The determinants of poverty in Mexico

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THE DETERMINANTS OF POVERTY IN MEXICO

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ABSTRACT

This study examines the determinants or correlates of poverty in México. The data used in the study come from the 1996 National Survey of Income and Expenditures of Households.

A logistic regression model was estimated based on this data, with the probability of a household being extremely poor as the dependent variable and a set of economic and demographic variables as the explanatory variables. It was found that the variables that are positively correlated with the probability of being poor are: size of the household, living in a rural area, working in a rural occupation and being a domestic worker. Variables negatively correlated with the probability of being poor are: the education level of the household head, his/her age and whether he or she works in a professional or middle level occupation.

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CHAPTER I

INTRODUCTION

Poverty in Mexico is widespread and pervasive. According to the estimates presented by Garza-Rodríguez (2000), more than 34 million people were living in poverty in 1996, which represents 38 percent of the Mexican population. Although this rate decreased constantly from 1950 until 1984, after that year there has been no further improvement (Székely, 1998) and, as shown by Garza-Rodríguez (2000), the poverty rate increased significantly during the 1994-1996 period.

The high poverty rates prevalent in the country are a reflection of both low incomes and an unequal income distribution. Mexico has one of the more unequal income distributions in the world. According to the World Bank (1999), only eleven countries in the world have a worse income distribution than Mexico. This feature of the Mexican economy is not new; it has been one of its distinct characteristics for a long time. According to Székely (1998) income distribution in Mexico improved between the years of 1950 and 1984, but then worsened after that year. The Gini coefficient decreased from 0.52 in 1950 to 0.44 in 1984 but then increased to 0.49 in 1992. Our own estimates in this

study indicate that the Gini coefficient further increased even more to 0.52 in 1996, the same figure as for 1950.

During the 1980's and 1990's, the period in which income distribution has become more unequal, the Mexican economy experienced a deep transformation which involved a major shift in the development model that the country had been following until the 1970´s. Important manifestations of this change were the macroeconomic stabilization programs that were implemented, the process of trade liberalization, the privatization of state-owned enterprises and banks, deregulation and the reduction or elimination of barriers to foreign investment in important sectors of the economy since 1988.

After these reforms, the Mexican economy started to grow consistently, although slowly, from 1987 until 1994. However, after a series of political events, including the appearance of a guerilla movement in the south of the country and the assassination of the Institutional Revolutionary Party presidential candidate, the Mexican economy entered one of the most profound crises in recent history. Gross Domestic Product fell 6.2 percent in 1995 and the peso lost half its value against the dollar. The real minimum wage fell by 13 percent, while real private consumption decreased 9.6 percent. Although the economy eventually recovered during 1996, the gains were not enough to compensate for the losses that occurred during 1994. Thus, per capita real GDP was still 4.8 percent lower in

1996 as compared to 1994, average real wages were 22 percent lower than in 1994 and real private consumption was 7.5 percent below the 1994 figure.

During the 1994–1996 period there was a slight improvement in income distribution in the country. The Gini Index decreased from 0.5338 in 1994 to 0.5191 in 1996. The income share of the lowest three deciles increased slightly and the share of the highest decile decreased. However, a closer look at the income distribution reveals that the persons situated in the lowest three percentiles of the distribution, the poorest of the poor, reduced their share during the period.

According to the estimates obtained by Garza-Rodríguez (2000), both moderate and extreme poverty increased in Mexico during the 1994–1996 period, and both the depth as well as the severity of poverty also increased in the same period. Although the author did not decompose the poverty changes as due to decrease in income and the worsening of income distribution, it is possible that both factors played a role in the increase in poverty levels that occurred during the period. Thus, although the Gini coefficient declined during the period, indicating a reduction in income inequality, the Lorenz curves for the two years intersect in the lower percentiles of income, which indicates that the income share of the poorest of the poor decreased during the period.

The poverty profiles constructed by the author for both years indicate that although poverty is predominantly rural in Mexico (60 percent of the rural population was poor in 1996), urban poverty more than doubled during the period, from 9 percent of urban population in 1994 to 21 percent in 1996. This indicates that although poverty alleviation programs should concentrate in the rural sector, the urban sector should not be neglected when designing and implementing policies to mitigate poverty.

Another variable that the poverty profiles suggested as an important determinant of poverty was the level of education of the household head. In both years considered in the study, poverty incidence was higher the lower the level of instruction of the household head. For example, 58 percent of the number of people living in households headed by persons with no instruction was poor in 1996, while only 2.7 percent of the number of people living in households headed by persons with at least a year of college was poor in the same year.

Suggesting a strong correlation between poverty and occupation of the household head, poverty incidence is higher for households whose head works in a rural occupation or in a domestic occupation and it is lower for households whose head works in a professional occupation or in a middle level occupation.

The poverty profiles also showed that poverty rates are higher for households with the following characteristics:

they live in rural areas, have more than five family members, their head has a low level of education and works in the primary sector or in a domestic occupation.

To test the hypothesis about the determinants or correlates of poverty we use a logistic regression with the dependent variable being the dichotomous variable of whether the household is extremely poor (1) or is not extremely poor (0). The explanatory variables considered in the analysis were: gender, age, education, the occupation of the household head, and size and location (rural or urban) of the household.

The study is organized as follows: Chapter II reviews the literature about the magnitude and evolution of poverty in Mexico during the last two decades. This chapter also deals with the few papers that have been written about the determinants or correlates of poverty and the methodology they use.

Chapter III describes the ENIGH 1994 and 1996 Surveys, and the selection of variables from the (1996) Survey that will be used in this study.

Chapter IV presents the results of the multivariate analysis to explore the correlates or determinants of poverty in Mexico based on the 1996 ENIGH dataset. A logistic regression is run, with the dependent variable being the dichotomous variable of whether the household is extremely poor (1) or not extremely poor (0). The explanatory variables considered in the analysis were:

gender, age, education and occupation of the household head, size and the location (rural or urban) of the household.

Finally, Chapter V proposes some conclusions based on the analysis developed in this study.

CHAPTER II

LITERATURE REVIEW

2.1 Economic Development and Poverty

It has now for some time been recognized that the concept of economic development should not be limited to be equivalent to economic growth alone, or even to economic growth with an adequate distribution of income. The current consensus recognizes that there cannot be economic development without the reduction of poverty. Meier (1984) notes that, as far back as 1953, Viner (1953) warned against a limited definition of economic development, one that does not include the reduction of massive poverty, but noted that that notion was far away from the mainstream of economics at that time.

Chenery (1974) brought the question of distribution into the picture again. He noted that despite high growth in some developing countries during the 1960´s and 1970´s, most of the population in those countries did not benefit from high growth, because low-income groups did not share in the increased income.

Seers (1979) went beyond the problem of inequality to include progress in reduction of poverty. He said that the reduction of unemployment should be a requirement to be able to say that a country is developing. In his view, un- or under-employment is an important cause of poverty and economic development involves reducing un- or under-employment.

2.2 Poverty and Welfare

The World Bank (1990) defines poverty as "the inability to attain a minimum standard of living". Lipton and Ravallion (1995) state that "poverty exists when one or more persons fall short of a level of economic welfare deemed to constitute a reasonable minimum, either in some absolute sense or by the standards of a specific society". Any definition of poverty includes a given level of welfare below which a person will be considered poor. Then, it is necessary to determine how to assess welfare. In this respect, there are mainly three approaches in the literature: the welfarist approach, the basic needs approach and the capabilities approach.

The welfarist approach bases comparisons of well-being solely on individual utilities, which are based on social preferences, including poverty comparisons (Ravallion, 1993). Some problems related with this approach are the need to make inter-personal utility comparisons to obtain social

welfare functions, the degree of validity of full-information and unbounded rationality assumptions on the part of the consumers, as well as the possible conflicts between individual maximization and valuable social objectives (Ravallion, 1993).

The basic needs approach concentrates on the degree of fulfillment of basic "… human needs in terms of health, food, education, water, shelter, transport" (Streeten et. al., 1981). The main argument behind the basic needs approach is the possibly low correlation between income and the degree to which these needs are satisfied.

The capabilities approach, due to Sen (1985, 1987) considers commodities not as ends, but as means to desired activities. Sen (1987, p.25) writes that the "value of the living standard lies in the living, and not in the possessing of commodities…" In this approach, poverty is interpreted as lack of capability. The operationalization of this approach is difficult, but an attempt has been made in the UNDP Human Development Reports. The capabilities approach has been criticized on the ground that it does not clearly recognize the role individual preferences play in welfare, thus taking the opposite extreme to the welfarist approach.

