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Determinants of female labor force participation in Venezuela: A cross-sectional analysis

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Determinants of Female Labor Force Participation in Venezuela:

A Cross-Sectional Analysis

by

Betilde Rincon de Munoz

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
Department of Economics
College of Business Administration
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Note to Reader: The original of this document contains color that is necessary for understanding the data. The original dissertation is on file with the USF library in Tampa, Florida.

Dedication

I dedicate this project to my mother and father who, from heaven, are probably feeling very happy and proud of me right now. Thanks to them for always believing in me. I also dedicate this to my dear husband, Avilio, because he was always my rock, his enthusiasm never failed me. Thank you for your confidence in my ability and determination to achieve this.

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Determinants of Female Labor Force Participation in Venezuela:

A Cross-Sectional Analysis

Betilde Rincon de Munoz

ABSTRACT

The purpose of this study is to fill the gap in research about women in Venezuela by investigating the determinants of their labor force participation between 1995 and 1998. The Central Office of Statistics and Information in Venezuela provides cross-sectional data collected semiannually about individual, demographic, socio-economic and geographical characteristics of individuals living in Venezuela during this period. This study uses binomial and multinomial logit models to test a number of hypotheses. First, the full sample of women between 15 and 60 years old is used to investigate the importance of individual, demographic, socioeconomic, and geographical characteristics in the labor force participation decision, also controlling for a time trend. The same decision is also analyzed for three subsamples: married women, single women, and women heads of household. Comparisons are made between each subsample and the full sample, and also among the different subsamples. Next, multinomial regressions using the same explanatory variables are performed to examine labor market behavior when there is a three-way choice: whether to participate in the formal sector, the informal sector or not to participate in the labor market at all. The multinomial regressions are also performed on the three subsamples as well as on the full sample. Again comparisons are made between each subsample and the full sample and also among the three subsamples.

The results of these analyses show considerable differences in motivating factors among the three groups. The conclusion that must be drawn from this research is that one cannot generalize about the women's labor force participation just by studying the behavior of women in the aggregate. The relative importance of motivating factors depends strongly on the specific subsample to which a woman belongs, a fact unrevealed by previous empirical work. The more detailed analyses produced by this dissertation provide deeper understanding of the labor force participation of Venezuelan women. This information will make a valuable contribution to policy-makers who seek to encourage the important economic contribution of women to this previously under-studied labor market.

Chapter One

Introduction

The massive influx of Latin American women into the labor market, and their ensuing contribution to the region's economic growth were two of the most important developments in the Western Hemisphere in the twentieth century. These developments took place in the context of structural changes that forced women to look for and respond to the demands of the market in the employment sector. Indeed, for any country, the proportion of various population groups in the labor force both affect, and reflect, the overall rate of economic growth, the economic circumstances of those groups, and the role of women in the society. This project examines the determinants of this increased participation of women in the labor force in Venezuela.

Although a study of labor supply includes the level of labor force participation, as reflected in annual hours worked, as well as on the number of individuals participating in the labor force at a point in time, this project will deal only with labor force participation. Since labor force participation in the U.S. and other developed countries has been studied extensively, a brief survey of empirical evidence of these countries is included in this project as well as that of developing countries, including those from Latin America.

The level of women's participation in the labor market in Venezuela has increased dramatically in recent decades, from 17.5 percent to 47.2 percent between 1950 and 2000. The rise of the petroleum state and the rapidly growing economy also created

employment for women in the labor force. However, the economic downturn at the end of the twentieth century impacted the overall labor market as well as the labor participation rates of women. The first objective of this research project is to investigate the effects of various factors on women's decision to work during the second half of the 1990s in Venezuela. Secondly, given the increased importance of the informal sector in the labor market, the project seeks to understand the distribution of the female labor force among the formal and informal sectors. Finally, the differences in choosing employment in the formal and informal sector among married, single women, and female heads of household are investigated. The study contributes to the economic literature devoted to analyzing labor force participation in Latin America, and specifically Venezuela. It also provides an analysis that could serve as the basis for the formulation of emerging public policies oriented towards women's advancement.

1.1 Venezuela in the 1990s

In order to understand Venezuelan women's labor force participation during the 1995-1998 period, it is important to mention some relevant characteristics of the Venezuelan population, the labor market, and the most important indicators of the country's economic activity.

The Venezuelan economy is mainly based on the exploitation and commercialization of petroleum and its byproducts. For many years, the Venezuelan people enjoyed a relatively good standard of living, as well as urbanization and modernization, as byproducts of the extraordinarily high oil revenues. The quadrupling of crude oil prices in 1973 spawned an oil euphoria and a spree of public and private

consumption unprecedented in Venezuelan history. During the 1970s, the government established hundreds of new state-owned enterprises and decentralized agencies, as the public sector became the primary engine for economic growth.

In addition to establishing new companies in such areas as mining, petrochemicals, and hydroelectricity, the government also purchased private companies. In 1975, the government nationalized the steel industry and in 1976, the oil industry was nationalized. This tremendous influx of money allowed the public sector of the economy to embrace an internal industrialization that substituted for previous imports of many finished goods, capital and technologies, and provided for the construction of an important infrastructure of highways, extensive irrigation of agricultural lands, and a huge hydroelectric system, among others. Moreover, in the last three decades, the economy reached some degree of diversification with the exploitation and exportation of iron ore, petrochemical products, aluminum, cement, steel and other industrial products. The Venezuelan government also made important advances in providing public health and education services to the Venezuelan people.

1.2 The Venezuelan Economic Crisis: 1980-1999

In 1983 the price of oil fell, and soaring interest rates caused the national debt to multiply. Oil revenues could no longer support the array of government subsidies, price controls, exchange-rates losses, and the operation of more than 400 public institutions. Widespread corruption and political patronage only exacerbated the situation. By 1989 the economy could no longer support the high rates of subsidies and the increasing

foreign debt burden, particularly in light of the nearly 50 percent reduction of the price of oil during 1986.

In 1989 the government launched profound policy reforms with the support of structural adjustment loans from the International Monetary Fund (IMF) and the World Bank.¹ The purpose was to reduce the role of government in the economy, orienting economic activities toward the free market, and stimulating foreign investment. The most important adjustment was the massive devaluation of the national currency, the bolivar.² In spite of these efforts, the extraordinary outflow of monetary resources from the economy created one of the most serious financial banking crises in Venezuela in 1994.³ As a consequence, another structural adjustment program called the Venezuelan Agenda was implemented. The final years of the 1990s were marked by great economic structural changes that brought about a sharp decline in the standard of living. Those in the middle and working classes faced increasing financial hardships: the poverty rate increased by over 60 percent by the end of 1997.⁴ Low employment in the oil sector, lack of sustained growth of non-oil activities, and shrinkage of the public sector, i.e. the main causes of the contraction of the formal sector, are likely to remain unchanged for some time.

¹ The document with all the economic adjustment was known as the “Big Turnaround.”

² Other related policies sought to eliminate budget deficits by 1991 through the sales of state-owned enterprises, to restructure the financial sector and restore positive real interest rates, to liberalize trade through tariff reduction and exchange rate adjustment, and to abolish most subsidies and price controls. The government also aggressively pursued debt reduction schemes with its commercial creditors in an effort to lower its foreign debt repayments.

³ The 1994 banking crisis was unprecedented in Venezuela. Very few other Latin American countries experienced a similar situation. It was accompanied by a currency exchange control period of 21 months (1994-1996).

⁴ The World Bank reported that in Venezuela the poverty rate in 1981 was 17.7 percent; it reached 78 percent by the end of 1990s.

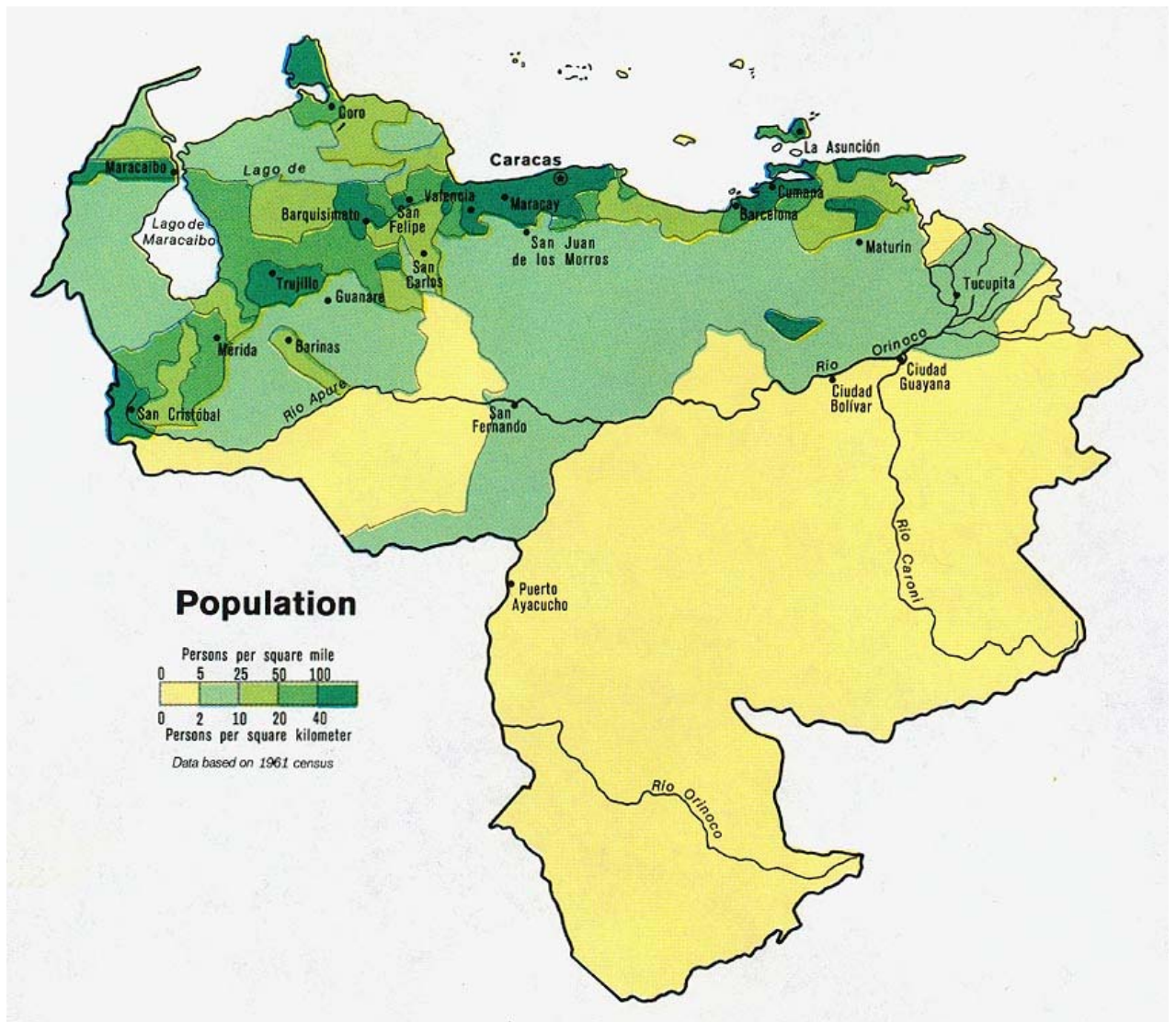
1.3 The Venezuelan Population in the 1990s

The Venezuelan population was approximately 23 million people at the end of 1998.⁵ Despite a low overall population density (21.4 persons per square kilometer in 1987), the distribution is extremely uneven. The most striking phenomenon in the distribution of the Venezuelan population has been the shift from a highly rural to an overwhelmingly urban population in response to the process of economic growth and modernization due to the development of the oil industry. Most of its population is concentrated in the western Andean region and along the coast. Although nearly half of the land lies south and east of the Orinoco River, that area contained only about 4 percent of the population in the late 1980s. About 75 percent of the total population lived in only 20 percent of the national territory, mainly in the northern mountains (Caracas and surrounding areas) and the Maracaibo lowlands. In the 1990s, the north, which is the area of the country's first colonial cities, agricultural estates, and urban settlements, remained the administrative, economic, and social heartland of the country. Moreover, 40 percent of the people live in the eight most urbanized cities of the country⁶ whereas the indigenous population (1.5 percent) lives in the southern areas of Venezuela and also in some part of the Zulian region. Finally, for the period under analysis, 1995-1998, 86 percent of the Venezuelan population lived in urban areas, as the following figure shows.

⁵ Census of the Republic of Venezuela, 2000.

⁶ Caracas, Maracaibo, Valencia, Barquisimeto, Merida, Guayana, and Cumana.

Figure 1 Distribution of Venezuelan Population



Source: University of Texas Library,

http://www.lib.utexas.edu/maps/americas/venezuela_pop_1972.jpg

1.4 Education

Although the issue of free public and compulsory education at the primary level first arose during the independence struggle⁷ in 1811, the real beginning of free public

⁷ The ideal of free, universal education has become inextricably joined to the name of the national hero Simon Bolivar. This ideal has since permeated Venezuelan educational policies.

education began in 1870 when the president of Venezuela, Antonio Guzman Blanco, issued a decree in which he recognized compulsory elementary mass education as the responsibility of national and local governments. At least six years of primary school were compulsory until 1980, when the Law of Education was passed. This law established compulsory preschool education and nine years of basic education for children six to fourteen years of age. For those continuing their education, the system offered two years of diversified academic, technical, and vocational study at a senior high school, which could be followed by various types of higher education—junior college, university, or technical institute, all paid for the government. In addition, adults were encouraged to participate in special night classes conducted at all education levels. Overall, Venezuela was among the most literate of the Latin American countries. The literacy rate among Venezuelans fifteen years of age and older increased from 51.2 percent in 1950 to 91.1 percent in 1995. College education enrollment has also grown significantly. By 1995, approximately 600,000 people were registered in more than 100 private and public colleges and universities,⁸ technical schools, and military institutions. It is also important to highlight the success of the “Great Mariscal of Ayacucho,” a scholarship program implemented in 1975. Under this program, thousands of students have enrolled in American and European universities at both undergraduate and graduate levels.

⁸ The most important public universities are the Central University of Venezuela (founded in 1725), Andres Bello Catholic University (founded in 1953), Metropolitan University (founded in 1970) and the Simon Bolivar University (founded in 1970) in Caracas; Los Andes University (founded in 1810) in Mérida; Zulia University (founded in 1891) in Maracaibo; Carabobo University (founded in 1892) in Valencia; Oriente (founded in 1958) with the headquarters in Cumana and branches in different cities of the North-Eastern region; and, the Centro-Occidental Lisandro Alvarado University (founded in 1962) in Barquisimeto.

1.5 The Venezuelan Labor Market in the 1990s

The significant increase of the rate of labor market activity in the population is an important characteristic of the economy in recent years. The total labor force participation rate rose from 59 percent in 1994, to 69 percent in 1999. During the 1990s, women increased their labor force participation by 13 percent while that of men increased by only 3.2 percent.⁹ Labor force participation was highest among women 25 to 44 years of age.

Another of the more significant changes that occurred in the labor market is the increasing importance of the informal sector.¹⁰ After remaining fairly constant at around 40 percent for a decade, the percentage of workers employed in the informal sector increased to 49 percent in 1994 and to 52 percent in 1999. This meant that the majority of the active population was employed outside of the formal sector of the economy,¹¹ with all the implications and costs that implies, in terms of (a) lacking the benefits of social security and pensions provided through formal employment, (b) lower average salary levels, (c) depreciation of marketable skills, and (d) lost income tax revenues for the government.

Employment in Venezuela has historically been concentrated in service activities, specifically health, education, personal services; and trade. Employment decreased in the

⁹Labor force participation of men decreased from 79.5 percent in 1950 to 69.2 percent in 1990; and, increased their participation to 72.4 percent by 1998 (1950 National Census of 1950, OCEI, 1998).

¹⁰ Women reported as self-employed (excluding professional and technicians), employers of business with less than 5 employees, or as family workers, are assumed to be engaged in the informal sector of the labor force. This definition follows the methodology used by the Central Office of Statistics and Information (OCEI, 1990). The increase in employment in the informal sector was also a byproduct of the globalization process, which was a factor that helped increase self-employment activities. Albeit important, this is beyond the scope this project.

¹¹ The nation's 1990 labor law incorporated provisions for organized labor, collective bargaining, generous fringe benefits, and retirement and disability pensions. Venezuela passed a national minimum wage law in 1974.

manufacturing industry, the third-largest sector in terms of employment, in the late 1990s, exacerbated by a notable reduction of industrial activities. The agriculture sector showed the same tendency to a lesser extent. The construction, transportation and communications industries were the only ones that did not register significant changes in employment.

Unemployment fluctuated based largely on the health of the oil industry which in turn greatly impacted the productive activities of other industries. In 1978 only 4.3 percent of the labor force was unemployed, compared with the peak level of 14.5 percent in 1984 when oil revenues fell. By 1989, the unemployment rate was 8.7 percent. In 1994, as a consequence of the implementation of the first macroeconomic adjustment, the Big Turnaround, the unemployment rate fluctuated between 7 and 9 percent. By 1995, it increased to levels of around 11 percent with a peak of 13 percent in 1996 as a result of the banking crises of 1994 (INE, Annual Report, 1978-1995).

