that Apply to all the Socio-economic Groups

credit=1 if the household takes credit; 0 otherwise

remit=1 if the household gets remittance and/or any other support; 0 otherwise

gift= 1 if the household gives out remittance and/or other support; 0 otherwise

pension= 1 if the household gets pension income; 0 otherwise

farm= 1 if the household is engaged in any farming activity or owns any livestock/poultry; 0 otherwise

retrench= 1 if anybody in the household is retrenched; 0 otherwise

Tenancy= 1 if the household owns a house; 0 otherwise

Vulner = 1 if the household ever experienced food shortage; 0 otherwise.

Variables Specific to Wage Employees

public=1 if the household head is employed in the public sector; 0 otherwise

Variables Specific to Self-employed Households

HHFBA=1 if the household is engaged in household female business activity; 0 otherwise