2.3 Poverty Lines

The next step in poverty analysis is the definition of one or several poverty lines, which can be absolute or relative. This will be necessary to identify the people living in poverty, to distinguish the poor from the non-poor. In the absolute poverty concept, poverty is seen as a situation of insufficient command over resources, independent of the general welfare level in society, while the relative poverty concept is seen as a situation of purely relative deprivation (Hagenaars and van Praag, 1985).

Ravallion (1993, p.30) defines an absolute poverty line as "one which is fixed in terms of living standards, and fixed over the entire domain of the poverty comparison", while a "relative poverty line, by contrast, varies over that domain, and is higher the higher the average standard of living".

Several approaches can be used in constructing poverty lines, each related to a given concept of poverty. From an absolute poverty standpoint, they can be defined using income, total expenditure, consumption expenditure, a basket of goods that satisfies basic needs, or food shares. From a relative poverty standpoint, poverty lines can be defined as a function of income or as a function of relative deprivation in terms of commodities, that is, defining poor households as those that are unable to attain given commodities that are normal for their society. Hagenaars and de Vos (1988) have proposed the use of poverty lines based

on subjective definitions, based on surveys asking people whether they consider their income (or consumption) levels to be sufficient for them. Absolute poverty definitions are mostly used in developing countries, while relative poverty definitions are mainly used in developed countries.

2.3.1 Basic Needs Poverty Lines

Basic needs is the most widely used approach to setting a poverty line in developing countries. It considers the expenditure or income necessary to obtain a given basket of goods that satisfies basic needs, mainly food, shelter and clothing. The first and most important component of this estimate is food expenditure, which must be enough to provide a minimum food-energy intake, as recommended by nutritionists. Then some estimate of non-food expenditure is added to this amount to obtain a total minimum expenditure. A problem related to the estimation of the food component is that there are many food combinations that will yield the required minimum nutrition level and food habits vary across regions and ethnic groups in a country. However, the most difficult problem is estimating the non-food component of the poverty line, since in this case there are no objective criteria on which to base the estimate.

The two most widely used methods to estimate poverty lines are the food energy method and the food-share method. The food energy method estimates the total expenditure that will just satisfy the recommended food-energy intake. This is done through the use of a regression, in which the independent variable is calorie intake and the dependent variable can be consumption expenditures or income. This method has the advantage that it will automatically yield the non-food component of expenditure or income, but it has the disadvantage that it will yield different poverty lines across sub-groups of the population.

The food-share method estimates the cost of a food bundle that meets the energy (calorie) and other requirements and then divides it by the share of food in total expenditure of a group considered to be poor. For example, if the cost of the minimum calorie, protein, and vitamins and other nutrients food bundle is $300, and the share of food in the budget is 50 percent, then the poverty line would be $600.

Another method is proposed by Lipton (1983) who argues that the level of expenditure in which income-elasticity of demand for food-staples is unity is where the (ultra-poor) poverty line should be set. As Ravallion (1993) notes, the problem with this approach is that the poverty line, thus estimated, will shift according to all other variables entering the demand function.

2.4 The Measurement of Poverty in Mexico

Although there have been relatively many studies about income distribution in Mexico, studies about poverty have been less frequent. The most recent studies have been published by Hernández-Laos (1990), Levy (1994), INEGI-CEPAL (1993), Lustig (1992 and 1995)and Székely (1995 and 1998). Differences in methodology used by these authors make it difficult to compare their results. The main differences in the methodology they use are: different poverty lines, different welfare variables (income or consumption), different adjustments for inflation, whether the data were adjusted to be compatible with national accounts or not and, whether the sample was expanded to the total population. With all these differences in methodology, different results were obtained. Extreme poverty head-count estimates range from 15.5 percent (Lustig (1992), using Levy's extreme poverty line) to 59.5 percent (Lustig (1992), using Hernández-Laos extreme poverty line). Head-count poverty estimates (including moderate and extreme poverty) range from 47.4 percent (Lustig(1992), using CEPAL's poverty line) to 81.1 percent (Lustig(1992), using Levy's poverty line).

Table 2.1 shows the different poverty lines used by each of the authors in their studies.

Table 2.1 Mexico: Poverty Lines used in Several Studies (Quarterly Per Capita Income, June 1984 Pesos and Converted Dollars at the average 1984 Exchange Rate of 185.19 Pesos per Dollar)

Author	Moderate Poverty		Extreme Poverty	
	Pesos	Dollars	Pesos	Dollars
Levy	39,215.18	211.95	9,372.12	50.61
Hernández-Laos	44,228.18	238.83	2,6219.56	141.58
CEPAL	20,116.33	108.63	10,460.89	56.49

Source: Lustig (1992)

Lustig (1992) describes the criteria used by the authors to determine the poverty lines:

Levy. The extreme poverty line is equal to the cost of one of the "minimum nutritional requirements basket" recommended by COPLAMAR (1983), (COPLAMAR was a Federal Agency created by the Mexican Government to coordinate poverty alleviation policies) multiplied by 1.25. The moderate poverty line is equal to the cost of one "minimum basic basket" recommended by COPLAMAR, which includes food and non-food commodities.

Hernández-Laos. The extreme poverty line is an "infra-minimum" COPLAMAR defined basket of goods, which includes food, housing, health and education expenditures. The moderate poverty line is supposed to be the same as Levy's moderate poverty because it is based on the same COPLAMAR's basket, but it is not equal and it has not been possible to find out why the two measures are different.

CEPAL. The extreme poverty line includes only the expenditure in a food basket that meets the minimum nutritional requirements. The moderate poverty line is equal to twice the extreme poverty line for urban areas and equal to 1.75 times the extreme poverty line for rural areas (same criteria than used in the INEGI/CEPAL study).

Besides the different poverty lines used by the authors, other differences in methodology existed. Levy does not expand the sample, while Lustig, Hernández-Laos and CEPAL expand it. Hernández-Laos and CEPAL adjust the data to be consistent with national accounts, while Levy and Lustig do not. Also, Hernández-Laos does not correct the data for inflation, which at the time the survey was done was significant; Levy and Lustig adjust the data for inflation while it is not clear whether CEPAL adjusts it or not.

The Mexican National Institute of Statistics, Geography and Informatics (INEGI) and the Economic Commission for Latin America (CEPAL) carried out another study in December of 1993. The study, "Magnitude and Evolution of Poverty in Mexico 1984-1992" was based on the National Survey of Household Incomes and Expenditures (ENIGH) for 1984, 1989 and 1992. INEGI/CEPAL considered two poverty lines, one for extreme poverty and the other called "intermediate poverty".

The first concept included all households that did not have sufficient income to buy a minimum food basket that met indispensable nutritional requirements as estimated by CEPAL. The "intermediate" poverty line is equal to twice the

extreme poverty line (twice the minimum food basket expenditure) for urban areas and 1.75 times the extreme poverty line for rural areas.

It is generally accepted that a poverty line which covers only minimum food expenditures can be considered an ultra-poverty line, while if that ultra-poverty line is multiplied by the reciprocal of the food share expenditure of the poor we obtain a poverty line that considers minimum food expenditure plus non-food expenditures. Based on this reasoning, it could be said that what INEGI/CEPAL calls "intermediate" households are in fact households living in what might be called "moderate" poverty. The income of these households is more that enough to buy the minimum food consumption basket, but it is less than enough to buy both this food basket and the non-food consumption basket.

With these definitions in mind, we can analyze the estimates made by INEGI/CEPAL. For the 1992 ENIGH survey, they found that 13.6 million people, 16 percent of the population, were living in extreme poverty and 23.6 million people, or 28 percent of the population were considered "intermediate" households, or what might be considered "moderate" poverty as mentioned above. Adding both figures, we could obtain an estimate of poverty in Mexico for 1992, an estimate that includes people living in extreme poverty and people living in moderate poverty. According to these figures, 37.2 million people, representing 44 percent of the population were in poverty in that year.

These are national figures, including both rural and urban areas. Poverty in rural areas was much higher, 26 percent of the rural population were extremely poor and 29 percent moderately poor, meaning that more than half of Mexico's rural population (55 percent) was poor in 1992. Although at first sight these figures seem exaggerated, as defined by the study itself, they include only the income needed to buy a minimum food consumption basket that meets minimum nutrition requirements (extreme poverty line) and the income needed to buy this food basket plus a minimum non-food basket ("intermediate" or moderate poverty).