During every year of the 1990s, nominal minimum wages increased due to progressive decreases in real wages because of inflation and currency depreciations.¹² This decrease in real wages, combined with high rates of unemployment, generated losses in household income which helps explain the increase in the labor force participation rate of women who entered the labor force to compensate for the loss of real household income.

Labor policies contained in the Venezuelan Agenda were designed and implemented during the period under study (1995-1998) to mitigate the fall in real salary of those

¹² Nominal minimum wages (including transportation and food bonus) in urban areas increased from 17,794.4 bolívares per month in 1989 to 242,282.7 bolívares per month in 1998 (OIT, Panorama of Labor, 1999), an increase of 1,261.56 percent.

employed in the formal sector, the costs of which were transferred to the employer. This in turn provided disincentives for employers to hire additional workers.

1.6 Venezuelan Women and the Labor Market

The labor force participation of Venezuelan women increased from 18 percent in 1950 to 31 percent in 1990, and to 43 percent by 1998 (National Census of 1950, OCEI, 1998). Factors such as accelerated economic growth, democratization of the educational system, and the decrease in fertility rates, on one hand; and the economic and social deterioration after the fall of the oil revenues and the financial crisis of 1994, on the other, influenced the upward trend in women's labor force participation (Irene Casique, 1994; Orlandina Oliviera, 1997). In fact, improved educational and job opportunities since the establishment of democracy in 1958 have enabled more women to enter the labor force, thus helping themselves and/or their families attain middle-class status.¹³ Not surprisingly, those who moved from the lower to the middle class in Venezuela often attributed their changed status to their education, and accordingly, many struggled to send their children to private schools so that they could move still further up the social ladder. The social distinction between private and public school, particularly at the secondary level, has intensified as a result of the expansion of public education. This project aims to investigate and interpret those changes among these women.

The results of this dissertation research, using the individual data of the

¹³ Most accounts describe the Venezuelan middle-class as the country's most dynamic and heterogeneous class in terms of social and racial origins, and as the greatest beneficiary of the process of economic development. Consisting of small businessmen, industrialists, teachers, government workers, professionals, and managerial and technical personnel, this class is almost entirely urban. Some professions, such as in teaching and government services, were traditionally associated with the middle class, whereas newer technical professions have expanded the options and enhanced mobility within this class.

Household Sample Survey data set from 1995.1 to 1998.2, indicate that women's labor force participation in Venezuela during the period under study is affected by such factors as demographic characteristics, geographical factors, and socio-economic conditions.

This study goes still further by examining women's choices between employment in the formal versus the informal sectors, and whether these choices are different if they are single, married, or heads of household. My results are unique as there is no other study of women's labor force participation in Venezuela after the 1980s using micro data.

The remainder of this dissertation is organized as follows. The theories of allocation of time and human capital investment are summarized in Chapter Two. Chapter Three provides a brief review of the empirical evidence on female labor force participation in the United States, other developed countries, and Latin American developing countries, with an emphasis on Venezuela. Chapter Four describes the objectives of this project, the methodological approaches, the data used, and the specifications of the models. Chapter Five presents and discusses the research results. Finally, Chapter Six summarizes the contributions this study makes to the existing literature, and provides a brief discussion of future research.

Chapter Two

The Theory of Allocation of Time and Human Capital Investment

Two complementary theoretical approaches support the study of labor force participation of women in this project. Both focus on different aspects of the labor supply decisions. On one hand, the neoclassical model of allocation of time deals with whether a woman will enter the labor market by comparing the value of her time in the market to the value she places on her time spent at home and if she decides to do so, how much time will be spent on market work. On the other hand, the human capital investment theory stresses the relationship between the return on the investment of acquiring valuable skills and the time the person expects to work during his/her life. In other words, labor participation outcomes are related to general skills acquired through education and training [Joseph G. Altonji and Rebecca M. Blank, (1999); Francine D. Blau, Marianne A. Ferber and Anne E. Winkler (2002)]. Indeed, those who are planning to participate in the labor market as full-time workers are prompted to invest more in education and training (Altonji and Blank, 1999). Moreover, the human capital model emphasizes the role of women's preferences and the choices they may make to invest less in job-related education and training, as well as to spend a smaller share of their adult years in the labor force (Blau et al., 2002). Other factors include premarket discrimination, or societal discrimination, in which various types of social pressures influence women's choices adversely. However, such explanations are beyond the scope of this project.

In the following three sections, a brief description of these theoretical models and the contribution of each to the study of the labor force participation of women is presented.

2.1 The Neoclassical Model of Allocation of Time

Economists traditionally analyze labor supply through the use of the neoclassical model of allocation of time¹⁴ or the model of labor-leisure choice, which is an extension of the utility maximization problem of consumer theory. The model analyzes how individuals make choices in deciding how they will spend a fixed amount of time. They must decide how many hours to work, and how many hours to spend consuming a variety of goods, ranging from computers and cars to DVDs and theater.

In the simplest model, an individual has two uses for his/her time, either working in the labor market at a real wage rate of W per hour, or “leisure”. According to this basic model, individuals wish to maximize their utility¹⁵ or satisfaction (U) by purchasing goods and services (C) in the marketplace and by consuming time in leisure activities (L).¹⁶ The amount of both consumed will depend on the individual’s market wage (W), personal preferences, and the nonlabor income (V) that person enjoys.

The individual’s utility function will be:

$$U = f(C, L) \tag{1}$$

¹⁴ The theoretical treatment of the allocation of time was pioneered by Gary S. Becker (1965).

¹⁵ Jeremy Bentham (1780) coined this usage.

¹⁶ C and L are “composite” goods. We must be aware that utility is, in fact, derived by spending income and time on the consumption of a wide variety of goods and services.

where U is an index that measures the individual's well being, assuming people are able to rank in order all possible situations from the least desirable to the most.¹⁷ Thus, a higher index U means more C and/or L and more satisfaction. Moreover, C and L are economic "goods" – that is, whatever economic quantities they represent, we assume that more of any particular good is preferred to less.

When the individual seeks to maximize his/her utility with respect to time in the period under analysis, he is bound by two conditions: first, he must allocate the day's discretionary time (T) – that is, 16 hours time, either to working for pay (H) or to leisure (L). The other condition is related to the income he needs to buy goods and services in the market place: Labor wages ($W * H$) and nonlabor income (V)¹⁸ are the only sources of the individual's income.

These constraints can be written as the following:

$$L + H = T \quad (2)$$

$$C = (W * H) + V \quad (3)$$

The individual's budget constraint is represented by equation (3). It tells us that individual's consumption expenditures must not exceed the total income.

We can rewrite (2) and (3) as follows:

$$C = W(T - L) + V \quad (4)$$

¹⁷ Every individual has his own set of indifference curves (U_1, U_2, \dots) reflecting his preferences. For a complete analysis, see Walter Nicholson (1992), pp. 130-132.

¹⁸ Nonlabor income includes from property assets, stocks, and dividends. For women, it also is assumed to include the husband's earnings. A further assumption in this model is that the individual does not save or borrow.

Setting up the Lagrangian expression to represent the individual's utility maximization problem yields

$$\ell = U(C, L) + \lambda \{ [W(T - L) + V] - C \}$$

The first order conditions for a maximum are

$$\frac{\partial \ell}{\partial C} = \frac{\partial U}{\partial C} - \lambda = 0 \therefore MU_C = \lambda \quad (5)$$

$$\frac{\partial \ell}{\partial L} = \frac{\partial U}{\partial L} - \lambda W = 0 \therefore \frac{MU_L}{W} = \lambda \quad (6)$$

Equating (5) and (6), we get

$$\frac{MU_L}{MU_C} = W \quad (7)$$

This expression can be interpreted as the utility-maximizing labor supply decision principle. That is, in order to maximize utility, given the real wage, W , the individual should choose to work that number of hours for which the marginal rate of substitution of leisure for consumption is equal to W (Nicholson, 1992, p. 683).¹⁹ The interior solution of the model answers the question of the number of work hours to be supplied by the worker.

An increase in W , holding income constant, makes leisure more expensive. Therefore, by consuming additional hours of leisure, the worker gives up more in forgone wages, producing a negative substitution effect with respect to hours of leisure. On the other hand, since leisure is a normal good, the income effect will be positive. That is, an increase in the wage rate, W , will increase the consumption of leisure, L , since the person now feels better off. Since work and leisure are mutually exclusive ways to spend one's

¹⁹ For the graphical approach, see George Borjas (2000), p. 33.

time, these two opposite reactions prevent the model from predicting the direction of the change in the number of hours worked. The ambiguity cannot be solved unless one knows the worker's actual labor supply decision. If the substitution effect dominates, the result will be an increase in the number of work hours supplied. On the other hand, if the income effect dominates, the number of work hours supplied by the worker will decrease. Empirical studies have shown that the income effect tends to dominate for men and the substitution effect, for women.²⁰

When nonlabor income, V , changes, there is no ambiguity since the income effect operates alone. Thus, an increase in V will cause an increase in leisure time and a decrease in the hours worked, and vice versa.

A corner solution of the model will occur when the individual has decided not to participate in the labor force. Economic theory explains this case through the definition of reservation wage, W^* as the measure an individual places on his/her non-market time. The reservation wage is the wage that would make a person indifferent between not working and working that first hour. The value of W^* is influenced by his/her tastes and preferences, the level of nonlabor income V , factors influencing the value of one's time at home such as the number of children, and marital status.

This theory has been successfully used to explain women's labor force participation. Let us consider Figure 2, the graphical depiction of the utility-maximizing labor supply decision of an individual that is the analytical expression of equation (7). The value of the market goods is measured on the y-axis. The number of discretionary

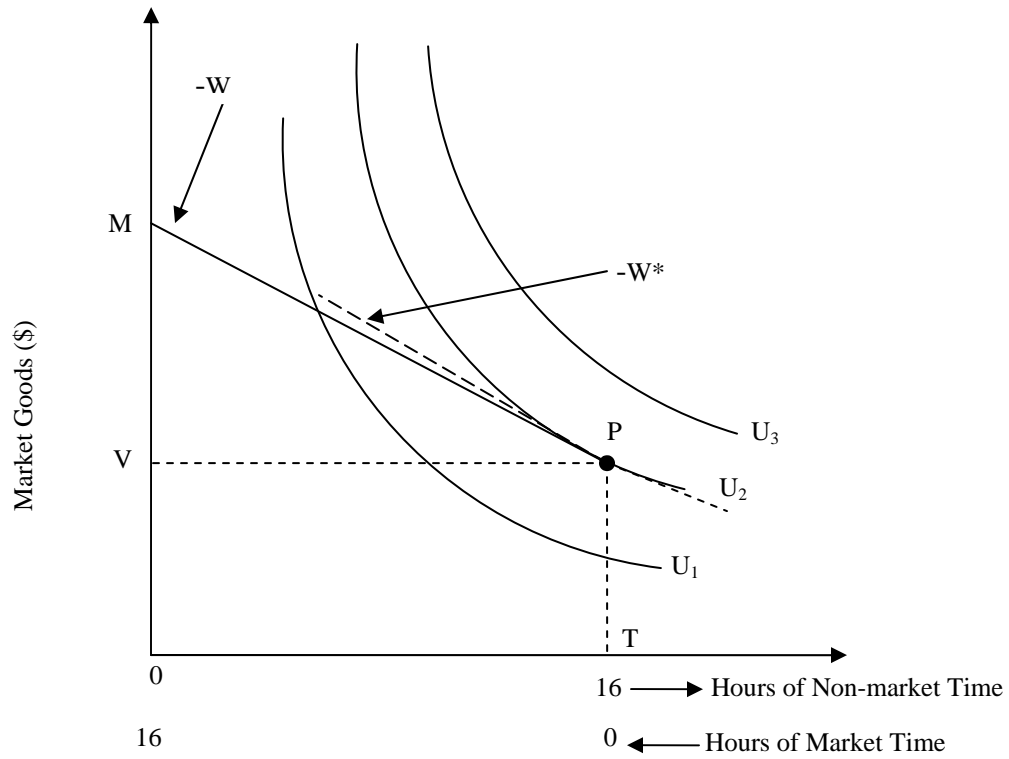
²⁰ See Thomas J. Kniesner (1976); Mary T. Coleman and John Pencavel (1993); Thomas Mroz (1987); Jeffrey Zabel (1993); and Alice and Masao Nakamura (1994).

hours in a day and leisure are measured on the x-axis from left to right and hours of market work are measured from right to left. Consider the set of indifference curves of a woman, U_1 , U_2 and U_3 . The higher the level of index U , the better off she perceives herself to be; the negative of the slope of the indifference curve is the ratio of the marginal rate of substitution between leisure and income (MU_L/MU_C). The budget constraint that she faces is TPM : the negative of its slope represents the market wage she faces (W). Her utility maximizing point will be the point where the marginal rate of substitution of the highest possible indifference curve equals her market wage (W). In this figure, her market wage is W and her nonlabor income is V . At point P in both panels (a) and (b) of the figure, the negative of the slope of the indifference curve at zero hours of market work represents the reservation rate (W^*). She will choose not to participate if the reservation wage is greater than or equal to the market wage --that is, if $W^* \geq W$, as in panel (a). She will be willing to participate in the labor force only if the wage rate that the market offers her is greater than the reservation wage --that is, $W > W^*$, as in panel (b). If so, she will maximize her utility at point Z where the budget constraint is tangent to the highest attainable indifference curve (U_2), thus achieving the graphical equivalent of equation (7) by spending 8 hours on market work and enjoying 8 hours of leisure time. Her total income will be $S = 8W + V$.

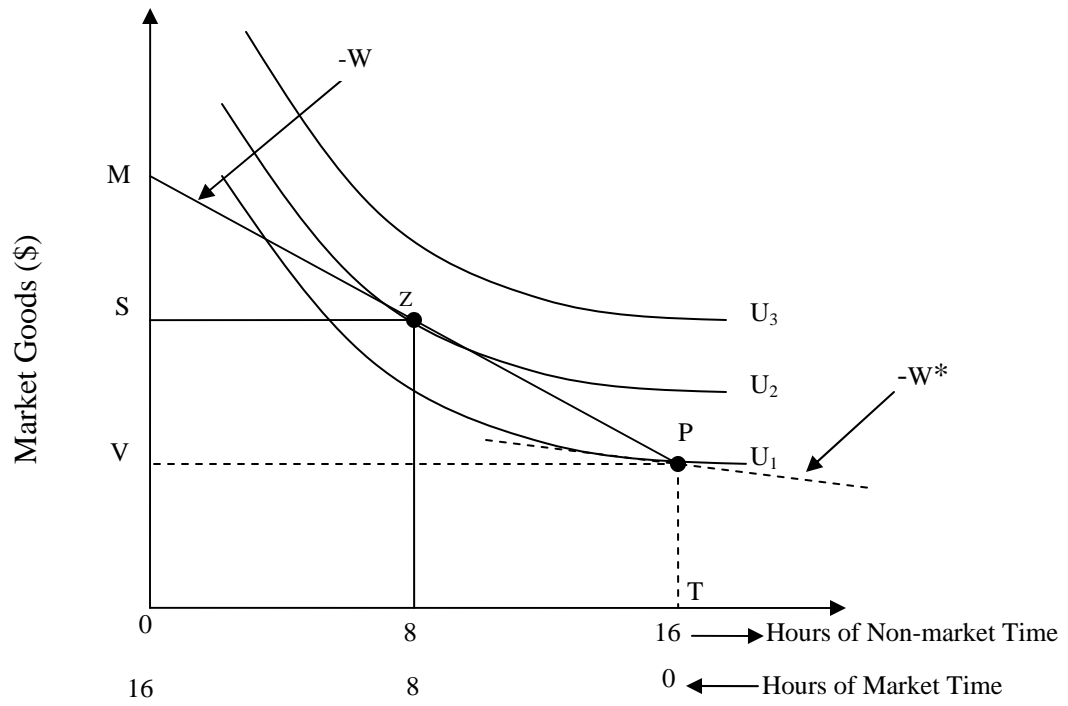
This analysis suggests that an increase in the value of market time (W) will produce an increase in the probability that the individual will choose to participate in the labor force. In other words, labor force participation is positively related to the wage or the value of market time. Conversely, factors that increase the value of non-market time (W^*) tend to lower the probability of labor force participation, *ceteris paribus*, i.e. labor

force participation is negatively related to the reservation wage or the value of non-market time.

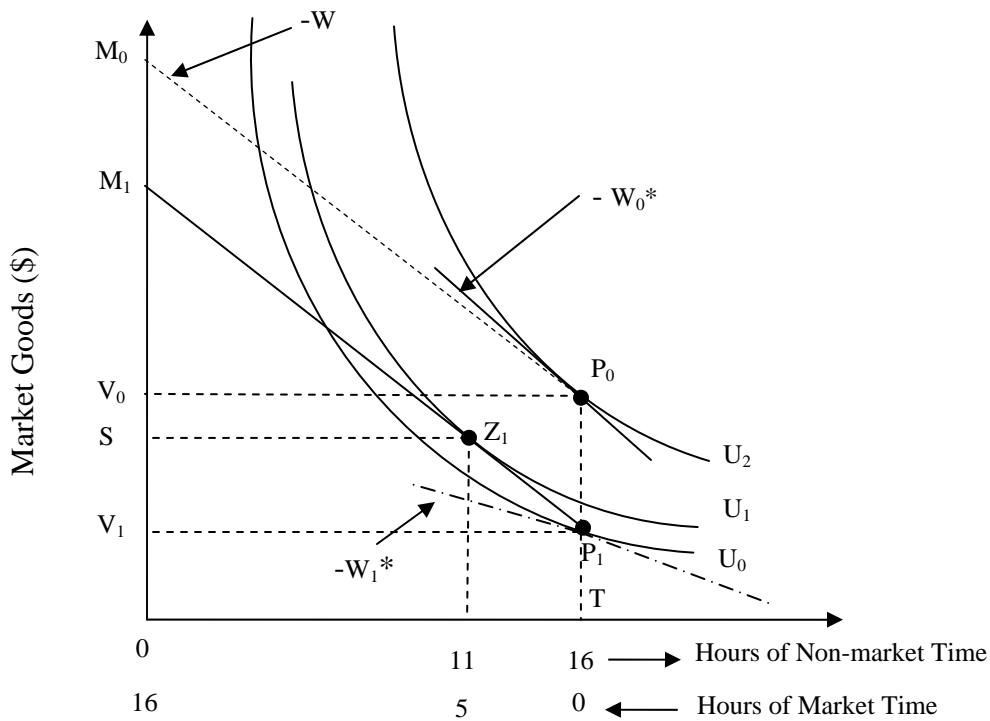
Figure 2 The Labor Force Participation Decision



Panel (a) Does not Participate in the Labor Market (Corner Solution).



Panel (b) Participates in the Labor Market (Interior Solution).



Panel (c) The Impact of Changes in Nonlabor Income V on Labor Force Participation.

The assumption that leisure is a normal good implies that the reservation wage W^* rises (falls) as nonlabor income V increases (decreases). For those individuals out of the labor force, a higher (lower) reservation wage makes it less (more) likely that a person will participate in the labor market. No ambiguity is present since the income effect operates alone. Figure 2 panel (c) depicts the effect of a decrease in nonlabor income from V_0 to V_1 on the woman's labor force participation, when the wage rate W is held constant. Initially her budget constraint is M_0P_0T . She maximizes her utility at point

P_0 since her reservation wage W_0^* is greater than the wage rate W , so she is out of the labor force, as in panel (a). Her income will be V_0 .

If her nonlabor income decreases from V_0 to V_1 , her budget constraint becomes M_1P_1T . She will now enter the labor force because at point P_1 , zero hours of work, her reservation wage W_1^* is less than the wage rate W . Thus, she will maximize her utility at point P_1 and provide 5 hours of work to the market. Her total income will be $S = 5W + V_1$. Note that she is now on indifference curve U_0 , with a lower level of utility than previously.

2.1.1 The Household Production Approach

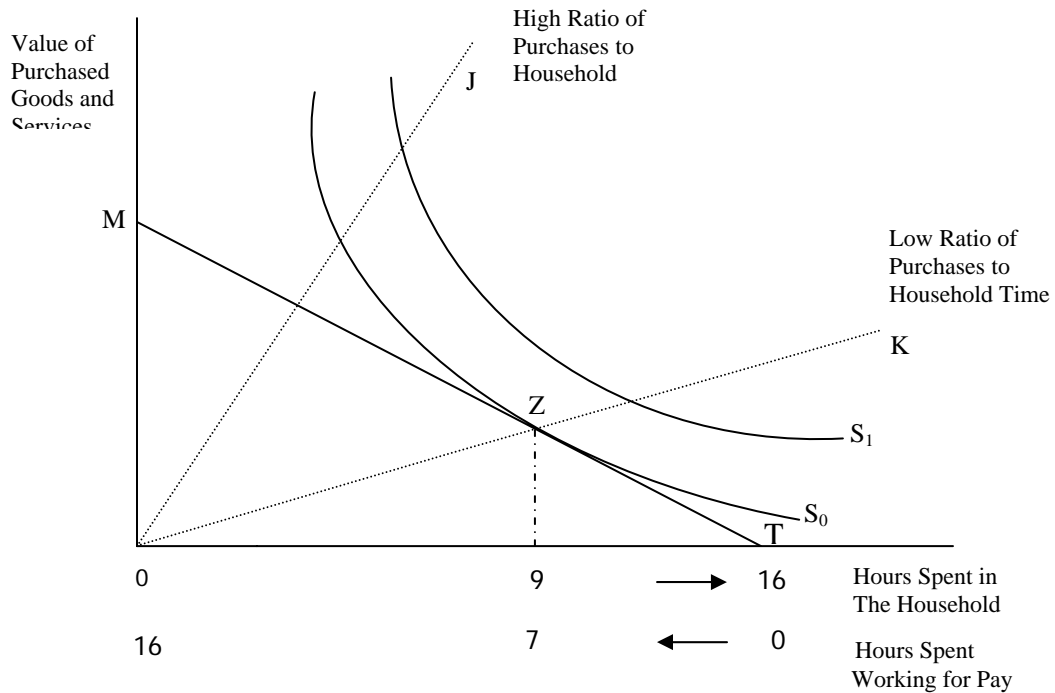
In the simplest model of labor supply, individuals decide how to allocate their time between labor and leisure. Household time was assumed to be leisure time. It was assumed that utility was generated by directly consuming leisure time and purchased goods. A more complex model describes time as being allocated between market work and household production.²¹ Time not spent working for pay is viewed not as something that is directly consumed but as an input to the production of household commodities. It is these commodities which are ultimately consumed and thus generate utility for household members.

Analysis using this model is shown graphically in Figure 3. It is assumed that a single mother is the only decision-maker of the household. She derives utility from the commodity “child-rearing.” Her objective is to maximize utility for herself and her

²¹ The pioneering model of household production is by Becker (1965). For a brief summary of the work in this area, see Reuben Gronau (1997).

children. She will be deciding at the same time how much to work for pay and how to take care of her children in a way that best satisfies her preferences.

Figure 3 The Production of Child Care



In the graph, the value of purchased goods and services is represented on the y-axis and discretionary time in one day is represented on the x-axis. Hours spent on household production are measured from left to right; hours spent working for pay are measured from right to left. Curves S_0 and S_1 , called utility isoquants, represent the different combinations of purchased goods and services and household time that generate the same utility. S_1 represents greater utility than S_0 . They have negative slopes because the inputs are substitutes in child-rearing. That is, if household time is reduced, child-rearing affording equal satisfaction can be produced by increasing the purchases of goods

or services outside the home. The convexity of the isoquants reflects the assumption that as household time devoted to child-rearing progressively falls, it becomes increasingly difficult to make up for it with purchased goods and services and still hold utility constant. Moreover, along any ray emanating from the origin such as J or K, the ratio of purchased goods and services to household time in the production of child-rearing is constant. Finally, to complete the model, the single mother is restricted by her budget constraint MT which reflects the combinations of purchases and household time that are possible for her. As in the basic model of labor supply, the slope of the budget constraint is her wage rate (W) which indicates the increased value of purchases made possible by an additional hour of paid work.

As in the neoclassical model of allocation of time, this individual maximizes her utility at point Z, where she works for pay 7 hours and devotes 9 hours to taking care of her children. Note that whether household time is conceived of as an input into the production of commodities or as leisure time, the resulting theory of labor supply is unchanged. First, let us consider the case where there is nonlabor income (V) holding the wage rate constant. Her budget constraint would shift to the northeast (and be parallel to the original one). The income effect would tend to reduce labor supply to the market. She would tend to purchase more, or higher-quality, goods and services, and she would spend more time at home.

If her wage rate (W) were to rise, there would be income and substitution effects. As above, the income effect tends to reduce market labor supply. The substitution effect, i.e. the fact that the higher wage increases the cost of spending an extra hour at home, serves to increase hours of market work. As in the neoclassical model, theory cannot tell

us whether, if wages increase, the income or the substitution effect will dominate. The result will depend on the shape of the utility isoquants.

2.1.2 The Tripartite Choice Model of Allocation of Time

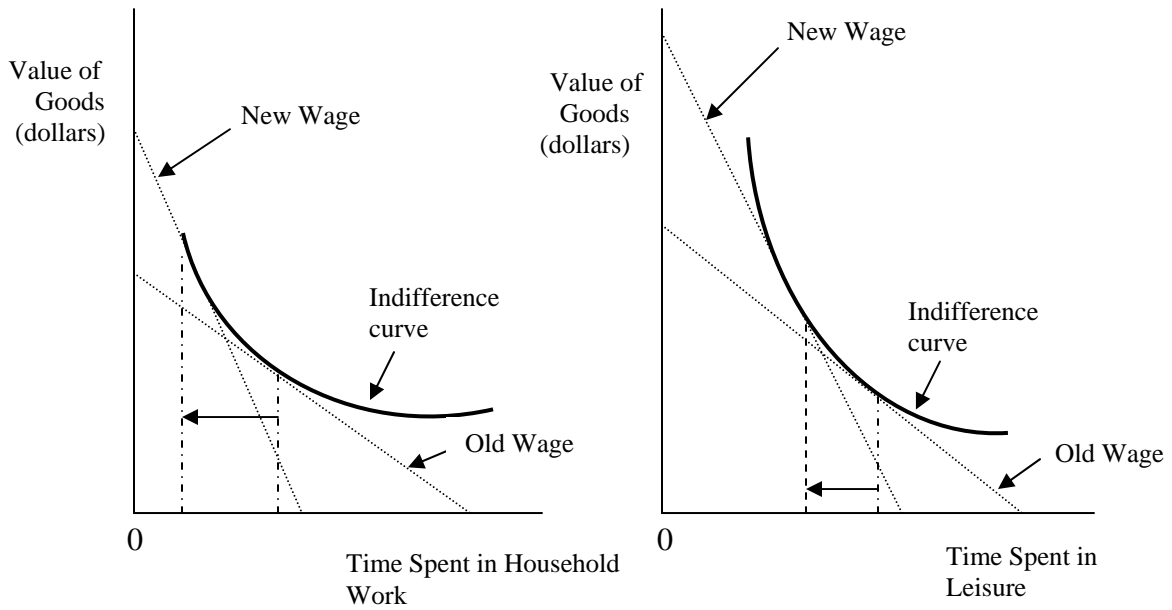
A more complex household production model assumes more than one decision maker in the household (husband, wife and any children old enough to work). The three-way allocation of time model of labor supply considers choices among actual leisure time, time spent on household production, and market work. Hence there are two substitution effects when the market wage increases: one between market and household work and the other between market work and leisure time. It is argued that the magnitudes of these two effects are different and that the weight of the former in one's overall response to a wage change is related to one's role in household production. Regarding substitution between market and household work, purchasing more goods or services can easily compensate for fewer hours of household work. For example, reduced time devoted to such household chores as cooking, cleaning, and childcare can be easily replaced through the purchase of a microwave, prepared food, an electric dishwasher, or the services of a babysitter. On the other hand, the substitution between market work and leisure is more difficult since leisure activities consume time and the possibilities for economizing on time are thus limited.²² However, those with higher wages are more likely to engage in leisure activities that require expensive market-purchased inputs such as skiing or playing golf. Those with lower wages are more likely to engage in more

²² One definition of the difference between household production time and leisure time is that one could pay someone else to perform household production tasks, but not to pursue leisure activities. However, with respect to the leisure activity of travel, for example, a person with a higher market wage might fly to a vacation destination rather than driving, thus saving some time but spending more money.

time-intensive, less goods-intensive leisure activities such as hiking or working crossword puzzles.

One can illustrate the difference in magnitudes of both substitution effects using two-dimensional graphs such as shown in Figure 4 panels (a) and (b). On the y-axis we represent the value of goods (dollars); and, on the x-axis are time spent in household work and time spent in leisure in panel (a) and (b) respectively.

Figure 4 Large vs. Small Substitution Effect When the Wage Rate Increases



(a) A Relatively Large Substitution Effect between Market and Household Work

(b) A Relatively Small Substitution Effect between Market Work and Leisure

To isolate the substitution effect associated with a higher market wage, the new budget constraint with a steeper slope is kept tangent to the same indifference curve. Panel (a) shows the tradeoff between the market goods and household work time that keep utility constant, while panel (b) shows the goods-leisure tradeoff. The gradual curve in the indifference curve in panel (a) implies that a reduction in hours of household work can easily be compensated for by purchasing more goods. Conversely, panel (b) shows that the sharper curve in the goods-leisure indifference curve reflects the greater difficulty of substituting goods for leisure time without loss of utility or satisfaction.

2.2 The Human Capital Investment

2.2.1 The Human Capital Investment Model

Modeling the labor supply decisions requires not only decision factors such as the current wages, preferences regarding household production and/or leisure, but also a framework that incorporates labor market investment behavior into a lifetime perspective. Many labor supply decisions require a substantial investment on the part of the worker. An individual invests resources in himself today in order to increase his or her future productivity and earnings. Economists refer to this behavior as investment in human capital. The most important kind of investment in human capital is education and training. The knowledge and skills a worker has, gained from education and training, including the learning that experience yields, generate a certain stock of productive

capital. The value of this productive capital depends on how much one with these skills can earn in the labor market.²³

As in any study of investment decisions, to determine whether it is worthwhile, one must compare expenditures and receipts incurred at different periods. The investor must be able to calculate the returns to the investment by comparing the current costs²⁴ with the future returns or benefits. In the case of educational and training investment by workers, the expected returns are in the form of higher future earnings, increased job satisfaction over one's lifetime, and a greater appreciation of non-market activities and interests. Benefits that are received in the future are worth less to us now than an equal amount of benefits received today.²⁵

The basic model of human capital investment assumes that people are utility maximizers and take a lifetime perspective when making choices about education and training. The widely used concept of present value allows us to calculate the value of amounts received in different time periods.

$$\text{Present Value} = \frac{B_1}{(1+r)} + \frac{B_2}{(1+r)^2} + \frac{B_3}{(1+r)^3} + \dots + \frac{B_T}{(1+r)^T} \quad (8)$$

where B_t is a stream of yearly benefits (B_1, B_2, \dots) over time periods (1 to T), and r is the discount rate. Since r is positive, benefits into the future will be increasingly discounted. In making decisions, workers compare the present value of future benefits with the costs.

²³ Investment in job search and migration also increases the value of one's human capital (Ronald G. Ehrenberg and Robert S. Smith, 200, p. 290). However, these last two human capital investments are beyond the scope of this project.

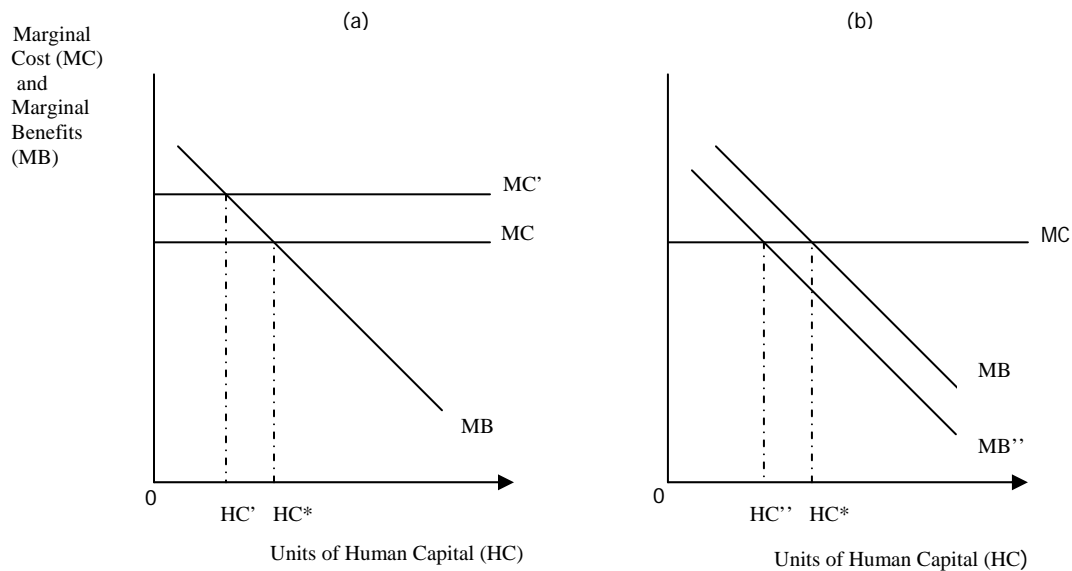
²⁴ The cost of an additional year of schooling includes such costs as tuition, supplies, and forgone earnings, as well as psychic costs.

²⁵ If people plan to consume their benefits, they prefer to consume them earlier; if people plan to invest the monetary benefits rather than use them for consumption, they can earn interest on the investment and increase their funds in the future.

For example, individuals deciding about an additional year of schooling are assumed to compare the near-term investment costs (C) with the present value of expected future benefits. So, investment in additional schooling is attractive if the present value of future benefits exceeds costs.