Other more recent studies of poverty include the PhD dissertations by Alarcón (1993) and Castro-Leal (1995). Alarcón uses Levy´s methodology to calculate HC, FGT and PG for 1989 and compares them with Levy´s results for 1984. She found that all three poverty measures increased in the period considered. Extreme poverty increased from 20 percent of the population in 1984 to 24 percent in 1989. Rural areas registered the largest increase in poverty, increasing from 37 percent of the population in 1984 to 42 percent in 1989, while poverty in urban areas increased from 10 percent of the population in 1984 to 12 percent in 1989.

The poverty gap increased from 0.06 in 1984 to 0.08 in 1989, with again the rural areas experiencing the largest increase, rising from 0.12 to 0.16. The FGT_2 index, which measures the severity of poverty, increased from 0.026 in 1984 to 0.039 for the national measure and from 0.057 in

1984 to 0.080 in 1989 for rural areas. Since Alarcón uses COPLAMAR´s moderate poverty line criteria, the estimates for moderate poverty that she obtains are very large and controversial. They are based on the pattern of consumption of the seventh income decile of the Mexican population. Measured by the Headcount Index, Alarcón found a slight decrease in total poverty, from 81 percent of the population in 1984 to 79 percent in 1989. However, the poverty gap and the FGT index increased slightly. PG increased from 0.46 in 1984 to 0.47 in 1989, while FGT increased from 0.30 to 0.32 in the same period.

In her PhD dissertation, Castro arrives at different conclusions about changes in poverty incidence between 1984 and 1989, but she uses a different methodology than Levy and Alarcón. Castro finds that extreme poverty decreased from 14 percent of the population in 1984 to 11 percent in 1989, while moderate poverty decreased from 66 percent of the population in 1984 to 62 percent in 1989.

In order to take into account the composition of the household, Castro also calculates the poverty measures using adult equivalence scales and finds a statistically significant decline in moderate poverty between 1984 and 1989, in contrast with the decline in extreme poverty, which is non-significant.

2.5 Studies about the Determinants of Poverty

Although the construction of poverty profiles is useful because it allows us to know whether poverty is increasing or decreasing as well as the changes in the composition of the population in poverty, poverty profiles do not throw much light about the causes of poverty. They only provide a description of poverty according to several economic, demographic or social characteristics, but do not go in depth as to look for the underlying causes of differences in poverty rates across population groups and/or across time.

However, while the literature on poverty measurement is by now relatively developed and abundant, there are very few studies dealing with finding the determinants or causes of poverty. In general, these studies have used different methodologies, including ordinary least square regression where the dependent variable is continuous, logistic regression where the dependent variable is binary, and quantile regressions where the dependent variable is income.

In one of the first studies about the determinants of poverty, Kyereme and Thorbecke (1991) estimated a cross-section regression model for Ghana, using the 1974-1975 Ghana Household Budget Survey. In their model, the dependent variable was the total calorie gap for each household in the Survey and the explanatory variables were a set of economic, demographic and geographic location variables. They found that income and education of the household are inversely

related to household calorie gap.

Rodríguez and Smith (1994) used a logistic regression model to estimate the effects of different economic and demographic variables on the probability of a household being in poverty in Costa Rica. The data they used was from a national household-income survey carried out in 1986. Among other results, the authors found that the probability of being in poverty is higher the lower the level of education and the higher the child dependency ratio, as well as for families living in rural areas.

Coulombe and McKay (1996) used multivariate analysis to analyze the determinants of poverty in Mauritania based on household survey data for 1990. They estimated a multinomial logit model for the probability of being in poverty depending on household-specific economic and demographic explanatory variables. The authors found that low education, living in a rural area and a high burden of dependence significantly increase the probability of a household being poor.

2.6 Studies about the Determinants of Poverty in Mexico

Studies about the determinants of poverty in Mexico are few, and they use different methodological approaches.

Cortés (1997), using the ENIGH 1992, estimates a logistic regression of the probability of being poor as a

function of several economic, demographic and location variables. He finds that the probability of being poor decreases with the number of years of education and increases with the burden of dependency and if the household is located in a rural area.

Székely (1998), using a different approach and based on the 1984, 1989 and 1992 Surveys reaches the conclusion that lack of education is the single most important factor in explaining poverty in the country. Other variables that he found as directly related to poverty are: household size, living in a rural area, and occupational disparities.

CHAPTER III

THE DATA

3.1 Overview

This thesis uses the information contained in the micro data from the National Surveys of Incomes and Expenditures of Households (ENIGH) for 1994 and 1996, carried out in those years by the Instituto Nacional de Estadistica, Geografia e Informatica (INEGI), Mexico´s national institute of statistics. Although the most recent survey that has been carried out was for 1998, the micro data for this survey has not yet been made available to the public, so that the 1994 and 1996 surveys are the most recent surveys that have been published by INEGI. These surveys are directly comparable since they follow the same methodology, using the same conceptual framework, reference period, and sample design. The 1994 survey has 12,815 observations while the 1996 survey has 14,042 observations. Each survey was carried out during the third quarter of the year.

3.2 Survey Methodology

The surveys' sampling unit is the house and the unit of analysis is the household. The household and its members can be classified according to various socio-economic and demographic characteristics such as income and occupational characteristics, the physical characteristics of the residence and the services available to the residents of the household.

3.2.1 Socio-demographic Characteristics

The characteristics included in the Survey are the following (and refer to the household residents): kinship relationship with the household head, gender, age, instruction level attained, school attendance, literacy status, and type of school attended.

3.2.2 Occupational Characteristics of Household Members.

The Survey's questionnaire asks about the labor force activity of household members, i.e. if they belong to the economically active population or to the economically inactive population. The economically active population includes the employed population and the unemployed population actively seeking employment. The employed population comprises the population 12 years and older who

declared that they worked at least one hour a week. The unemployed population included those 12 years and older who were unemployed and actively looking for a job at the time of the interview. The economically inactive population includes housewives, students, retirees, renters, permanently disabled workers and discouraged workers who are no longer seeking work because they have been unable to find a job.

3.2.3 Economic Transactions.

The economic transactions considered in the surveys are current transactions and financial or capital transactions. Current transactions are defined as those whose object is to cover basic needs and the result is not cumulative. Financial or capital transactions are those motivated by the desire to accumulate.

Current transactions include current income and current expenditures. Current income includes both monetary and non-monetary income (in-kind payments) received by household members during the reference period. The income concept registered in the surveys is net income, after deducting taxes, social security payments, union payments or other deductions. Current monetary income includes the following sources: wages, entrepeneurial income, rents, incomes from cooperatives, transfer payments and other current income.

Non-monetary income comprises: auto-consumption (household production consumed in the household), in-kind payments, gifts, and the imputed rent from owner-occupied housing.

3.2.4 Survey's Reference Periods

There were different reference periods for the variables included in the Surveys. For the socio-demographic variables the reference period was at the moment of the interview. For the income variable, the reference period was for one month before the interview up to six months before the interview. For the occupational characteristics the reference period was the month before the interview.

3.2.5 Survey's Geographic Coverage

The Survey is statistically representative at the national level and at the urban and rural level. According to INEGI this characteristic makes it impossible to obtain inferences at the state level, except for a few states in which the sample was expanded to permit inferences at the state level. These states paid for the cost of the expanded surveys. For the 1994 Survey, the sample was expanded for the states of Aguascalientes, Coahuila, Mexico, Puebla, Veracruz and the Metropolitan Mexico City Area. For the 1996 Survey the sample was expanded for the states of Campeche, Coahuila, Guanajuato, Hidalgo, Jalisco, Estado de México,

Oaxaca, Tabasco and the Metropolitan Mexico City Area. However, the analysis in the following chapters is performed only at the national level and at the rural and urban levels, and no analysis is done for the particular states mentioned above.

3.3 Sampling Design

The ENIGH data were obtained through a two-stage stratified sampling design. First stage sampling units are Areas Geoestadisticas Basicas, AGEBS (basic geo-statistic areas) and second stage sampling units are housing units. AGEBS in urban areas measure around 20 to 80 blocks.

The Surveys include information about expansion factors for each selected house, and they are equal to the inverse of the probability of selection. In this sense, the expansion factor for each selected house indicates the number of houses that each house represents in the total population of dwelling units.