Figure 5 yields some interesting insights about the behavior and earnings of workers. The human capital decision can be illustrated comparing marginal costs (MC) and marginal benefits (MB).

Figure 5 The Optimal Acquisition of Human Capital

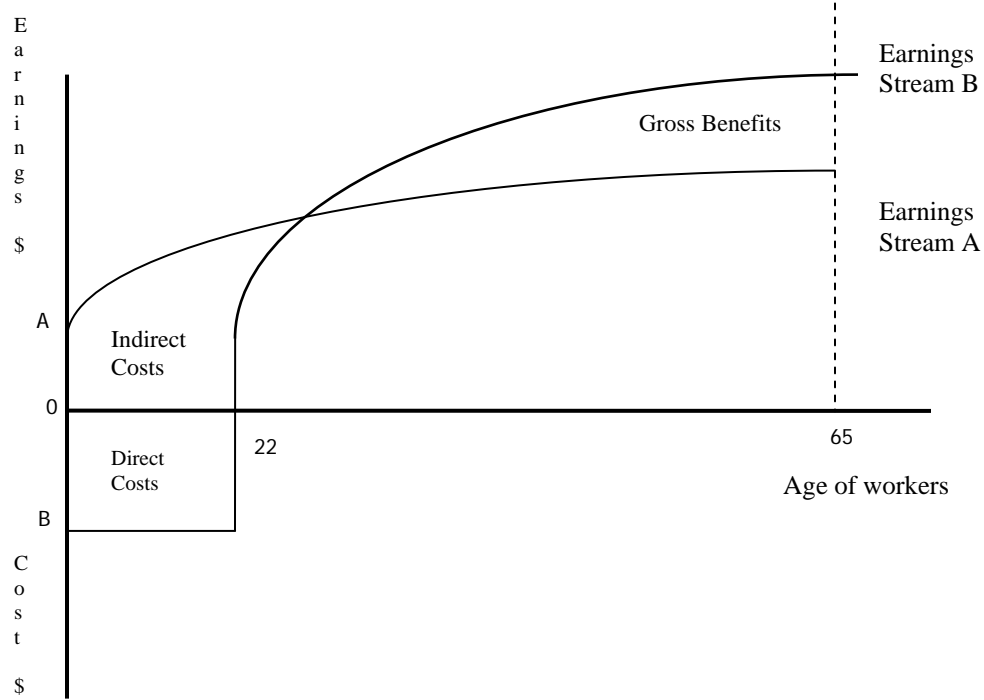


The marginal costs, MC , of each additional unit of human capital are assumed to be constant. The present value of the marginal benefits, MB , is shown as declining, because each added year of schooling means fewer years over which benefits can be recouped. The utility-maximizing amount of human capital (HC^*) for any individual is shown as that amount for which $MC = MB$. Panel (a) of Figure 5 shows a worker who

finds learning to be especially demanding, to which he attaches a higher marginal cost, MC' . Accordingly, he will acquire a lower level of human capital, HC' . Panel (b), depicts the case of those who expect lower benefits (MB'') in the future from additional investment in human capital, who will acquire less human capital, HC'' .

Many insights from this simple theory can be discovered by analyzing the decision a young adult faces about whether to invest full-time in education or a training program after leaving high school. Figure 6 illustrates, for example, a person considering college. She or he faces a choice between two streams of earnings over her or his lifetime. Stream A , shows the earnings stream of a high school graduate. This stream begins immediately but does not increase very much over time. Stream B , that of a college graduate, has negative income for the first four years, followed by a period when the wage may be less than the high school graduate makes, but then it takes off and rises above stream A .

Figure 6 Alternative Earnings Streams



Clearly, the earnings of the college graduate would have to rise above those of the high school graduate to induce someone to invest in a college education. The gross benefits, i.e. the difference in earnings between the two streams, must total much more than the costs because such returns are in the future and are therefore discounted. This graph relates to equation (8) in that $T=43$ ($65-22$) and in each year B_i represents the difference between the earnings of a college graduate and a high-school graduate.

2.2.2 Women's Supply of Labor

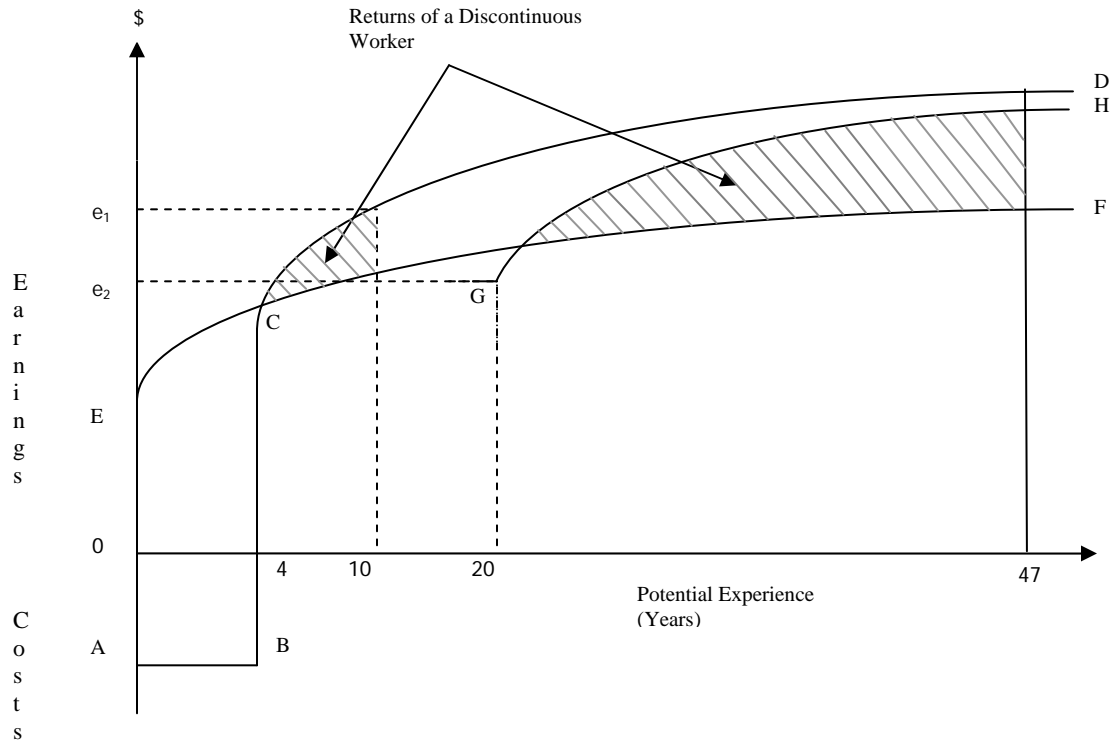
Human capital theory suggests several reasons why women might decide to acquire smaller amounts of formal education than men. Many scholars have emphasized the traditional roles of women within the family of which childbearing is one of the most important. Women know that bearing children might force them to leave the labor market

for a while. Again, the present value equation (8) gives us the insight of the potential behavior of women. If a woman is planning to interrupt her participation in the labor market, her investment in additional education might no longer be profitable since her time out of the labor market results in a reduction in benefits since T would be smaller. Moreover, a woman may decide against investment in the types of human capital that require sustained, high-level commitment to the labor force because the investment depreciates rapidly during periods of work interruptions.²⁶

²⁶ Moreover, the human capital model helps explain gender differences in fields of specializations. For instance, women would prefer to work as teachers of history or languages which have a slower pace of change, and avoid working in those fields in which technological change is fast, such as engineering.

Figure 7 illustrates the impact of these factors on the investment in formal education by women. The total time elapsed since completing high school is represented on the x-axis.

Figure 7 The Impact of Work Interruptions on the Education Investment Decision of Women

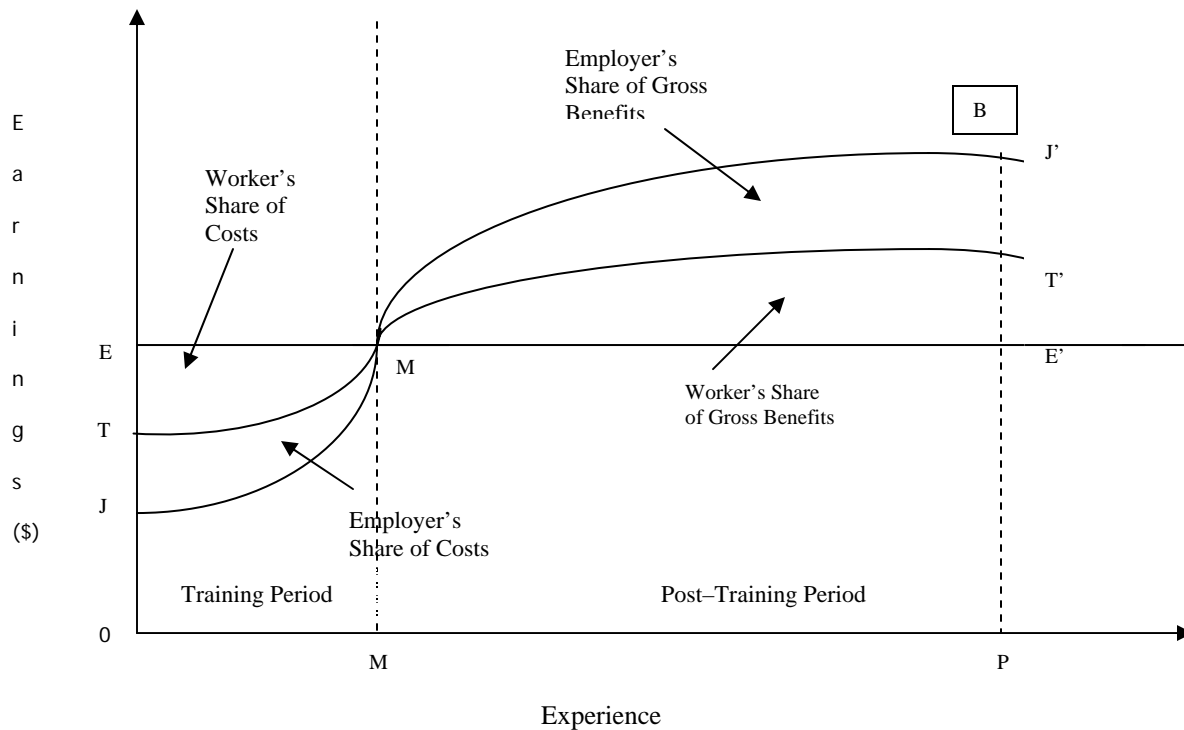


The graph depicts the case of a woman who plans to be in the labor force for a period of 6 years after college and then to drop out for 10 years, say, for childrearing. Assuming that she will retire at age 65, her expected work life is 33 years instead of 43 years. EF represents her earnings profile if she had decided not to go to college. If we assume that her skills depreciate during the time spent out of the labor force, upon her return to the labor force, her earnings (e_2) will be less in real terms than she was making when she left (e_1). Consequently, after her return to the labor force she will be facing

profile GH rather than profile CD.²⁷ The time out of the labor force has cost her a reduction of earnings over the remainder of her working life. In this example, the benefits of the investment in college education, the sum of the two shaded areas, may not be large enough to make it worthwhile. Thus, a woman with an adherence to the traditional roles in the family is less likely to pursue college and graduate study. Anticipating time out of the labor force, she is likely to reduce her amount of educational investment.

Other kinds of human capital investments are those made after one has started to work, in training received at the workplace. All forms of training, whether formal training programs, informal training under the supervision of a more experienced worker, or general training, are costly. If the training is specific to one firm or employer, workers and the firm share the cost.

Figure 8 Sharing of Costs and Benefits in Firm-Specific On-The-Job Training



²⁷ However, the figure shows that GH approaches CD over time, as she retools or becomes less rusty.

Consider an individual's decision to invest in firm-specific training. Profile JJ' represents his productivity if he engages in the training. EE' is the earnings profile available to him at another firm with no training. Since firm-specific training is not transferable, there are incentives for the worker and employer to share the costs. On the the individual's side, he is not willing to bear all the training costs because if were to lose his job, all his investment would vanish. By the same token, the employer is unwilling to bear all the costs of firm-specific training because if the individual were to quit, the firm would lose its investment. Moreover, if the employer were to bear all the cost and received all the benefits, the individual's earning profile would be EE'. In this case, he would have an incentive to quit his job when a shift in demand resulted in higher wages or even better working conditions elsewhere.

The solution for both employer and the individual (employee) is to share the cost of, and returns to, firm-specific training. TT' would be the employee's earning profile in that case. He would be paid a wage greater than his marginal product during the training period (from 0 to M) since his productivity is low; the employer accepts the lower current productivity in exchange for higher output later. But after training (from M to P') the employee's wage is below his post-training marginal product. Workers accept the lower wages for the same reason that one decides to obtain formal schooling: in the expectation of improving the present value of their lifetime earnings (Becker, 1985). In general, for workers and employers, the increases in productivity yield higher earnings and profits, which will be greater the longer the worker stays with the firm.

In the case of general on-the-job training, in which employees acquire skills usable elsewhere, the workers alone will pay the training costs. In this case the magnitude of cost versus future benefits is the individual's principal concern (Blau et al., 2002).

Figure 9 Investment in General On-The-Job Training Over the Life Cycle

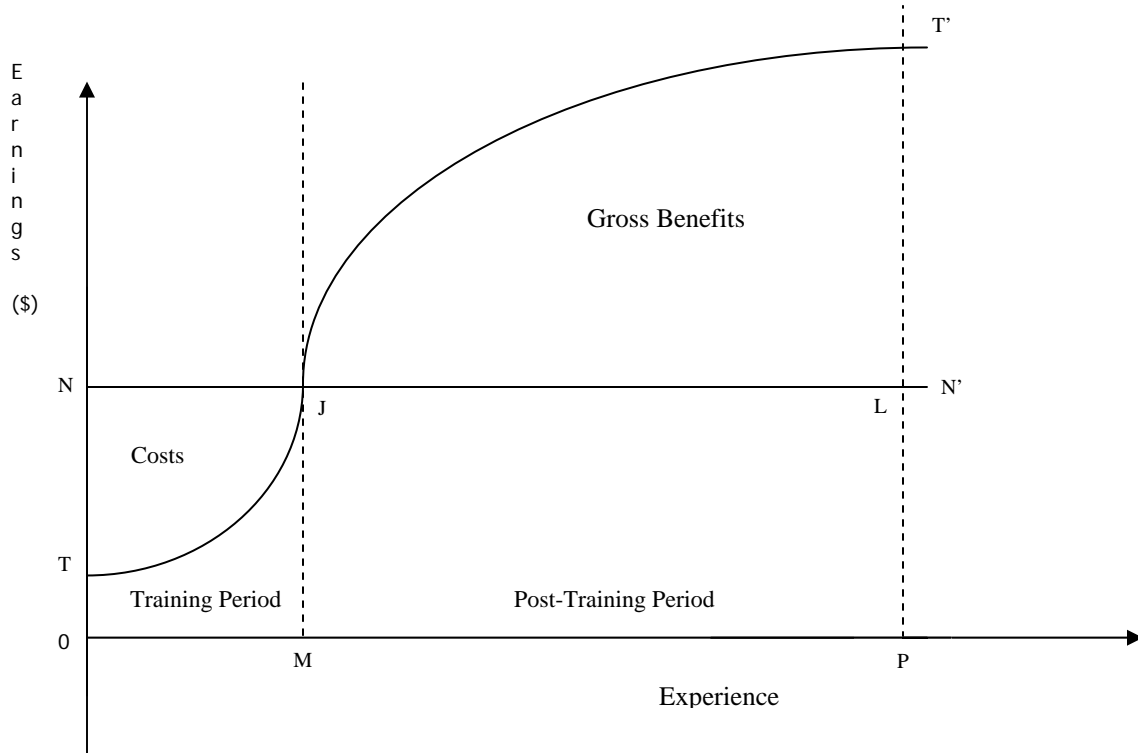


Figure 9 graphically depicts the life-cycle implications of human capital theory as it applies to general on-the-job training. Let us consider a woman's investment decision. She will compare the experience-earnings profile she can expect if she takes a job with no training (NN') to the profile she can expect if she receives general training (TT'). In this case, there are costs²⁸ and the firm will bear the decline in output for the period of training only if she accepts lower wages at that time, a wage below what she could obtain elsewhere. This lower wage corresponds to her productivity to the firm during the

²⁸ Direct costs would be the expenses for instructors or for the material used in the training. Indirect costs result when her coworkers or the supervisor transfer their attention from daily production to training activities.

training period. The area TNJ represents the costs of the general training during the period OM. As she becomes more skilled, her earnings increase along with her productivity. After the training period, they surpass what she could have earned without training. Assuming a total OP years of labor market experience over her work life, her gross benefits will be the area JT'L. As in the case of formal schooling, she is likely to undertake the investment if the present value of the gross benefits exceed the costs.

Thus, the human capital model tells us that not only formal education but also on-the-job training leads to increases in productivity (Walter Oi, 1962). People who have the ability to learn quickly (usually those who are better-educated) are those most likely to seek out, and be presented with, training opportunities. They tend to quickly select the ultimately highest-paying jobs where much learning is required and thus use their abilities to the greatest advantage. Consequently, they are most likely to enjoy greater monetary returns on their human capital investments during work lives.

According to the human capital model, women who follow traditional gender roles such as child-rearing and home production activities will tend to acquire less valuable on-the-job training because of their weaker attachment to the labor market (Becker, 1985). Two important implications from the analysis of the firm-specific training will help us to understand why women earn less than men over the work life, and, why women are less attached to the labor market. First, as discussed above, a relatively permanent attachment is likely to develop between the firm and the specifically trained worker. Such workers are less likely either to quit or to be laid off their jobs than untrained or generally trained workers. Second, because employers pay part of the costs of firm-specific training, they will be concerned about the expected employment stability

of workers hired into jobs where such training is important. So women expecting to interrupt their work lives are less likely to be offered or to seek out opportunities to engage in on-the-job training. Accordingly, they will be less likely to be attached to the labor market and to enjoy higher earnings since they have less to lose by dropping out. Conversely, as more women are employed in jobs with training opportunities, the opportunity cost of work-force interruptions is increased and their labor force attachment is further reinforced.²⁹

As Figures 8 and 9 suggest, earnings will increase with experience for workers who have invested in training because a worker's productivity is augmented by such training. Finally, the human capital model predicts that recent increases in the labor force participation of women, especially of married women of childbearing age, will cause dramatic changes in the acquisition of schooling and training by women since the expected return on their investments will be greater.

²⁹ This situation has been observed during recent decades (Blau et al., 2000).

Chapter Three

Literature Review

An analysis of trends in labor economics throughout the world reveals that sustained increase in women's participation in the labor force during the last century, particularly during its second half. This fact has stimulated considerable interest in the economic analysis of a woman's decision to work. The pioneering studies of Jacob Mincer (1962) and Glen G. Cain (1966) in the United States have served as a theoretical and empirical foundation for numerous studies of female labor force participation.

This chapter provides a brief review of the empirical evidence about female labor force participation in the United States, in some other developed countries, and in developing countries of Latin America, with special emphasis on Venezuela.

3.1 Women's Labor Force Participation in the United States

Women's labor force participation in the United States showed a tremendous upward trend during the last century. In 1900, only 20 percent of all women worked for pay. Less than 6 percent of all married women older than 15 were employed.³⁰ By 1930, the figure had risen to 26 percent for all women, but before 1940 the labor force participation rate of married women was still only 14 percent (Dora L. Costa, 2000). In 1945, after the social and economic disruptions caused by two world wars and the Great

³⁰ Those who did work came from predominately working-class families (Costa, 2000).

Depression, only 30 percent of all women were in the labor force. Abundant empirical literature documents the rapid increase in the labor force participation rate of married women after World War II. By the century's end, the labor force participation of all women older than 16 years old had risen to 60 percent, and among married women, to 62 percent. During the 1990s another shift occurred in the composition of the female labor force: this time the group of single mothers with young children increased substantially while that of married women slowed down (Blau et al., 2002).

Given the enormous social and political significance of this increase in the percentage of women working for pay,³¹ especially among married women, many scholars from various disciplines began to investigate the reasons for such behavior. In the remainder of this section the most prominent empirical studies regarding women's labor force participation in the United States, particularly after World War II, are reviewed.³²

Back in 1962, Mincer analyzed the variation in labor force participation of married women in 57 large northern standard metropolitan statistical areas (SMSAs) in 1950. His original study used a single equation model of lifetime female labor supply. His model assumes that women choose levels of market time on the basis of "permanent" wage rates and income.³³ He points out three factors that influence the timing of female

³¹ During the twentieth century, the rising labor force participation of women increased the aggregate labor force participation rate of 25 to 44 year-olds by 50 percent (Claudia Goldin, 1989).

³² The earliest studies, those in the 1950s to the mid-1970s, and historical studies, used only aggregate data or macro data. However, the empirical analyses since the mid-1970s have used micro data. Many econometric developments of the 1970s were stimulated by the new availability of data from household surveys, both cross-section and panel, which contained information on relatively large numbers of individuals (Robert Moffitt, 1999).

³³ He introduces the notion of differential labor supply responses to permanent and transitory wages rate and incomes, and uses this notion to reconcile, in part, the discrepancy between time series and cross section estimates of female labor supply functions.

labor force participation: lifetime variation in opportunity cost due to the presence of children, unemployment of the spouse, and general business cycle fluctuations.³⁴ Mincer hypothesizes that an increase in family income, *ceteris paribus*, has a positive effect on leisure time, but may also indirectly affect the allocation of work time between home and market.³⁵ His results support his *a priori* expectations: wives' wages have a strong positive effect on labor force participation while the husbands' incomes have a negative but weaker effect.³⁶ He also reports that high unemployment tends to discourage labor force participation. From the 1919-29 decade to the 1949-59 decade, Mincer concluded that changes in family income and in the wife's wage account for at least 70 percent of the increase in labor force participation of married women.³⁷

Following Mincer's lead, researchers began to further identify important characteristics associated with married women's labor supply. Several studies applied his conceptual framework to cross-section data. The most comprehensive statistical economic study was conducted by William G. Bowen and T. Aldrich Finegan (1969), which consisted mainly of cross-section regressions to estimate models of the supply of

³⁴ He develops the conceptual framework that the market wage influences not only the allocation of time between market work and leisure, but also between work in the market and work in the home.

³⁵ The relative income elasticities of home-produced vs. market-produced goods would determine the strength of this effect.

³⁶ June A. O'Neill (1981), using aggregate time-series data and linear equations, finds results that support Mincer's basic model: the positive effect of the women's wage rates and the negative effect of family income on women's allocation of time to the market.

³⁷ Glen G. Cain and Martin D. Dooley (1976) attempted to improve the specification of the model by using a three-equation system in which wives' labor force participation, fertility, and wages are jointly determined, a formulation based on the presumption that these variables are endogenous. The Cain-Dooley results for 1970 do not differ substantially from those of Mincer with respect to the labor supply function. The wage and income coefficients are mostly significant, and the point estimates of elasticities are large--around +2 and -1 for wages and husband's income, respectively. Thus the results support the prevailing economic hypothesis that the wage effect on labor supply will be positive and that the income effect will be negative.

married women in each of three decennial Census years: 1940, 1950, and 1960. They use ordinary least squares regression techniques on data from 100 Standard Metropolitan Statistical Areas (SMSAs). Their model explains the labor force participation of married women in an area in terms of four variables representing its labor market characteristics: the unemployment rate, the wife's expected market wage rate, the relative supply of adult females, and the relative demand for female labor based on the industrial structure of that area. They also include some variables to control for differences in the socio-economic characteristics of households in the areas: median level of husband's income, proportion of black wives, proportion of families with young children, median educational level of adult females, and mean level of family nonlabor income. They find that wives are becoming less sensitive to all four of the labor market variables. The reason is that, as the labor force of married women grew over the years, the proportion of older, more experienced, work-oriented wives became larger. These wives exhibit less sensitivity to the market wage level and to the rough measures of competition for available jobs.³⁸

Many important aspects of household behavior involve choices among discrete alternatives. Recognition of this fact in the 1970s led to the development of statistical models appropriate to the analysis of such "quantal response" problems in cross-section

³⁸ Weaker results are found in Judith M. Fields (1976) who makes a comparison of intercity differences in the labor force participation rates of married women in 1970 with those of 1940, 1950, and 1960. She reports that during the ten-year period from 1960 to 1970, the married female labor force continued to grow, from 30.5 percent to 40.8 percent of the total civilian labor force, contributing nearly half of the total increase in the labor force during the decade. Her empirical work compares the earlier Census regressions for SMSAs reported by Bowen and Finegan (1969) with a similar model, applied to 1970 data. She finds that the overall pattern of results indicates that by 1970 the model has lost much of its explanatory power. The nine independent variables together explain only from 37 to 58 percent of the variation in wives' labor force participation rates among SMSAs. This result could reflect a real change over time in the labor supply function, if, as Fields suggests, women were significantly changing their work role orientation. Alternatively, it could reflect a change in the correlation matrix of the independent variables or other underlying statistical problems.

data.³⁹ Yoram Ben-Porath (1973) proposes a model in which, aside from transitory factors such as children and income variation, the timing of participation over the life cycle is random. Assuming that all consumers work at some time during their life cycle, regressions of participation on mean values of wages and income yield coefficients that may be interpreted as estimates of Hicks-Slutsky substitution and income effects (Nicholson, 1992, pp. 136-7).

A recurring discordance between estimates of substitution effects of wage rates on labor supply obtained from cross-section analysis of data and annual hours of work data stimulated the important research by H. Gregg Lewis (1968) who, with Ben-Porath (1973), demonstrated that the labor force participation decision at any age is a discrete decision and that estimates of labor force participation equations produce parameters that are conceptually distinct from estimated parameters of hours of work functions. Both papers ignore the focus on the life cycle that is implicit in Mincer's work. In the Lewis-Ben-Porath model, participation and hours of work at any age are generated from a concave utility function defined for that age. By changing the nature of the preference function from that implicitly utilized by Mincer, they demonstrate that participation and hours of work equations are not as closely related as they would be if Mincer's assumption of perfect substitutability between leisure at different ages were accepted. Ben-Porath and Lewis implicitly ignore all components of intertemporal substitution. The Ben-Porath-Lewis papers were a stimulus to later work by James J. Heckman (1974) who formulates a model of annual labor force participation, annual hours of work, and wage rates that explicitly models the interrelationship between hours of work and labor force

³⁹ For a survey of developments in this field, see Daniel McFadden (1976)

participation. The probability that a woman works is estimated from a common set of parameters. His statistical procedure extends the Tobit procedure⁴⁰ to a simultaneous equations system. His methodology differs from the Tobit model in that it allows different parameters to affect the probability that a woman works than the ones influencing her hours of work. The method allows him to utilize an entire sample of women, whether or not they work, to estimate the functions determining their wage rates, probabilities of working, and hours of work. These parameters allow an estimation of the value of time for non-working women, and the wage rates they would face in the market.

James Heckman and Robert J. Willis (1977), stimulated by Ben-Porath's (1973) work, apply a sophisticated methodology for the treatment of panel data to the labor force participation of married women. Assuming that response probabilities are governed by a beta distribution, they derive a generalization of the cross-section logit model to enable it to deal with sequences of discrete events in panel data. Using a beta-logistic model,⁴¹ they find that the distribution of labor force participation probabilities is U-shaped, indicating that most women have probabilities near zero or near one. Another way of expressing this phenomenon is "persistence," that women who participate at one age are more likely to participate at future ages, as is found in Kim B. Clark and Lawrence H. Summers (1982).

Late in the 1970s, James J. Heckman (1978), after reviewing the results of the latest research on the life cycle labor supply of married women, presented the first of a class of dynamic models of labor supply. His work attempts to merge two interpretations

⁴⁰ William H. Greene, 2003, p. 764.

⁴¹ They call their model a beta-logistic model since under a plausible parameterization of this distribution, they derive a likelihood function of the conventional logit model in the case of cross-sectional data.

of the coefficients of wage rates and unearned income derived from labor force participation regressions. The first interpretation, which stems from Mincer's (1962) pioneering study and subsequent studies of Cain (1966), Marvin Kosters (1969), and Orley Ashenfelter and himself (1974), relates to a life cycle model of labor supply and interprets the estimated wage and income coefficients as estimates of substitution and income effects. However, the same interpretation is given to the coefficients obtained from hours of work regressions. The second approach considers the labor force participation decision at a point in time as a discrete decision. In this sense, wage and income coefficients estimated in participation equations are conceptually distinct from those estimated in hours of work functions.⁴² This view ignores the fact that most consumers have ample opportunity to substitute time and goods over the life cycle, and to invest in human capital.⁴³ Heckman claims that, in general, one cannot use the cross-section mean to estimate the probability of any sequence of labor force participation decisions over the life cycle if there is any unobserved heterogeneity in the population. Finally, the author presents a dynamic model of labor force participation that attempts to merge these two traditions. His model can be used to interpret the interrelationship among the various dimensions of labor supply analyzed in the literature and can also shed some light on certain empirical findings that rigorously analyze one-period models of labor supply.

James J. Heckman and Thomas E. MaCurdy's (1980) study is an extension of the Heckman (1974) analysis to a life cycle model of married women. The work described in

⁴² Labor force participation regressions describe "corner phenomena" and do not estimate "interior solution" Hicks-Slutsky income and substitution effects, although they estimate parameters of the utility function of consumers (Heckman, 1978).

⁴³ Following this tradition are Ben-Porath (1973) and H. Gregg Lewis (1977).

this paper also extends the dynamic analyses of labor force participation by Heckman and Willis (1977) and Heckman (1978) to a structural dynamic model that accommodates both hours of work and labor force participation decisions in a unified framework. The model is a simple computed fixed-effect Tobit model suitable for analysis of panel data which they estimate on eight years of panel data drawn from the Michigan Panel Survey of Income Dynamics. Their empirical work refutes the implicit assumption maintained in previous work that non-market time at one age is a perfect substitute for non-market time at any other age. The paper considers the meaning and measurement of labor supply responses to “permanent” and “transitory” income and wage rates in a model of decision making under perfect certainty without credit constraints. They find empirical evidence consistent with the permanent income hypothesis but no evidence of a labor supply response to “transitory” income variation among married women. Their empirical results agree with the prediction of the theory: labor supply is inversely related to lifetime wealth measures; children affect lifetime labor supply decisions; and future values of variables determine current labor supply decisions.

Claudia Goldin (1983a) studied married women’s labor force participation from the perspective of their economic roles. She writes that, although change in the labor force participation rates of married women did accelerate after World War II, many of the preconditions for this expansion had been set decades before. The education, household roles, the occupations of single women, and the fertility behavior of married women had a lasting impact on their later response to economic factors. She uses a life-cycle approach to understanding change in the economic role of married women. She produces a matrix of cross-section and time-series labor force participation rates by marital status,

age, race, and national origin from 1890 to 1980 and covers cohorts born from 1816-1825 to 1946-1955. Her empirical results indicate that long-term changes in the economic role of white married women have been the result of three sets of factors: cohort-specific effects, primarily education and fertility; point-in-time factors, wages assumed to be exogenous and the unemployment rate; and a time trend, which probably proxies long-run changes in the structure of the economy such as the growth of the service sector. Goldin (1991) again studies married women's labor force participation during the 1940s and 1950s, focusing this time on the role of World War II in the rise of women's employment. She uses two retrospective surveys conducted in 1944 and in 1951, from a study directed by Gladys L. Palmer (1954) with the assistance of the U.S. Bureau of the Census. She finds that the 1940s were the turning point in married women's labor force participation, and more importantly, more than 50 percent of the women working in 1950 had been working in the 1940s. She argues that various social constraints may have inhibited the work activities of married women prior to 1940. If the impediments to economic change were partly ideological, then a major break with the past, such as that affected by war, could have redefined economic roles. She concludes that the war had far less direct influence on female labor supply than was believed.

Robert T. Michael (1985) discusses three independent inquiries into the consequences of the rise of women's labor force participation during the period 1950-1980. He uses cross-sectional differentials in female labor force participation by characteristics including age, educational attainment, marital status, and (among married women) the proportion with younger children. He finds that the changes in women's labor force participation over the three decades were not uniform in terms of age, marital

status, or educational composition. The new employees in the 1950s were predominantly older, married, and relatively less educated, while in the 1970s they were younger, less likely to be married, and far better educated. However, although the compositional shift in the population by age, marital status, and the presence of young children seem to have had almost no influence on overall female labor force participation, the increase in educational attainment has contributed about one-quarter of the rise in labor force participation. Finally, the differences in labor force participation among groups as defined by age, marital status, presence of young children, and education are far less pronounced in 1980 than they were in 1950.

James P. Smith and Michael P. Ward (1985) investigate the reasons for the growth in the female labor force in America during the twentieth century. They share the opinion of Goldin (1983.b) that the remarkable transformation of American women at work cannot simply be viewed as a result of changes in attitudes or in labor markets that have been taking place exclusively since World War II. On the contrary, they find that the rise in market participation by married women occurred throughout the century and not simply after World War II. The temporal correspondence between the rapid rise in labor force participation and in their education, does suggest that American schools were important in transforming the role of American women at work. They found that the period of rapidly increasing relative female wages predates this increase in women's education, so other events were clearly stirring within the labor market. They argue that the clerical sector opened up a whole new set of jobs that presumably lessened the conflict between work and marriage. Regarding the effects of World War II on women's

labor force participation, the authors allow that its role has been controversial.⁴⁴ They claim that only marital status matters: being married acts as depressant on labor market activity. They conclude that the longer-term growth in the female labor force reflects something far more fundamental than the demographic composition of the population.