Although the Primary Sampling Units corresponding to each observation are not released by INEGI in the compact disc that contains the surveys, we were able to obtain them directly from INEGI for the 1996 survey, but not for 1994. Thus, it is possible to obtain statistical inferences using the complete information from the sampling design for 1996, but not for 1994, in which case we only used the strata information, but not the Primary Sampling Units information.

3.4 Poverty Lines used in this Study

Instead of calculating a new poverty line to be used in this study we decided to follow the majority of studies written about poverty in Mexico by using the poverty line estimated by COPLAMAR (1983). COPLAMAR considers two poverty lines, one delimiting extreme poverty and the other delimiting moderate poverty. The extreme poverty line constructed by COPLAMAR includes only the necessary income to buy a minimal food bundle, including 34 different items equivalent to 2082 calories per day per adult. The moderate poverty line includes, besides food, minimum standards for expenditures in housing, health and education.

Using these COPLAMAR poverty lines Székely (1998) updated the extreme and moderate poverty lines for 1992, equal to 92,986 pesos per head per month and 167,949 pesos per head per month, respectively. We took these poverty lines calculated by Székely (1998) and inflated them using the CPI for families with incomes below a minimum wage (for the extreme poverty line) and for families with incomes between one and three minimum wages (moderate poverty line). These poverty lines are shown in Table 3.1.

Table 3.1 Poverty Lines, 1994–1996 (Current Pesos per

Capita per Month)

	1994	1996
Extreme Poverty	109	204
Moderate Poverty	197	367

Source: Author´s calculations, based on Székely (1998)

CHAPTER IV

THE DETERMINANTS OR CORRELATES OF POVERTY IN MEXICO

4.1 Introduction

Garza-Rodríguez (2000) analyzed the evolution of poverty levels and poverty profiles during the period 1994-1996. He looked at the issue of what happened to poverty during the period as well as what happened to the composition of the poor according to several demographic and socioeconomic characteristics. This knowledge can be useful since it allows us to know whether poverty is increasing or decreasing as well as the changes in the composition of the poor. However, it does not provide us with much insight about the causes of poverty. For example, is poverty higher in rural areas only because education attainment is low and family size is high in rural areas or is poverty high in rural areas even if we control for those variables?

While the literature on the measurement of poverty is relatively abundant, studies about the determinants or causes of poverty are scarce. However, it is precisely in this area where research can be most useful, since the main causes of poverty need to be understood in order to be able

to design the most efficient policies to reduce it.

There are several approaches that can be taken in the analysis of the causes of poverty. If we follow the income approach, poverty can be thought as being caused by lack of income, which in turn can be caused by reduced command of economic resources available to the household. Thus, in general terms, poverty can be thought as being due to the limited amount of assets owned by the poor and to the low productivity of these assets.

Many variables can be considered as the determinants of income, and thus, of poverty. We can divide these variables into two general areas: the characteristics associated with the income generating potential of individuals and the characteristics associated with the geographic context in which the individual lives. The first kind of characteristics would include, for example, the assets owned by the individual, both physical and human, while the second type of characteristics would include, for example, the place in which the individual lives (urban or rural). However, there are severe problems in determining the direction of causality. Does poverty cause the characteristic or is it the presence of a given characteristic which causes poverty?. An example of this problem is whether poverty causes large households or a large household causes poverty. It is necessary to determine the direction of causality, but this is a difficult task that has not been solved yet due among other things to the

unavailability of better data, especially panel data in developing countries. What we will try to do in this chapter is to get an approximation about the determinants of poverty, even if they could more properly be called the correlates of poverty.

We also need to separate the effects of correlates. For example, if we find that poverty is highly correlated with rural location, and rural location is highly correlated with low education, then we need to know how much poverty is due to rural location and how much is due to low education. We approach this problem through the use of multivariate analysis, using a logistic regression. In order to explore the correlates of poverty with the variables thought to be important in explaining poverty a logistic regression model was estimated, with the dependent variable being the dichotomous variable of whether the household is extremely poor (1) or not extremely poor (0). The explanatory variables considered in the analysis were: gender, age, education and occupation of the household head, and size and location (rural or urban) of the household.

In this model, the response variable is binary, taking only two values, 1 if the household is extremely poor, 0 if not.

The probability of being extremely poor depends on a set of variables **x** so that

$$\begin{aligned} \text{Prob}\,(Y = 1) &= F(\boldsymbol{\beta}'\mathbf{x}) \\ \text{Prob}(Y = 0) &= 1 - F(\boldsymbol{\beta}'\mathbf{x}) \end{aligned} \qquad \textbf{(4–1)}$$

Using the logistic distribution we have:

$$\begin{aligned} \text{Prob}(Y=1) &= \frac{e^{\beta' x}}{1+e^{\beta' x}} \\ &= \Lambda(\boldsymbol{\beta}'\mathbf{x}), \end{aligned} \qquad \textbf{(4-2)}$$

Where Λ represents the logistic cumulative distribution function.

Then the probability model is the regression:

$$\begin{aligned} E[y \mid \mathbf{x}] &= 0[1 - F(\boldsymbol{\beta}'\mathbf{x})] + 1[F(\boldsymbol{\beta}'\mathbf{x})] \\ &= F(\boldsymbol{\beta}'\mathbf{x}) \end{aligned} \qquad \textbf{(4-3)}$$

4.2 Empirical Results

The estimated regression is shown in Table 4.1. Except for gender of the household head and industrial occupation, all of the coefficients in the regression are significantly different from zero at the 95 percent confidence level. The variables that are positively correlated with the probability of being poor are: size of the household, living in a rural area, working in a rural occupation and being a domestic worker. The variables that are negatively correlated with the probability of being poor are: having at least one year of primary education, having completed primary education, having at least a year of secondary education, having at least a year of preparatory school (senior high school) and having at least a year of college.

Besides education, other variables negatively correlated with poverty are age of the household head, working in a professional occupation and working in a middle level occupation.

Table 4.1 Logistic estimates of poverty determinants

Number of observations=14042
chi2(14)=3144.28
Prob > chi2=0

Log Likelihood =-3829.7657 Pseudo R2=0.291

PINDEXT	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
FEMALE	0.0053611	0.1061904	0.05	0.96	-0.2027683	0.2134904
RURAL	1.100304	0.0789172	13.943	0	0.9456291	1.254979
HHSIZE	0.3453314	0.0125041	27.618	0	0.3208239	0.369839
AGE	-0.0348488	0.0023971	-14.538	0	-0.0395471	-0.0301505
PROFOCUP	-0.7083106	0.2850134	-2.485	0.013	-1.266927	-0.1496947
RURALOCUP	0.8476774	0.1016767	8.337	0	0.6483947	1.04696
INDOCUP	0.0403985	0.1134476	0.356	0.722	-0.1819548	0.2627518
MIDDLEOCUP	-0.5731112	0.1295563	-4.424	0	-0.8270368	-0.3191856
DOMESTICOC	0.4777243	0.1515968	3.151	0.002	0.1806001	0.7748486
INCELEM	-0.3958658	0.0757204	-5.228	0	-0.5442751	-0.2474564
COMPELEM	-0.8177559	0.0935378	-8.743	0	-1.001087	-0.6344252
ATLSOMEHS	-1.347069	0.1244239	-10.826	0	-1.590935	-1.103203
ATLSOMEPREP	-2.096054	0.2614024	-8.018	0	-2.608394	-1.583715
ATLSOMEUNIV	-3.600028	0.5973537	-6.027	0	-4.77082	-2.429237
CONSTANT	-2.4781	0.1746701	-14.187	0	-2.820447	-2.135753

The variables in Table 4.1 are defined as follows:

DEPENDENT VARIABLE:

PINDEXT Binary variable indicating whether a household is below the extreme poverty line

or not (1 if extremely poor, zero if not).

INDEPENDENT VARIABLES:

FEMALE	Binary variable indicating whether the household head is female or male (1 if female, zero if male).
RURAL	Binary variable indicating whether a household is located in a rural area (less than 15,000) or in an urban area (1 if located in rural area, zero if not).
HHSIZE	Size of the household.
AGE	Age of the household head.
PROFOCUP	Binary variable indicating whether the household head works in a professional occupation or not.
INDOCUP	Binary variable indicating whether the household head works in an industrial occupation or not.
MIDDLEOCUP	Binary variable indicating whether the household head works in a middle level (white collar) occupation or not.
DOMESTICOC	Binary variable indicating whether the household head works in a domestic occupation or not.
INCELEM	Binary variable indicating whether the

	household head has incomplete elementary education or not.
COMPELEM	Binary variable indicating whether the household head has completed elementary education or not.
ATLSOMEHS	Binary variable indicating whether the household head has at least a year of high school or not.
ATLSOMEPREP	Binary variable indicating whether the household head has at least a year of senior high school or not.
ATLSOMEUNIV	Binary variable indicating whether the household head has at least a year of college or not.

4.2.1 Model's Predictive Power

In order to assess the predictive power of the model, a classification table of correct and incorrect predictions was constructed, based on the predicted probability of being

poor. A probability equal or greater than 0.5 was interpreted as a prediction of a household being extremely poor, while a probability lower than 0.5 was interpreted as a prediction of a household not being extremely poor. Table 4.2 shows the classification table for the model. In this table, "D" represents the number of poor households in the sample while "~D" represents the number of not poor cases in the sample. The symbol "+" represents the number of households predicted as poor by the model while "–" represents the number of not poor cases predicted by the model.

Table 4.2 Classification Table of Correct and Incorrect Predictions

	True		
Classified	D	~D	Total
+	481	273	754
-	1332	11956	13288
Total	1813	12229	14042
Sensitivity	Pr(+| D)		26.53%
Specificity	Pr(-|~D)		97.77%
Positive predictive value	Pr(D| +)		63.79%
Negative predictive value	Pr(~D| -)		89.98%
False + rate for true ~D	Pr(+|~D)		2.23%
False - rate for true D	Pr(-| D)		73.47%
False + rate for classified +	Pr(~D| +)		36.21%
False - rate for classified -	Pr(D| -)		10.02%
Correctly classified			88.57%

As can be seen in the Table, the model's sensitivity rate (percent of poor cases correctly predicted by the model) is 27 percent, while the model's specifity rate (percent of non-poor cases correctly predicted by the model) is 98 percent.

The false positive rate for households classified as poor by the model is 36 percent, which means that 36 percent of the number of households predicted as poor by the model are in fact not poor. The false negative rate for households classified as not poor by the model is 10 percent, which

means that 10 percent of households predicted as not poor by the model are in fact poor.

The positive predictive value rate of the model is 64 percent, which means that 64 percent of the total number of predicted poor households is in fact poor. Negative predictive rate is 90 percent, meaning that 90 percent of the total number of not poor cases predicted by the model is in fact not poor.

As a whole, the model correctly predicts 89 percent of cases.

4.2.2 Marginal Effects and Odds Ratios

Since the logistic model is not linear, the marginal effects of each independent variable on the dependent variable are not constant but are dependent on the values of the independent variables (Greene, 1993). For the logistic distribution we have:

$$\frac{d\Lambda[\boldsymbol{\beta}'\mathbf{x}]}{d(\boldsymbol{\beta}'\mathbf{x})} = \frac{e^{\beta'x}}{(1+e^{\beta'x})^2} = \Lambda(\boldsymbol{\beta}'\mathbf{x})[1-\Lambda(\boldsymbol{\beta}'\mathbf{x})]\boldsymbol{\beta} \quad \textbf{(4-4)}$$

Thus, as opposed to the linear regression case, it is not possible to interpret the estimated parameters as the effect of the independent variables upon poverty. However,

it is possible to compute the marginal effects evaluating expression (5-4) at some interesting values of the independent variables, such as the means of the continuous independent variables and for some given values of the binary variables. This is the procedure we will use in the next sub-sections to draw graphs showing the effect of the independent variables on poverty.

Another way to analyze the effects of the independent variables upon the probability of being poor is by looking at the change of the odds ratio as the independent variables change. The odds ratio is defined as the ratio of the probability of being poor divided by the probability of not being poor. Table 4.3 shows the odd ratios for each independent variable as well as its corresponding standard error and confidence intervals, with the variables' labels being the same as in Table 4.1.

Table 4.3 Odds Ratios Estimates of Poverty Determinants

Number of obs=14042

chi2(14)=3144.28

Prob > chi2=0

Log Likelihood = −3829.7657 Pseudo R2=0.291

PINDEXT	Odds Ratios	Std. Err.	z	P>|z|	[95% Conf.	Interval]
FEMALE	1.005375	0.1067612	0.05	0.96	0.8164674	1.237992
RURAL	3.005079	0.2371524	13.943	0	2.574432	3.507764
HHSIZE	1.412458	0.0176615	27.618	0	1.378263	1.447501
AGE	0.9657514	0.002315	−14.538	0	0.9612247	0.9702995
PROFOCUP	0.4924755	0.1403621	−2.485	0.013	0.2816961	0.8609708
RURALOCUP	2.334219	0.2373358	8.337	0	1.912468	2.848977
INDOCUP	1.041226	0.1181246	0.356	0.722	0.8336391	1.300504
MIDDLEOCUP	0.5637687	0.0730398	−4.424	0	0.4373433	0.7267407
DOMESTICOC	1.612401	0.2444348	3.151	0.002	1.197936	2.170263
INCELEM	0.673097	0.0509672	−5.228	0	0.5802623	0.7807842
COMPELEM	0.4414211	0.0412896	−8.743	0	0.3674799	0.5302402
ATLSOMEHS	0.2600012	0.0323503	−10.826	0	0.2037349	0.3318067
ATLSOMEPREP	0.1229406	0.032137	−8.018	0	0.0736528	0.2052113
ATLSOMEUNIV	0.0273229	0.0163215	−6.027	0	0.0084734	0.0881041
CONSTANT	1.005375	0.1067612	0.05	0.96	0.8164674	1.237992

As can be seen in the Table, the variables RURAL, HHSIZE, RURALOCUP, and DOMESTICOC have odd ratios greater than one, which means that these variables are positively correlated with the probability of being poor.

On the contrary, the variables AGE, PROFOCUP, MIDDLEOCUP, INCELEM, COMPELEM, ATLSOMEHS, ATLSOMEPREP and ATLSOMEUNIV all have odd ratios lower than one, which means that these variables are negatively correlated with the probability of being poor.

The confidence interval for the odd ratios of FEMALE and INDOCUP includes the number one, which means that these

variables have no statistically significant effect on the probability of poverty.

4.2.3 Poverty and Gender

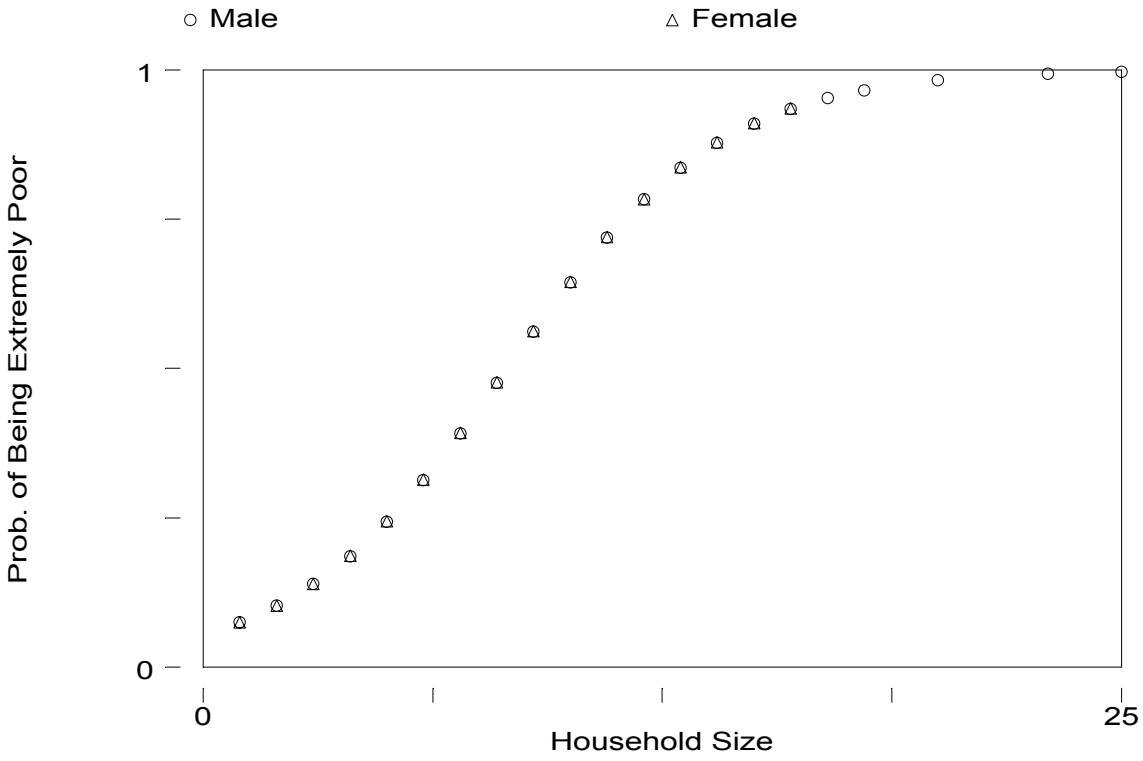
Several studies have discussed the phenomenon of the feminization of poverty, which is said to exist if poverty is more prevalent among female-headed households than among male-headed households. This situation might be due to the presence of discrimination against women in the labor market, or it might be due to the fact that women tend to have lower education than men and therefore they are paid lower salaries. Using a different methodology than the one used in this chapter, Székely (1998) found no evidence that female-headed households are more likely to be poor than male-headed households. Using a logistic regression and the 1992 National Survey of Income and Expenditures, Cortés (1997) finds that the probability of being poor decreases by six percent if the household is headed by a woman.