Their study also provides evidence of women's labor behavior after World War II using formal statistical models for the period 1950-81, when improved time-series data were available. They disaggregated time-series data across the period. Over this 31-year time span their observations consist of mean values of labor supply variables at each year of age (annual hours worked by women, annual hours worked by working women and weekly labor force participation rates), education, potential work experience, weekly wages, and fertility rates.⁴⁵ The data are arranged in the form of a set of life-cycle histories for individual birth cohorts. They found that although the work effort of the typical woman has risen a great deal since 1950, the amount of labor supplied by a randomly selected working woman has scarcely changed. The discrepancies between the two annual hours series indicate that much of the expansion in female work involved labor force participation decisions. They find weekly labor force participation exhibits the largest across-cohort increase in labor supply. They also find that rising real wages accounted for 60 percent of the total growth in the female labor force; and, that half of this wage effect in expanding labor supply was the fertility-reducing consequence of a higher wage.

⁴⁴ For instance, Clark and Summers (1982) and others view this event as a catalyst that permanently altered women's view of their appropriate labor market roles. In contrast, as discussed above, Goldin's (1983a) empirically based study reports only indirect effects of the war on female labor force participation.

⁴⁵ For the subperiod 1967-80, they used Current Population Survey (CPS) micro files to calculate means at single years of age. Over the subperiod 1950-66, CPS published tables on distribution of weeks worked and income.

In similar research, Zvi Eckstein and Kenneth Wolpin (1989), using data from the National Longitudinal Survey mature women's cohort, estimated a structural dynamic model of married women's labor force participation and fertility in which wages are stochastic and work experience or cumulative participation is endogenous.⁴⁶ The basic feature of their model is that labor market participation affects future wages, which in turn affects future labor force participation.

Susan Elster and Mark S. Kamlet (1990) model labor force participation of married women from a sociological perspective. They examine whether traditional economic variables have a differential influence across social groups (defined in their paper by broad occupational and age classifications). They also study whether "income aspirations"⁴⁷ have a differential influence across these same social groups. Data for the study were drawn from the U.S. Bureau of the Census, 1980 and public-use microdata sample for the Pittsburg Standard Metropolitan Statistical Area (SMSA), 1983. Results from their logit equations indicate that individuals' responses to particular influences such as education, age, past marital history, fertility, and income aspirations, differ across social groups. It follows from this that such differences influence married women's labor force participation behavior.

⁴⁶The model is contained in the class of model that describes the life-cycle capital accumulation process with endogenous labor supply such as Yoram Weis (1972) and Heckman (1976). It is closest in spirit to that of Weiss and Gronau (1981).

⁴⁷ It is a measure of the relative income. People's well being depends not only on the absolute level of income and consumption but also on the individual's aspirations. The determinants of income aspirations have been empirically studied. The econometric results show that income aspirations increases with personal income and they are related to the aggregate income in the community. Particularly, a higher average income in the community increases people's levels of aspirations; and, the estimated effect are larger for people who interact with other community members (Alois Stutzer, 2003).

Claudia Goldin (1994) studies the relationship between women's labor force participation and economic development. She explores the hypothesis of the U-shaped female labor force function for more than one hundred countries including the United States,⁴⁸ using data from the work of many other researchers.⁴⁹ She examines why the change in the dominance of the income or the substitution effects takes place and why the U-shape is traced out. She asserts that the rising portion of the U has dominated the literature on female labor force participation in the United States and many developed countries.⁵⁰ The change of the function from the downward portion of the U to the rising portion, she points out, holds the key to why women enter the labor force at higher stages of economic development and why their social, political and legal status generally improves with economic progress. She explains that the increase in the education of females relative to males as educational resource constraints are relaxed, and women's increased ability to obtain jobs in the white-collar sector after school completion were the main reasons for this change. She concludes that women's increased education and their ability to work in more prestigious occupations both increase the substitution effect and decrease the income effect. As the substitution effect begins to swamp the income effect, the upward portion of the U is traced out, and women's labor force participation enters the modern era.⁵¹

⁴⁸ Other researchers studying this hypothesis are John Durand (1975), George Psacharopoulos and Zafiris Tzannatos (1989), and T. Paul Shultz (1991).

⁴⁹ The education data are from Robert Barro and Jong-Wha Lee (1993), the GDP/capita (1985) data are from Robert Summers and Alan Heston (1991), and the female labor force participation rates are from the extensive United Nations WISTAT collection (United Nations 1992).

⁵⁰ Richard Layard and Jacob Mincer (1985) confirm the relationship across a variety of developed economies.

⁵¹ Another relevant empirical study with pretty much similar results is Kristen Mammen and Cristina Paxon's (2000) study.

3.2 Women's Labor Force Participation in Other Developed Countries

Most developed countries experienced sizable increases in women's labor force participation rates since 1960, and in most countries this change was primarily a result of the changes in the labor market activity of married women. As the body of literature about female labor force participation in the United States has grown, the same economic models developed for studying the United States have been used to analyze the labor force behavior of women in other countries.

Recent trends in women's labor force participation in the United States have also been observed in other industrialized countries.⁵² Ehrenberg and Smith (2000) examine the trends in women's labor force participation among women ages 25 to 54 in Canada, France, Germany, Japan, Sweden and the United States in 1965, 1973, 1983 and 1997. They use data from the Organization for Economic Co-operation and Development, *Labor Force Statistics* (Paris: OECD, various dates). They find that the fraction of women in the labor market in all of these countries, on average, increased from half or less in 1965 to approximately two-thirds or more in thirty years.⁵³ Although they find some differences in trends across countries, it is likely that common factors such as changes in fertility, educational attainment, labor market opportunities, and social attitudes are influencing labor supply trends in the industrialized world (Blau et al., 2002). Constance Sorrentino (1990), points out factors explaining cross-country differences, such as the availability and amount of family leave and whether or not it is with pay, the availability of publicly funded day care, the design of tax policy, and

⁵² For a survey of trends between 1890 and 1980, see Mark Killingsworth and James Heckman (1986); for the period 1960-1980, see Mincer (1985).

⁵³ Borjas (2000) finds nearly similar results (p. 53).

variations in wage structure.⁵⁴ In the remainder of this section, I will examine some of the most relevant empirical studies from other developed countries, roughly in alphabetic order.

Robert G. Gregory, P. McMahon and B. Whittingham (1985) study women in the Australian labor force. They find that increases by married women are particularly significant: about 90% of the increase in women's labor force participation can be attributed to women employed part time. They note that Australian time-series equations are subject to structural instability, and that the estimated wage coefficients are rarely significant. They suggest that these severe difficulties arise because the female real wage has not played a market-clearing role and there has been excess supply of female labor, not adequately measured by the employment rate as officially defined. Consequently, labor force participation rates do not measure points on the labor supply curve. They conclude that to explain changes in labor force participation, emphasis has to be placed on the demand side of the labor market, particularly the mix of full-time and part-time jobs. They also generate cross-sectional results based on the 1976 census—a period during which they believe job rationing was particularly important. These equations give results similar to those of other developed countries, but fail to adequately predict the time-series variations of labor force participation, which are also subject to structural difficulties.

Michelle Riboud (1985) presents a comprehensive study of France. She uses cross-sectional data to study married women's labor force participation and attempts to use economic analysis and methods of statistical inference to interpret the phenomenon of

⁵⁴ For further discussion of cross-country trends, see Costa (2000).

the increase in women's labor force participation over the 1965-85 and earlier periods. An estimation of the market wage function shows that level of education, experience and tenure are important variables for explaining differences in wages and that women's withdrawal from the labor market depresses potential wage offers. Moreover, she estimates a labor force participation equation using a logit model; and also an alternative method of analysis obtaining Ordinary Least Squares estimates, using relative participation (RELP)⁵⁵ as an endogenous variable. Discrepancies are found in both methods, reflecting that the effect of schooling (via wage) on labor force participation has been rising over time. Using times-series analysis for the same period of time she shows that changes in male and female earnings and unemployment rates explain much of the trend in labor force participation. Finally, she uses the results of the analysis of women's labor force participation based on cross-sectional data to predict changes for 1965-1975 and 1975-1985; these predictions are compared with observed changes. She concludes that the same model of decision-making based on a comparison between the value of home time and earnings potential in the labor market explains both earlier and recent historical trends.

Wolfgang Franz (1985) analyses female labor force participation in Germany. He uses the Tobit procedure, which allows him to estimate labor supply functions including both hours worked and labor force participation in a cross-section analysis based on individual data. He found that it is necessary to distinguish among women by marital status: while labor force participation of young single women decreased substantially, married women have a higher labor force participation rate in the 1980s than in earlier

⁵⁵ Women's share of the labor force.

years. The Tobit estimates show that labor supply increases with higher education and with vocational education, and also if the husband is self-employed. As expected, the income of the husband has a negative impact on the woman's supply of labor. The presence of children reduces labor supply: the younger the children, the more labor supply decreases. In general, the author finds that labor force participation of married women increases slightly until the age of 28, and then it declines monotonically. Finally, he found foreign-born women work more than German women do.

Ben-Porath and Gronau (1985) study the trends in the labor force participation of women in Israel during the period 1955-1980 using data from the Central Bureau of Statistics of Israel.⁵⁶ The authors report that the labor force participation of Jewish women in Israel increased between 1955 and 1980, accelerating in the 1970s; two-fifths of women were in the labor force by 1985.⁵⁷ The sharpest rise was among mothers aged 25-44. Their main finding is that schooling accounts for most of the change in the labor force participation rates. Moreover, the differential in participation by marital status has sharply narrowed and the life cycle effects have been transformed: The M-shaped age/labor force participation profile has been replaced by an inverted U with delayed labor force entry due to prolonged schooling and more continuous participation in market work throughout the childbearing period. Incompatibility between child rearing and market work has been reduced by the increased availability of part-time work and

⁵⁶ Tapes of some of the Labor Force Surveys and the Consumer Expenditure Survey came from the data archives of the Faculty of Social Sciences.

⁵⁷ This figure was roughly the same as in such diverse countries as Germany, France, and Singapore. However, at the time this was lower than labor force participation in the Scandinavian and Eastern European countries (55-60 percent), the United States, Japan, (43-47 percent) and, surprisingly, Portugal (46 percent). Labor force participation in Israel was, however, higher than in some of the smaller or South European countries where it was less than 30 percent in Ireland, Spain, Italy, and the Netherlands) (Ben-Porath, 1973, table 2).

increased reliance on day-care services. They find that the increased employment of women is concentrated in the service industries, mostly in the public sectors, and is accompanied by some decline in the relative wage of highly educated women. Children (and particularly preschool children) are the strongest deterrent to a mother's labor force participation, which effect does not seem to weaken over the period.

Daniela del Boca (1988) finds that the Italian pattern of the female labor force participation shows a mild U-shape: women's labor force participation rates fell as the size of the agricultural sector declined and then rose as women's educational levels rose and as the service sector and manufacturing industries that employed women became more important.⁵⁸ Ugo Colombino and Bianca De Stavola (1985) attempt to develop a behavioral model of female labor supply in Italy. The model of labor force participation is estimated with cohort data and takes into account not only variables changing during each cohort's life cycle but also invariant factors summarized by cohort fixed effects. In a second stage these effects are regressed over a set of indicators that are meant to reflect variables unchanging over the cohort's life cycle and conditioning factors at the early stages of the working life. The results suggest that the flat female participation rate profile (from both a time-series and a cross-section perspective) is presumably produced by economic incentive effects that counterbalance each other.⁵⁹ However, with the recent

⁵⁸ Costa (2000) reports that Italy stands out as having the consistently lowest labor force participation rate for women.

⁵⁹ The authors found the following main factors: 1) a negative trend captured by the coefficients of cohort and (cohort)²; 2) a very powerful positive female wage effect; 3) an equally (if not more) powerful negative male wage effect; and 4) significant positive interactions, between cohort and age and between cohort and presence of children < 6.

rise in cohort-specific earning power, they identify a decrease in the work-disincentive effects of aging and of children under 6.

Haruo Shimada and Yoshio Higuchi (1985) study Japan. Their work reviews statistical data centering on female labor force participation and household behavior, using a common format for international comparison, and estimates income and wage elasticities from female labor supply equations. They suggest that analysis of the aggregate female labor force is misleading because it mixes heterogeneous groups with sharply different behavioral patterns. They find that the pattern for total female labor force participation is stagnation,⁶⁰ a distinct contrast to many advanced economies (e.g., the United States, Canada, the United Kingdom, Australia, Sweden, and Germany) where the labor force participation of women rose sharply during that period.⁶¹ However, the postwar increase of female wage and salary workers as a percentage of the female population has been sharp and exhibits a steadily rising trend, more or less comparable to that in the United States and European countries in recent decades. Although the historical sequence of events in Japan does not seem to fit the sequence of changes logically anticipated by the human capital theory, the compounding influences of social and institutional factors that affect the behavior of households must be taken into account. Clearly, in the United States and countries with a similar distribution of the labor force by employment status, the labor force participation decision may be treated as the choice “to work or not to work.” However, if individuals regard the decision to enter the labor force

⁶⁰ Labor force participation rates for all women went down slightly from around 57 percent in the mid-1960s to a low of around 52 percent in the mid-1970s; it increased somewhat afterward to reach 56 percent in 1981. A similar pattern occurred for married women, although lower by approximately 10 percentage points.

⁶¹The Japanese pattern is also curious in that the trend was reversed around the mid-1970s when the Japanese economy suffered the depressing effect of the first oil crisis.

as an employee as being distinct from the choice to enter the labor force as a family worker, then economic models of labor force participation, which treat these choices as identical, will incorporate a specification bias (M. Anne Hill, 1983).

M. Anne Hill (1989) produces another suggestive paper that takes into account the “informal sector”⁶² of Japan. The presence of an informal sector of the labor market allows women to engage in economic activities—by producing goods at home for sale in the market, working on a family farm, or working in a small family-run business—while simultaneously caring for children and performing other home-related duties. Thus choices of women may be viewed as trichotomous rather than dichotomous: women may choose to work in the formal sector of the labor market (as an employee), in the informal sector, or they may choose not to work. Accordingly, Hill estimates a trichotomous labor force participation model for a sample of employees, family workers, and nonparticipants from the Tokyo Metropolitan Area. A 1975 survey of married women (with husband present) between the ages of 20 and 59 is the database used for the empirical analysis. She found that education and market experience were significantly associated with a greater probability of working in the formal sector. In contrast she found that husband’s income and the number of young children were significantly associated with a greater probability of being out of the labor force. Variables such as experience and the presence of young children increased the probability of being employed in the informal sector.⁶³

Another country with low labor force participation rates for women is Spain.

Feliciano Hernandez Iglesias and Michelle Riboud (1985) describe trends in labor force

⁶² She assumes that women reported as self-employed or as family workers are engaged in the informal sector of the labor force following Adam Jaffe and K. Azumi (1960).

⁶³My dissertation research will draw heavily on the work of Shimada and Higuchi (1985), and Hill (1989).

participation of Spanish women since 1900. They estimate earnings functions and labor force participation models using a 1979 survey of married women. A model including the average experience of married women as an endogenous variable produces estimates that fit times series data. Their findings suggest an increasing effect of education on labor force participation, which confirm Schultz's (1991) hypothesis of increasing returns to various quality components of the labor force in developed economies.

Finally, Sweden stands out as special case among the developed countries. Costa (2000) reports that Sweden had the highest labor force participation rates of women of any country before dipping in the 1990s. Sweden has actively encouraged paid female labor force participation and promoted pronatalism since the 1930s. Moreover, the Swedish system of taxation provides substantial incentives for dual earner couples, and subsidized child-care in Sweden reduces the negative effect of children on women's earnings (Siv Gustafsson and Frank Stafford, 1992). Sweden's recent decline in labor force participation seems to be primarily related to its recession of the early 1990s: the same percentage point decline in labor force participation since then has been observed among men as well as among women (Costa, 2000). Siv Gustafsson and Roger Jacobson (1985) perform an empirical study about trends in female labor force participation in Sweden. They estimate the parameters of labor force participation equations using individual cross-section data from the three standard-of-living surveys done in 1968, 1974, and 1981. Their main findings are that the labor force participation of married women increased from 49.1 percent to 83.5 percent during the decades of the 1960s and the 1970s: and that increases in their own wages, have been by far the most important explanatory factor. Women's real wages have increased relative to their husbands' after-

tax earnings both as a result of the introduction of compulsory individual taxation in 1971, and of dramatically decreased sex differentials in pay partly associated with increased female education.

3.3 Women's Labor Force Participation in Latin American Countries

Unlike in the United States and other developed countries, very little empirical work in economics has been done about women's labor force participation in Latin America. However, disciplines such as sociology, anthropology, and psychology have contributed to a body of literature about Latin American women. Under the auspices of the World Bank in Washington D.C., George Psacharopoulos and Zafiris Tzannatos (1992) published a collection of studies evaluating women's employment and pay in this region⁶⁴ during the decade of the 1980s. They use the empirical results obtained for each of the countries' studies to draw conclusions about the general characteristics and trends in women's labor force participation in the region. Similar techniques⁶⁵ and comparable specifications are used for all the countries, to allow for an easier comparison of the results.

Latin American women overall had a low rate of participation in the labor market, averaging only 24 percent in the 1950s. However, it increased to 33 percent by the 1980s. Most of these women were between the ages of 20 and 50 years old. As to the underlying factors that help explain the increase in women's labor participation in the region, the authors conclude that it can be attributed to the economic crisis of the 1950s and 1960s

⁶⁴ The countries included are Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, Guatemala Honduras, Jamaica, Mexico, Panama, Peru, Uruguay, and Venezuela. Workers in these countries account for approximately 90 percent of the total labor force in the region both in the 1950s and the 1980s.

⁶⁵ Most analysis is conducted using probit and logit regressions.

which resulted in a more efficient use of female labor than has traditionally been the case, and the expanding employment of women in the public sector. After analyzing the results of individual studies, the authors found that most agree that the probability of a woman working for pay is greater (1) as they enter adulthood and up to the age of 40 to 45 years (after controlling for fertility); (2) if they reside in urban areas; (3) the higher their education level; (4) the more general (rather than technical/vocational) their education; (5) the lower their family responsibilities (in terms of young children present in the household); (6) if they live in a female-headed household; and (7) the lower other income and family wealth. The remainder of this section will summarize empirical findings of individual countries in alphabetical order.

Ying Chu Ng (1992) examines the determinants of female labor force participation in Argentina. The author uses data drawn from the 1985 Buenos Aires Household Survey that was conducted by the National Institute of Statistics (INDEC). Aside from personal characteristics, family composition, and educational attainment, economic factors related to the availability of income such as wealth, household income, and household production demands are also important. The Argentine labor market is characterized by cyclical periods in which labor is either scarce or relatively abundant because, on one hand, there are substantial fluctuations in terms of domestic and foreign migration, and on the other, the fact that unemployment and underemployment rates remain relatively low regardless of whether there is an excess or scarcity of labor suggests that there may be a strong “added worker” effect operating.⁶⁶ Ng finds that

⁶⁶ This effect predicts that the labor force of secondary workers, women and/or teenaged children, has a countercyclical trend, that is, it moves in the opposite direction of the business cycle: During recessions the labor force participation of this group of people will rise, and it will fall during expansions. Jairo A. Riveros and Carlos E. Sanchez (1990) provide

important factors determining women's propensity to work are marital status and presence of children. It is common for married women to withdraw from the labor force during childbearing and when their children are young. The highest probability of female labor force participation is found among women ages 25 to 29. Thus, as the youngest cohorts age, she predicts much higher levels of labor force participation in the future.

Katherine Scott (1992) studies female labor force participation in Bolivia. She uses data from the second round of the 1989 Integrated Household Survey (SIH), a bi-annual survey carried out by the National Statistical Institute of Bolivia (INE). The results reveal that 44 percent of the sample of women work for pay.⁶⁷ However, the definition of "employed women" used in the study may underestimate the real female work force because unpaid workers in a family business are not counted. In general, women who have lower levels of education than men are more heavily concentrated in the informal sector (World Bank, 1989).⁶⁸ Probit estimates of the labor force participation function shows the greatest likelihood of working for pay among women ages 35 to 44 but the probability declines among older women. Unmarried women and heads of household are more likely to work than are married women. Women high school students are less likely to participate in the labor market than those who are not. In contrast, attending, or having completed a technical school, teacher's college, or university degree has a highly significant, positive effect on the probability of labor force

evidence that this is the case. They report substantial increases in female labor force participation rates, particularly among women aged 35 to 49 years, during the economic crisis of the early 1980s.

⁶⁷ Women's labor force participation was estimated at 35 percent in 1987, up from the 1976 level of 20 percent (World Bank, 1989).

⁶⁸ There are some legal regulations that restrict women's participation in the formal sector of the labor market: they are not allowed to work at night, they are not allowed to work more than 40 hours per week, and the labor code bars women from carrying out jobs considered to be dangerous, unhealthy or hard labor (World Bank, 1989).

participation. Pregnancy has the expected negative impact: women who were pregnant in a given year had a lower probability of participating in the labor market than women who had not been pregnant. She also reports that language skills also have a significant impact on labor force participation: bilingual⁶⁹ women participate at a higher rate than women who speak only Spanish.

Jill Tiefenthaler (1992) uses a multi-sector model of female labor force participation to study the effects of economic and social adjustment programs on the well-being of Brazilian women, comparing women's economic opportunities in 1980 with those in 1989. The National Statistical Service collected the data for this study from 70,777 Brazilian households. The author considers it important to distinguish between the formal and the large informal sector in analyzing the Brazilian labor market.⁷⁰ Her model considers those who do not work for pay as not participating in the labor market. The formal sector is defined as all individuals who work for a wage while the informal sector is made up of the self-employed. Results from estimating the three-sector labor force participation equation reinforce many of her hypotheses: the important determinants are those variables that influence the market wage, variables that affect the reservation wage, and proxies for the costs of employment across sectors.⁷¹

⁶⁹Aymara and Spanish.

⁷⁰ She reports that the importance of accounting for the large informal sector in many developing countries was recognized over 40 years ago by Jaffe and Azumi (1960). They observed that women engaged in informal or "cottage-industry" work had higher fertility rates than women who worked in the formal sector. Results from several more recent studies, using more rigorous empirical analysis, have supported Jaffe and Azumi's supposition that women's costs of labor force participation are not equivalent across sectors. See Hill (1983, 1989), S. K. Smith (1984), David Blau (1984).

⁷¹ Morton Stelcner et al. (1992), who also studied the Brazilian multi-sectoral labor market, show that education is perhaps the most important determinant of labor force status and earnings. Moreover, it plays an important role in "sorting" individuals among alternative labor force activities.

Indermit A. Gill (1992) studies female labor force participation in Chile using data from the National Socio-economic Survey (CASEN) of Chilean households conducted in 1987. In general, Chile is a relatively developed labor market. However, women constitute only about 28 percent of the labor force. Female labor force participation is less than half that of males. The author investigates why, in the face of the rapid equalization of education levels across sexes, female labor force participation rates have not increased to levels observed in industrialized countries. The results of probit estimates for the labor force participation of women aged 14 to 65 years are as follows: higher degrees are positively associated with the probability of labor force participation; the age profile of female labor force participation is an inverted U-shape; married and cohabiting women are less likely to work for pay than are those who are single or separated; being head of household is positively correlated with the probability of labor force participation; higher household income (total income of other members of the household) increases the likelihood of working for pay (a somewhat puzzling result).

The case of Colombia has been studied by Eduardo Velez and Carolyn Winter (1992). Women's labor force participation increased from 19 percent in 1951 to 39 percent in 1985.⁷² The authors attempt to identify factors that influence a woman's decision to participate in the labor market using data from the 1988 National Household Survey conducted by the Statistics Administrative Department (DANE) in the largest Colombian cities. They estimate a probit model in which the probability that a woman will participate is estimated based on her parental status, age, education level, the size of the household in which she lives, and her status as head of household or otherwise. The

⁷² ILO (1990).

probit coefficients show that the probability of participating increases steadily with each additional level of completed education. A larger household has a positive, although small, effect on a woman's decision to work for pay. By contrast, being head of household has a substantial positive impact. As in many other studies, the presence of young children is shown to reduce the probability that a woman will work for pay.⁷³ In Colombia, however, even women with young children continue to be heavily represented in the informal sector.

Hongyu Yang (1992) studies female labor force participation in Costa Rica. The author finds the major factors that influence women's labor market activity are educational attainment, marital status, fertility, other household income, and age. Education has a powerful positive effect on the probability of female labor force participation: more educated women are more likely to participate in the market and are more likely to be employed. Using the results of probit estimates for female labor force participation, the author predicts the probability of labor force participation for each characteristic holding other characteristics constant at their means. The author found that high school graduates have the highest probability, 54.2 percent. Married women are less likely to participate than unmarried women, 17.7 percent versus 40.4 percent. The more children a woman has, the less likely she is to participate in the labor market. A female head of household has a higher likelihood of participating, 34.1 percent, compared to 22.7 percent probability for a woman who is not head of household. Finally, women who live in rural areas are less likely to participate in market activities.

⁷³ Thierry Magnac (1992), using samples drawn from urban household surveys between 1980 and 1985, finds similar effects.

There are two empirical papers about female labor force participation in Ecuador. The earlier analysis was undertaken by Mary Finn and Carol L. Jusenius (1975) using data for 1966. They find rather low rates of labor force participation among urban women, around 25 percent, with the highest rates among women who had completed college (89 percent). On the other hand, single women were more likely to work in the labor market, but earned substantially less than working wives, who also tended to be older and better educated. George Jakubson and George Psacharopoulos (1992) use data from the 1987 Ecuador Household Survey that was conducted in urban households in the three largest cities, Quito, Cuenca and Guayaquil, to study the increase in female labor force participation which their estimates show had increased to 50 percent.⁷⁴ They also found that more educated women are more likely to participate in the market and more likely to be employed; marital status and being head of household are the most important social determinants of both labor force participation and employment: i.e., wives with working husbands are much less likely to participate in the labor market than female heads of household. Women with young children are also less likely to work for pay.

Mary Arends (1992) examines female labor force participation in Guatemala. This country has the lowest rate of literacy in Latin America, and there is a large schooling gap between men and women. About 40 percent of its population is Amerindians, many of whom do not speak Spanish, and who have little access to social services or to formal labor markets. About half the work force is employed in agriculture, much of it at the subsistence level. The data source is the 1989 National Socio-

⁷⁴ The World Bank (1989) reports labor force participation rates among all women in Ecuador have continued to rise, except among females aged 12 to 19 years who are remaining in school longer. Labor force participation rates have been particularly high among women between ages 25 and 34 years, and have increased across all marital status categories. Married women increased their labor force participation from 16.8 percent to 21.1 percent between 1974 and 1982. The World Bank also reports that 61 percent of female heads of household were in the labor force in 1987.

Demographic Survey (ENSD), carried out by the Statistical National Institute. Results from probit equations estimation are that schooling level is an important determinant of labor force participation; that number of children and marital status have the expected negative and significant impact on participation; that participation peaks between the ages of 30 and 34, dips for women aged 35 to 39, and then rises again; that being head of household increases the probability of participation, as does living in Guatemala province and living in an urban area; that a woman from an indigenous group is less likely to participate in the labor market; and that household income has a positive effect on participation, as Gill (1992) reported for Chile.

Honduras is one of the poorest countries in Latin America. Carolyn Winter and Thomas H. Gindling (1992) use probit equations to investigate the factors that influence a woman's decision to enter the formal labor market or the informal sector in this country. The data used in their analysis come from the 1989 national survey, the Honduras Household Permanent Survey of Multiple Purposes (EPHPM). It is assumed that the decision to work and the decision regarding which economic sector to enter (formal or informal) are made simultaneously. Their results are as follows: 1) Holding all other variables at their mean values, the probability of participation increases substantially with each additional level of education completed. However, women with college degrees actually have a lower probability of participation than women with completed secondary education.⁷⁵ 2) Women's labor force participation rates by age group show the familiar inverse U-shape. Women's labor force participation peaks between ages 35 and 45 and then declines. 3) Having children aged six years or less reduces the probability that a

⁷⁵ This may reflect, in part, the high levels of unemployment among individuals with college degrees since some may become discouraged and leave the labor force.

woman will work. 4) Women are much more likely to participate in the labor market if they live in urban areas.

Diane Steels (1992) analyses women's labor force participation in Mexico. She focuses on factors that have been shown in previous studies to influence the decision to enter the workforce such as age, education level, presence of young children, marital status, and household wealth. The probit coefficients show that probability of participation in the labor market decreases as women become older although it remains relatively high even at older ages. Her analysis shows that with increased levels of education, women are more likely to participate in the labor market. Steels' study shows that women in Mexico are actually more likely to participate when there are children in the household, unlike most studies which indicate that the presence of at least pre-school aged children reduces the probability of labor force participation. Finally, living in an urban area increases the probability of a woman's participation in the labor market.

Female labor force participation in Panama is studied by Mary Arends (1992). Her empirical study uses data taken from the Household-Man Power Survey of August 1989 by the Office of Statistics and Census of Panama (DEC). The author comes to the following conclusions from her results: the likelihood of women working for pay increases with higher education levels from 10 percent for those with no education to 48 percent for those with over 4 years of university education; women with children under 6 years of age are less likely to be in the work force: the probability of labor force participation drops from 27 percent for those with no children under 6 years of age to 18 percent for women with three children in that age group; labor force participation peaks between 35 and 39 years of age; those living in an urban area are 12 percent more likely

to work than those living in a rural area; the probability of working increases from 20 percent to 57 percent if the woman is head of household; and additional workers in the household increases the probability of working.

Shahidur Khandker (1992) studies women's labor market participation in Peru where it increased from 34 to 43 percent between 1970 and 1985 in urban areas. He uses the probit estimates to predict the effect of changing certain characteristics holding other characteristics constant at their mean. He finds that women with university rather than secondary or post-secondary diplomas have substantially higher labor force participation, and that single women participate in the labor force more than married women (14.9 percent versus 5.52 percent, respectively). Finally, the predicted participation rate for women is the highest in Lima (15 percent) followed by other urban areas (9 percent) and rural areas (6 percent).

Mary Arends (1992) also studies women's labor force participation in Uruguay. She uses data drawn from the 1989 Household National Survey conducted by the General Administration of Statistics and the Census (DGEC), and finds that the female labor force participation rate is 52 percent. Arends presents the results of a simulation testing for each characteristic while holding all other characteristics at the value of their sample means. She finds that education plays a key role in predicting whether a female works. For example, the likelihood ranges from 28 percent for women with some primary education to 54 percent for women with a college degree. Arends finds that labor force participation is higher at all ages than in other Latin American countries. Labor force participation is lower at ages 14 to 19 than at other ages, which is to be expected given Uruguay's high enrollment rates in secondary education. The number of children also has

a significant negative effect on labor force participation. Being head of household increases the probability that a woman will work for pay from 34 percent to 65 percent. The number of employed persons in the household has a significant, positive effect on the probability that a female will be working.⁷⁶ The coefficient on household income is negative, as expected, but small. Lastly, living in Montevideo has a small positive effect on the decision to work.

3.4 Women's Labor Force Participation in Venezuela

According to information published by the Central Office for Statistics and Information (OCEI) in Venezuela, women's labor force participation has increased since the 1950s, when the rate stayed between 18 percent and 19 percent. By 1971, it had increased to 23 percent. The 1990 Population Censuses show that women's labor force participation had increased to 30.5 percent. Finally, the Household Sample Survey reports that their labor force participation rate reached 43 percent by 1998.

There are only a few studies about women's labor force participation in Venezuela. In a descriptive study, Maria Beatriz Orlando and Genny Zuniga (2000) analyze women in the Venezuelan labor market, focusing on their labor force participation and their income. They use aggregate data from the National Census since 1950. Their results show that Venezuela is similar to other Latin American countries where older women, "cohabitators"⁷⁷ and those with the lowest level of education

⁷⁶ The explanation for the sign is not immediately obvious. It may show a kind of family "work ethic" with members preferring to work outside the home (Arends, 1992).

⁷⁷ "Cohabitators" refers to a specific group of Venezuelan women who formerly lived with a partner but who have been abandoned or have decided to separate.

increased their labor force participation, as a strategy to cope with reduced family income. Leonardo Ledezma, Maria Beatriz Orlando and Genny Zuniga (2003) report on the determinants of labor force participation of women in Venezuela for the period 1980-2000. Among the factors that influence Venezuelan women's labor force participation, the authors point out, are income level, education, and the development of political and social institutions. Age is also important: the highest labor force participation, 46 percent, is observed for those between the ages of 30 and 39.⁷⁸

Two empirical papers investigate the labor market behavior of Venezuelan women: Cox and Psacharopoulos (1992) and Winter (1992). Both studies use the same data source, the Household Survey data, for 1987 and 1989, respectively, and the same methodology. Both studies estimate a probit equation for a sample of working and non-working women. Not surprisingly, results of the papers are quite similar: education has powerful effects on labor force participation as the human capital literature suggests. The probit coefficients show that the probability rises steadily with each successive level of education. Cox and Psacharopoulos find that living in a rural area reduces the probability of participating in the labor force by 13 percent, considerable more than Winter, who finds only a 6 percent difference.

Other results are related to specific variables used by each of the researchers. Cox and Psacharopoulos find that being a wife or partner reduces the probability of labor force participation by 22 percent, implying that family responsibilities compete for time

⁷⁸ Ledesma, Orlando and Zuniga (2003) also claim that the labor force participation of rural women has traditionally been reported at levels much lower than they really are because women consider some of their economic activities part of their domestic chores. However, it is clear that women have been participating in the labor force in greater numbers.

spent in the market.⁷⁹ Being head of household raises the probability by 23 percent. An increase in the income of other family members equivalent to 15 US\$ per month reduces the probability of working by 4 percentage points. Winter finds that being a mother of young children significantly increases the probability that a woman will withdraw from the labor force. And, finally, age is also an important factor. The probability of women working increases steadily starting in the mid-twenties and peaks between the ages of 41 and 45. Low labor market participation rates among women in their early twenties are consistent with the high enrollment of women in this age group in higher education (44 percent). Moreover, many in their early twenties may be having babies.