Looking at the results of the logistic regression estimated above, we reach the same conclusion as Székely (1998) since even though the sign of the coefficient for gender of the head is negative; it is not statistically different from zero at the 95 percent confidence level. However, as noted by Székely (1998), these results should be viewed with care because female-headed households could be

under-represented in the sample because there are cultural reasons to believe that many of the households that declared to be headed by males are in fact headed by women.

Figure 4.1 shows the probability of being poor for male and for female-headed households. This graph is drawn assuming the following values for the independent variables: the age of the household head is 44 years (the sample mean for this variable), the household location is in a rural area, the household's head did not complete elementary education and, finally, the head works in a domestic occupation. We can see in the Figure that the probability curves for male and female are almost the same, which shows that the gender of the head is not significant in explaining poverty in Mexico.

Figure 4.1 Probability of being poor and gender of the head



4.2.4 Poverty and Age

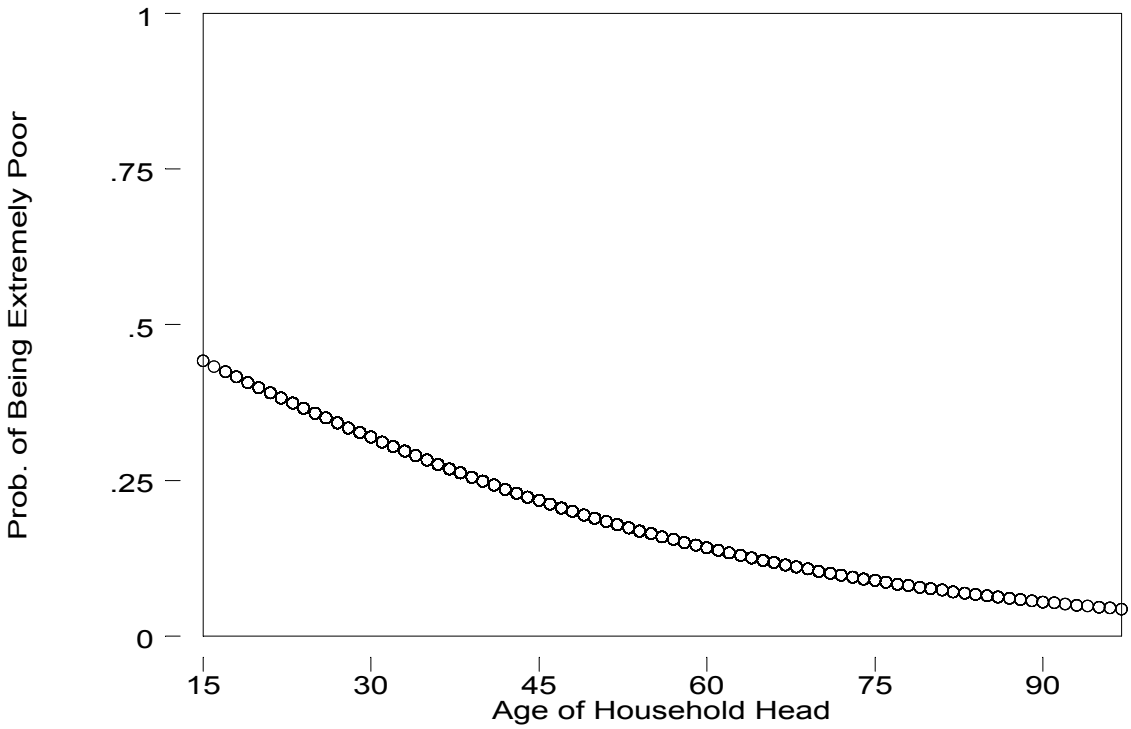
It is argued that poverty increases at old age as the productivity of the individual decreases and the individual has few savings to compensate for this loss of productivity and income. This is more likely to be the case in developing countries, where savings are low because of low income. However, the relationship between age and poverty might not be linear, as we would expect that incomes would be low at relatively young age, increase at middle age and then decrease again. Therefore, according to life-cycle theories we would expect to find that poverty is relatively high at

young ages, decreases during middle age and then increases again at old age.

For the case of Mexico and based on the 1984, 1989 and 1992 Surveys, Székely (1998) finds that age of the head is not relevant in explaining poverty. However, using the 1996 survey and the methodology developed above we found that age of the head is statistically significant in explaining poverty, although the effect is not very strong, since as can be seen in Table 4.2 above, an increase of one year in the age of the head decreases the odds of being poor by only 3.4 percent.

As Figure 4.2 shows, the probability of being poor decreases with age. This graph is drawn assuming the following values for the independent variables: household size is 4.58 members (the mean for this variable in the sample), the household head is male, the household location is in a rural area, the household's head did not complete elementary education and, finally, the head works in a domestic occupation.

Figure 4.2 Probability of being poor and age



4.2.5 Poverty and Household Size

Large households tend to be associated with poverty [World Bank (1991a,b), Lanjouw and Ravallion (1994)]. The absence of well developed social security systems and low savings in developing countries will tend to increase fertility rates, especially among the poor, in order for the parents to have some economic support from the children when parents reach old age. It might be rational for them to increase the number of children in order to increase the probability that they will get support when they get old. High infant mortality rates among the poor will tend to provoke excess replacement births or births to insure against high infant and child mortality, which will increase

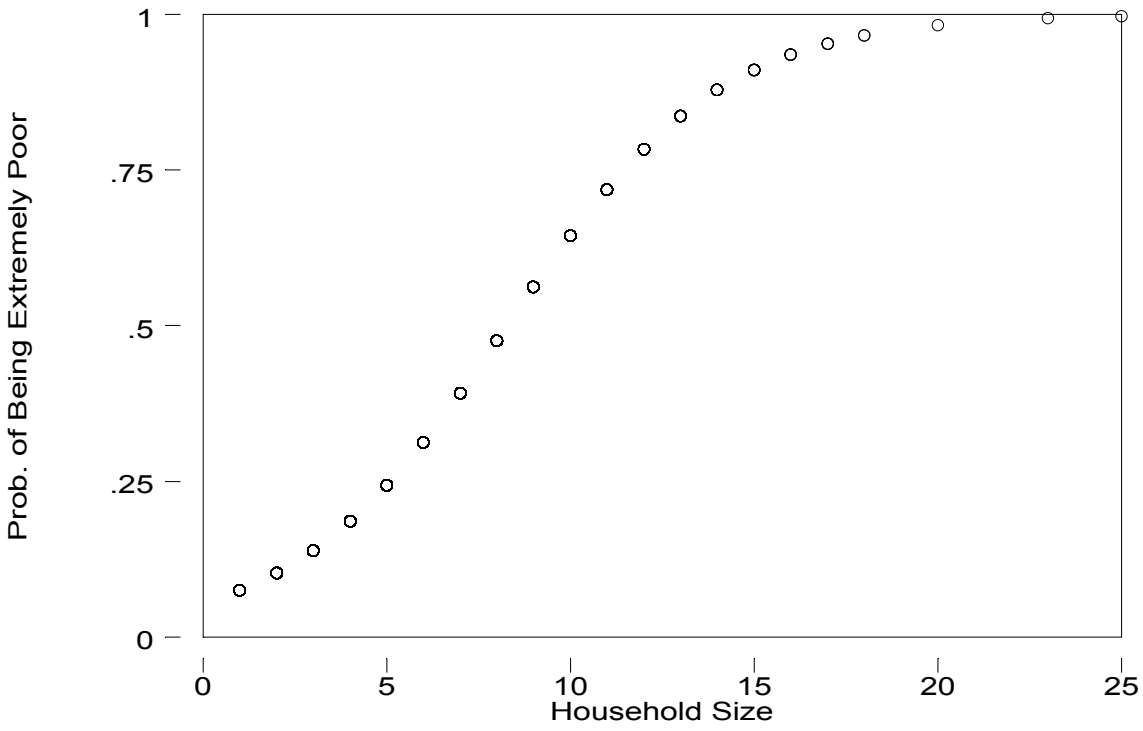
household size (Schultz, 1981).

For Mexico's case Székely (1998), using the 1984, 1989 and 1992 Surveys, found that household size is relevant in explaining poverty, while Cortés (1997), based on the 1992 Survey, found a direct relationship between poverty and the burden of dependency. Using the 1996 data, we obtained similar results since, as can be seen in Table 4.2 above, an increase of one in the size of the household increases the odds of being poor by 41 percent.

Figure 4.3 shows the probability of being poor as the size of the household increases from its minimum to its maximum, assuming that the independent variables take the following values: the age of the household head is 44 years (the sample mean for this variable), the household head is male, household location is in a rural area, the household's head did not complete elementary education and, finally, the head works in a domestic occupation.

It can be seen in Figure 4.3 that the effect of a change in household size upon the probability of being extremely poor is pronounced, and that this effect increases relatively rapidly up to a household size of around 14 members and then increases less rapidly up to the maximum household size of 25. Since 87 percent of households have between 1 and 8 members, the first part of the curve is the most relevant, which implies that household size has a strong correlation with poverty in Mexico.

Figure 4.3 Probability of being poor and size of the household.



4.2.6 Poverty and Rural–Urban Location

One of the most salient facts about poverty in developing countries is that it is higher in rural areas than in urban areas. The World Bank (1990) reports that the rural poverty rate was higher than the urban poverty rates for many developing countries during the 1980's. For example, in Kenya the rural poverty rate was six times the urban poverty rate, while in Mexico it was 30 percent higher during the same period. Although there may be problems associated to determining the direction of causality, several variables might explain why poverty is higher in

rural areas than in urban areas. First, rural areas are heavily dependent on agricultural production, which in developing countries is characterized by low labor productivity and therefore low incomes. Second, historically government policy has been biased against rural areas, including price policy, educational policy, housing, and public services in general. Third, natural disasters such as drought or flooding tend to affect rural areas more heavily than they affect urban areas, and although at first we might think that these phenomena would only affect transient poverty they affect the stock of capital of the communities which in turn have a permanent adverse effect on poverty rates.

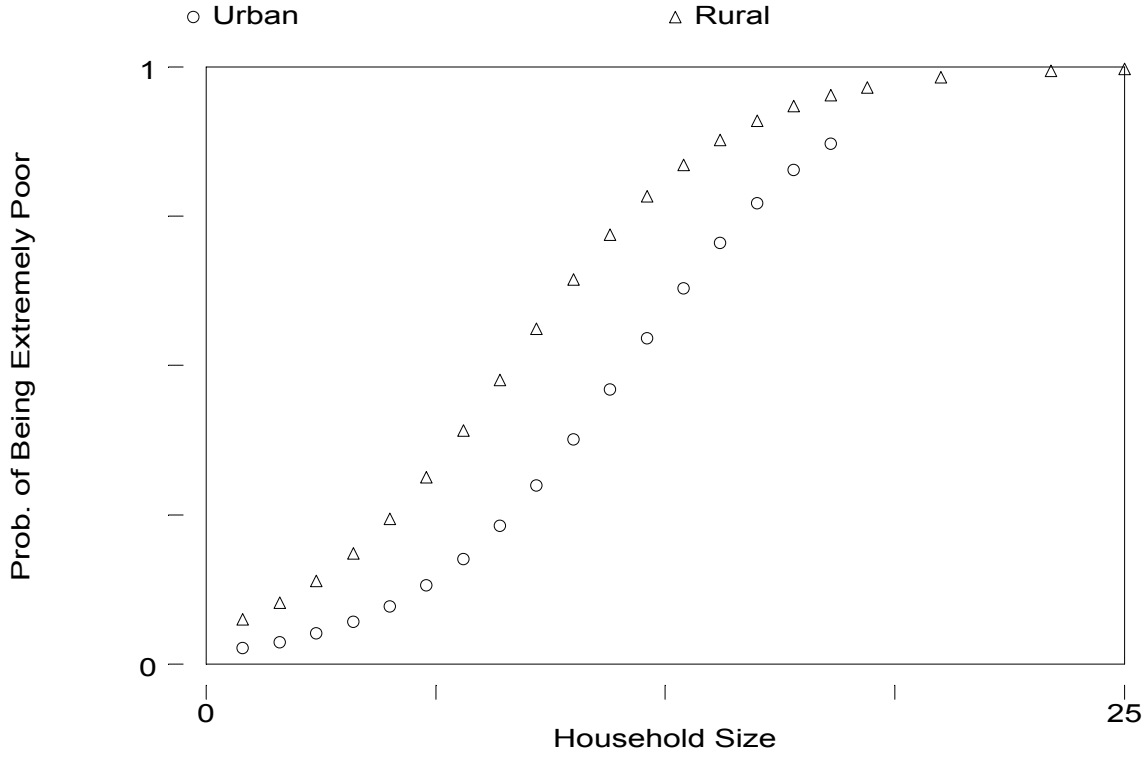
By constructing a poverty profile using the 1984 Survey, Levy (1994) concludes that poverty in Mexico is a predominantly rural phenomenon characterized by higher poverty rates in rural areas than urban areas. Cortés (1997) finds that the probability of being poor increases if the household is located in a rural area. Székely (1998) also concludes that rural–urban location is statistically significant as a cause of poverty in Mexico.

Our own estimates using the logistic regression for the 1996 survey indicate that rural location has a statistically significant positive effect on the probability of being poor. As shown in Table 4.2, the odds of being poor for a household located in a rural area are 3 times the odds of an urban household.

Figure 4.4 shows the effect of the size of the household and rural/urban location of the household upon the probability of being poor, assuming the following values for the independent variables: the age of the household head is 44 years (the sample mean for this variable), the household head is male, the household's head did not complete elementary education and, finally, the head works in a domestic occupation.

It can be seen from the graph that the probability of being poor is significantly higher for a household located in a rural area than for one located in an urban area, and that the difference is higher the larger the household size.

Figure 4.4 Probability of being poor and rural/urban location.



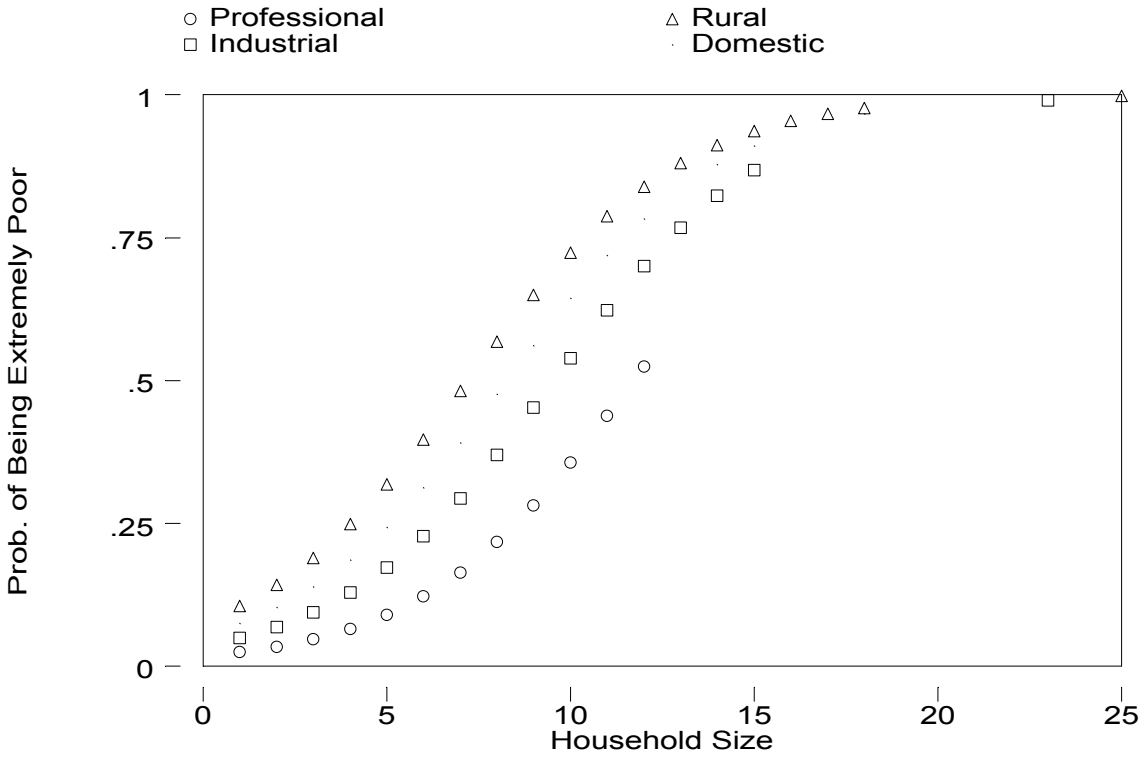
4.2.7 Poverty and Occupation

Occupation has a high correlation with poverty because occupations which require low amounts of capital, either human or physical, will be associated with low earnings and therefore with higher poverty rates. In our model we found that working in a professional occupation or in a middle level occupation decreases the probability of being poor, while working in a rural occupation or in a domestic occupation increases it. Working in an industrial occupation does not have a statistically significant effect upon the probability of being poor.

Figure 4.5 shows the effect of the occupation variable on the probability of poverty, based on the following assumptions about the values of the independent variables: household head is 44 years (the sample mean for this variable), the household head is male, the household is located in a rural area and the household's head did not complete elementary education.

It can be seen from the graph that the probability of being poor is higher for households whose head works in a rural occupation and in a domestic occupation and it is lower for households whose head works in an industrial occupation or in a professional occupation.

Figure 4.5 Probability of being poor and occupation



4.2.8 Poverty and Education

There is generalized evidence in household surveys and censuses that education is positively correlated with earnings [Schultz (1988); Psacharopoulous (1985); Blaug (1976)]. Higher earnings in turn are associated to lower poverty levels.

Education increases the stock of human capital, which in turn increases labor productivity and wages. Since labor is by far the most important asset of the poor, increasing the education of the poor will tend to reduce poverty. Thus, we might think of low education as one of the most important

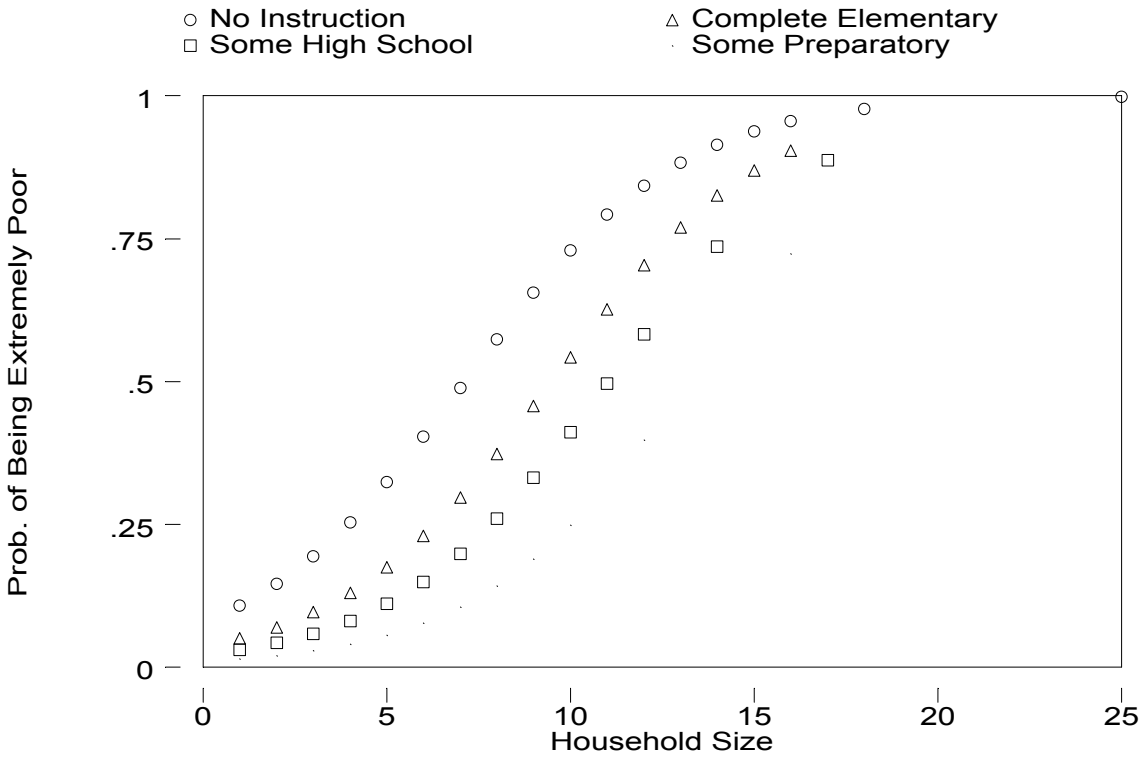
causes of poverty. In fact, there seems to be a vicious circle of poverty in that low education leads to poverty and poverty leads to low education. The poor are not able to afford their education, even if it is publicly provided, because of the high opportunity cost that they face. Many times they cannot attend school because they have to work to survive.

Both Székely (1998) and Cortés (1997) found that education is negatively correlated with poverty in Mexico. Székely reaches the conclusion that education is the single most important factor in explaining poverty in the country. The regression estimated in this chapter also finds that education has a significant effect on the probability of being poor.

Figure 4.6 shows the effect of the level of education on the probability of poverty, assuming that the other independent variables take the following values: age of household head is 44 years (the sample mean for this variable), the household head is male, the household is located in a rural area and finally, the head works in a domestic occupation.

Figure 4.6 shows that the probability of being poor decreases as the level of education increases.

Figure 4.6 Probability of being poor and Education



4.3 Summary of Findings

The estimates from the logistic model estimated in this chapter indicate that the probability of poverty is higher for households whose head has a low level of education and for households located in rural areas. Other variables that increase the probability of being poor are the size of the household and the rural or domestic occupation of the household head.

CHAPTER V

CONCLUSIONS

Reflecting the results obtained by Garza-Rodriguez (2000) in the construction of poverty profiles, the multi-variate analysis developed in this study shows that the variables that are positively correlated with the probability of being poor are: size of the household, living in a rural area, working in a rural occupation and being a domestic worker. The variables that are negatively correlated with the probability of being poor are: having at least one year of primary education, having completed primary education, having at least a year of secondary education, having at least a year of preparatory school (senior high school) and having at least a year of college. Besides education, other variables negatively correlated with poverty are age of the household head, working in a professional occupation and working in a middle level occupation. We did not find evidence in this study to support the hypothesis of the feminization of poverty, since the parameter estimate for this variable in the logistic regression was not statistically different from zero.

The multi-variate analysis shows that increases in educational attainment have an important impact on reducing the probability that a household is poor. The five binary

variables for education representing increasing levels of educational achievement show that as educational achievement increases, the probability of being poor decreases.

The logistic model shows that a rural family has a high probability of being poor. Even when controlling for education, the size of the household, and the other independent variables in the regression equation, the rural/urban variable is statistically significant and this variable increases the odds of a household being poor significantly. We can only speculate what factors, in addition to poor education and a large household, result in rural poverty. The migration from rural to urban areas is probably selective of the most ambitious and entrepreneurial persons, leaving the less ambitious and less entrepreneurial household heads in the rural areas. These household heads are more likely to be poor.

Government policy also may contribute to rural poverty beyond the effect of poor education by providing fewer resources to rural residents for services such as medical care and by policies that reduce the incentives to increase agricultural production. Poor medical care, which includes problems in the delivery of contraceptive supplies and services, may contribute to the larger household size in rural areas (Chen, et al., 1990).

Suggestions for further research include the construction of poverty profiles at the state and regional levels, but this task could only be possible if INEGI

expands the ENIGH Surveys to make them representative at the state and regional levels. Likewise, the availability of panel data is badly needed in order to be able to construct better models of the determinants of poverty.

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