3.5 The Contribution of My Dissertation Research

Psacharopoulos and Tzannatos (1992) collected a series of empirical studies of many Latin American countries. However, none of them attempt to advance the theoretical understanding of issues pertaining to women's time allocation between home and market work. These studies take analytical approaches used during the 1980s to investigate women's status in the Latin American labor markets, that is —women's employment and pay. Almost all the studies attempt to explain why Latin American women have lower rates of both labor force participation and pay, compared to men. They assume that there are no innate differences between the sexes that justify the observed gender differences. Thus, basically these papers study gender discrimination in

⁷⁹ This is only a partial explanation. Clearly, having a partner's income raises the reservation wage.

the labor market using the human capital framework.⁸⁰ The studies of all the countries use similar techniques and specifications in order to facilitate a comparison of the results, to find whether there are common patterns and factors at work in the region with respect to employment and pay of women.

This project is aimed to provide an in-depth analysis of the labor force participation of Venezuelan women during the 1990s, based not only on human capital theory, but also on the theory of allocation of time between home and market work. The more recent data presented in this study will overcome some of the most serious difficulties that Psacharopoulos and Tzannatos faced regarding the quality and coverage of the micro data collected by household surveys in the region during the 1980s.

The descriptive study of Ledezma, Orlando and Zuniga (2003), despite the report's title, is based on previous data from the 1990 census collected by the Central Office of Statistics and Information (OCEI). The empirical works of Cox and Psacharopoulos (1992), as well as Winter (1992), use micro data from 1987 and 1989, respectively. Thus, my project will greatly expand the rather small and now-outdated literature by investigating factors influencing female labor force participation in the decade of the 1990s. There will be a significant improvement in both the quality and quantity of data to be used in this study of Venezuelan women. For instance, the two empirical studies of Venezuela use a binary choice model to estimate the impact of the factors that influence women's labor force participation. However, in neither study are the unemployed properly identified: Cox and Psacharopoulos' (1992) definition is not strictly comparable with the official one, which, as in most countries, counts both the

⁸⁰ Gender discrimination is beyond the scope of this study. However, their findings about the determinants of women's labor force participation are pertinent.

unemployed and the employed as members of the labor force. Winter (1992), on the other hand, is unable to determine whether individuals are unemployed or employed in the informal sector. This is a serious issue, since a large informal sector exists in Venezuela. Consequently, in both studies, the authors include as participants in the labor market only actively working individuals, identified by their positive responses to questions concerning employment status: weekly hours worked and monthly income. The data available for the last years of the 1990s provide information to properly identify the formal and informal sector, thus allowing me to apply the methodology used by Hill (1989), to take into account the informal sector.⁸¹ Choices for Venezuelan women are: working for pay in the formal sector, being self-employed or working in family businesses in the informal sector, or being out of the labor force entirely. Thus, by applying methods of analysis not previously used to new data, this dissertation will offer a greatly-improved, in-depth, and up-to-date investigation into the labor participation decisions of women in Venezuela.

In Chapter Four the specific hypotheses to be tested and the estimation procedures are presented more formally.

⁸¹ Shimada and Higuchi (1985) also used the same method to study female labor force participation and household behavior in Japan.

Chapter Four

Research Design

This present analysis represents several distinct advances in the study of the labor force participation of women in Venezuela. First, improved data will be used to update previous empirical work on this topic and to overcome serious shortcomings of previous studies. The two empirical papers about Venezuelan women's labor market behavior by Cox and Psacharopoulos (1992) and Winter (1992) described in Chapter Three approached the labor force participation decision of Venezuelan women as dichotomous: "working" and "not working." The second advance of this study is that a trichotomous decision is considered, adding the option of participating in the informal sector. Finally, the labor force behaviors of different demographic groups of women are analyzed separately. In this chapter the data and methodology that will be used to analyze women's labor force participation in Venezuela between 1995 and 1998 will be discussed. The chapter is organized as follows: Section 4.1 describes in detail the objectives and hypotheses of this project. Section 4.2 describes the data sources to be used. Section 4.3 describes the methodology and estimation methods, and Section 4.4 describes the specification of the models and the description of variables involved in the analysis.

4.1 Objectives and Hypotheses

This study will provide an empirical update on labor force participation among Venezuelan women. This effort will help close the existing chronological gap in the literature by examining their labor force participation throughout the 1995-1998 period.

In this chapter the hypotheses are summarized more formally. An introduction to the methodology used is also included. In Chapters 2 and 3, we have discussed the economic theory behind women's labor force participation and a review of the literature, in which age, education, family income, and other factors were discussed in terms of how they affected women's labor force participation. The empirical tests in this study are based on the following hypotheses:

Hypothesis No. 1: Venezuelan women's labor force participation has increased during the last decades of the last century, particularly during the period 1995-1998. Factors such as age, education, marital status, urban residence, geographic location, headship of the household, socio-economic status, nonlabor income, and time influence their decision to work or not to work.

Hypothesis No. 2: Venezuelan women have increased their participation in the informal sector during the last decade of the last century. Factors influencing their decision to work in the informal sector are the same as those impacting their decision to work in the formal sector during this period.

Two additional hypotheses will be tested using the subsamples of married women, single women, and women heads of household.

Hypothesis No. 3a: Demographic, geographic, and socio-economic factors influence the labor force participation decision of married women, single women, and women heads of household in the same manner.

Hypothesis No. 3b: The factors considered in this study affect Venezuelan women's decision to work in the formal or informal sector similarly, whether they are married, single and/or heads of household.

4.2 Data Base

This study utilizes micro data from the Household Sampling Survey (EHM) of the Central Bureau for Statistics and Information (OCEI), the agency of the Venezuelan government that collects data and generates official statistics. This is a biannual, nationwide survey that measures the characteristics of the Venezuelan labor market as well as other demographic issues such as family composition, housing quality, access to public services and poverty status. The survey is conducted using multi-stage sampling; the sample is rotated to avoid refusal while maintaining consistency and representation. Five surveys will combine to produce pooled cross-sectional data: the first semester of 1995, and both semesters of 1997 and 1998. For purposes of this study the sample is restricted to woman between 15 and 60 years of age for whom all the specified variables are available.

4.3 Methodology

A description of research methodology follows.

4.3.1 Binomial Logit Model

To test Hypothesis No. 1 and Hypothesis No. 3a, the study models the binary choice that a woman is in the labor force ($Y=1$) or is not ($Y=0$) during the period. A set of factors such as age, education, marital status, head of household, socio-economic status, urban residence, geographic areas, nonlabor income, and survey time gathered in a vector X explain the decision, so that

$$\text{Prob}(Y=1|x) = F(x, \beta) \quad (1)$$

$$\text{Prob}(Y=0|x) = 1 - F(x, \beta) \quad (2)$$

The logit model uses the logistic distribution $\Lambda(\cdot)$

$$\text{Prob}(Y=1|x) = \frac{e^{x'\beta}}{1 + e^{x'\beta}} = \Lambda(x'\beta) \quad (3)$$

The probability model is a regression:

$$E[y/x] = 0[1 - F(x'\beta)] + 1[F(x'\beta)] = F(x'\beta) \quad (4)$$

Since the parameters of the model are not marginal effects, in the logit model,

$$\frac{\partial E[y/x]}{\partial x} = \Lambda(x'\beta)[1 - \Lambda(x'\beta)]\beta \quad (5)$$

To interpret the estimated model⁸², it is useful to calculate these values at the means of the regressors or other pertinent values.⁸³ The appropriate marginal effect for a binary independent variable would be

⁸² The method of the maximum likelihood is applied to estimate this model's parameters as in the multinomial logit model explained below.

$$\text{Marginal effect} = \text{Prob}[Y=1 | \bar{x}(d), d = 1] - \text{Pr}[Y = 1 | \bar{x}(d), d = 0], \quad (6)$$

Where $\bar{x}(d)$ denotes the means of all the other variables in the model.

4.3.2 Multinomial Logit Model

In order to analyze labor force behavior of Venezuelan women (Hypothesis No. 2), and then to compare their behavior among the three groups (Hypothesis No. 3b), the study follows Hill (1983) in using Daniel McFadden's (1974) model for discrete choice: the multinomial logit model.⁸⁴

The model is the standard one-period static labor supply framework in which each woman may select among three mutually exclusive choices: working in the formal sector as a paid employee (indexed p), working in the informal sector⁸⁵ (indexed f), and not working for pay (indexed n).⁸⁶ The preferences are defined by a utility function whose arguments are the Hicksian composite of all goods, non-market time, and vector of exogenous variables that affect labor force decisions. Rational decision-making is reflected in the maximization of utility subject to time and budget constraints. In other words, the woman compares the maximum utility attainable given each participation alternative and selects that alternative which yields the highest utility.

⁸³ To compute the marginal effects, one can evaluate the expressions at the sample means of the data or evaluate the marginal effects at every observation and use the sample average of the individual marginal effects.

⁸⁴ The labor force participation decision is modeled most appropriately within a life-cycle context, especially if there is heterogeneity across individuals with regard to the propensity to work in either labor market sector. (See Ben-Porath, 1973 and Heckman, 1978.) Unfortunately, in Latin American countries including Venezuela the panel data required to estimate a life-cycle model are not available.

⁸⁵ Both Cox and Psacharopoulos (1992) and Winter (1992) report the importance of the informal sector in the Venezuelan labor force.

⁸⁶ This specification does not allow for the possibility of working concurrently in more than one sector. However, the data include no information on multiple job holding and each person reports only one current employment status.

Formally, let V_{ji} be the maximum utility attainable for individual i if she chooses participation status $j = p, f, n$, and suppose that this indirect utility function can be decomposed into a non-stochastic component (S) and a stochastic component (ε):

$$V_{ji} = S_{ji} + \varepsilon_{ji}, \quad (7)$$

Where S_{ji} is a function of observed variables and ε_{ji} is a function of unobserved variables. The probability that the i^{th} woman selects the j^{th} labor force participation status is then given by

$$P_{ij} = \Pr[V_{ji} > V_{ki} \text{ for } k \neq j, k = p, f, n], \quad (8)$$

or, substituting in from (4-8),

$$P_{ij} = \Pr[S_{ij} - S_{ki} > \varepsilon_{ki} - \varepsilon_{ji} \text{ for } k \neq j, k = p, f, n], \quad (9)$$

If the stochastic components have independent and identical Weibull distribution,⁸⁷ then the difference between the errors ($\varepsilon_{ki} - \varepsilon_{ji}$) has a logistic distribution and the choice model is multinomial logit (McFadden, 1974).⁸⁸

To estimate the model, it is necessary to specify a functional form of the non-stochastic component of the indirect utility function S_{ji} . This component is approximated in linear form ($S_{ji} = \beta_j' X_i$), yielding an empirical specification of the form

$$P_{ji} = \frac{\exp(\beta_j' X_i)}{\exp(\beta_p' X_i) + \exp(\beta_j' X_i) + \exp(\beta_n' X_i)}, \quad (10)$$

⁸⁷ The Weibull distribution has a unimodal bell shape roughly similar to the normal distribution.

⁸⁸ For a complete description and discussions of the multinomial logit model, see McFadden (1974) and Domencich and McFadden (1975)

where X_i is a vector of independent variables explaining labor force participation and β_j is the parameter vector.

4.3.3 Estimation Method of Maximum Likelihood

For n alternatives in the multinomial logit model, only $n-1$ distinct parameter vectors may be identified. This linear dependence requires the normalization of the parameters, i.e. that

$$\sum \beta_j = 0, \quad (11)$$

For a comparison among the empirical results, it is useful to calculate the partial derivatives of the dependent variables, the probability of entering the paid labor force (P_p) and the probability of engaging in family work or self-employment (P_f), with respect to each independent variable. The partial derivatives are

$$\frac{\partial P_j}{\partial X} = P_j(1 - P_j) \frac{\partial S_j}{\partial X} - P_j P_k \frac{\partial S_k}{\partial X} - P_j P_n \frac{\partial S_n}{\partial X},$$

$$j, k = p, f, j \neq k. \quad (12)$$

The econometric model is specified so that $\partial S_j / \partial \ln W_k = 0$ if $j \neq k$. Therefore, the effect of the wage in each sector operates through the effect on the conditional indirect utility in that sector. For example,

$$\frac{\partial P_f}{\partial \ln W_p} = -P_f P_p \frac{\partial S_p}{\partial \ln W_p}.$$

Estimated standard errors of these derivatives may be calculated in a straightforward manner using the variance-covariance matrix of the estimated parameters.

McFadden (1974) suggests several measures of goodness-of-fit for the multinomial logit model. Among them is a likelihood ratio statistic:

$$-2[L(\hat{\beta}_0) - L(\hat{\beta})], \quad (13)$$

which, under the null hypothesis that all parameters equal zero, is asymptotically distributed as a chi-square variate with k degrees of freedom, where k is the number of estimated parameters. $L(\cdot)$ is the log likelihood evaluated at $\hat{\beta}$, the maximum likelihood estimate of the parameter vector and $\hat{\beta}_0$, a vector of zeros. An analog to the R^2 in a conventional regression is McFadden (1974) likelihood ratio index,

$$R^2 = 1 - \frac{L(\hat{\beta})}{L(\hat{\beta}_0)} = \text{LRI} \quad (14)$$

4.4 Specification of the Models

In order to test the three hypotheses, two models for discrete choice are described in this section: 1) the two-way choice model or binary logit model and 2) the three-way choice or multinomial logit model. Both models use the same set of variables but since they are testing different hypotheses, the expected signs may be different. A general description of the variables follows.

4.4.1 Dependent Variable

Women's labor force participation (WLFP) is a dummy variable which takes two values for the two-way choice model: 0 = not in the labor force, and 1 = in the labor

force. It takes on three values for the three-way choice model: 0= not in the labor force, 1=participating in the informal sector, and 2=participating in the formal sector.⁸⁹

4.4.2 Independent Variables: Description and Motivation

Three main categories of variables explain women's labor force participation: 1) individual and demographic factors:⁹⁰ age, education,⁹¹ and marital status; 2) geographic location factors: urban residence and region; and, 3) socio-economic condition factors: head of household, socio-economic status, nonlabor income, interaction terms (nonlabor income * survey dates), and survey dates.

Individual and demographic factors:

Age

Numerous empirical analyses have pointed out that the probabilities of labor force participation of women differ by age. In this study, age is entered in the labor force participation function as a series of five dummy variables in 10-year ranges: 15 to 20, 21 to 30, 31 to 40, 41 to 50, and 51 to 60.

Education

The effects of education reflect both non-pecuniary factors, such as "tastes" for market work versus work at home, and pecuniary ones such as potential market earnings. Changes of cultural values in Latin America and women's attitudes toward working for

⁸⁹ What truly determines the difference between workers of the formal and the informal sectors is the compliance with laws regulating market work. See more detailed definitions of the formal and the informal sector in Appendix A.

⁹⁰ Although important, the presence of children is not used in this project since the individual data do not have indicators linking children and mothers.

⁹¹ Age and education level dummy variables are included in the labor force participation equations as proxies for offered wages.

pay brought an increase in formal education for women, and consequently opportunities for better jobs. This variable is entered as a series of five dummy variables for the highest level of education completed, or if a student is currently enrolled at the level: primary education, secondary education, technical education and college.

Marital status

In general, married women have the burden of the domestic chores which limits their participation in the labor market. Moreover, the earnings of husbands and partners constitute nonlabor income for these women, which reduce their likelihood of participating in the labor market. A set of dummy variables represents five categories of marital status: single, married, divorced, widowed and “cohabitators.” Women currently cohabitating, i.e. with a partner present, are included with married women. The divorced group includes women who are separated from their husbands. The separate dummy variable “cohabitor” refers to a specific group of Venezuelan women who formerly lived with a partner but who have been abandoned or have decided to separate.

Geographic location factors:

Urban

The dummy variable for urban residence reflects a mix of demand side and taste or preference effects, which are likely to work in the same direction. An urban area may provide more jobs opportunities and better environment for a woman to perform market work. The variable takes the value of one if a women lives in an urban area, and zero otherwise.⁹²

⁹² Definitions of urban and rural areas are found in Appendix A.

Region

The division of the Venezuelan territory into regions organizes states according to their prevalent economic activities and availability of resources. There are nine regions: Capital, Central, Central-Western, Zulian, Andean, Plains, North-Eastern, Insular and Guayana. Since there are different mixes of economic activities, population growth and densities and migration patterns by regions, the likelihood of women's labor force participation may also differ by regions. A dummy variable for every region in the labor force participation equation is included.⁹³

Figure 10 Geographic Areas in Venezuela



Regions of Venezuela: **Zulian** (red), **Guayana** (pink), **Central** (blue), **Central-Western** (orange), **Insular** (purple), **Andean** (green), **North-Eastern** (light green), **Plains** (yellow).

Source: Perry-Castaneda Library. Map Collection. The University of Texas at Austin.

<http://www.lib.utexas.edu/maps>

⁹³ The Guayana region was dropped from this analysis because recent development activities do not allow for reliable data collection. Detailed information about the regions are found in Appendix A.

Socio-economic conditions factors:

Heads of household

Many women in Venezuela are heads of household with a large number of dependents and with few wage earners. Being head of household suggests the woman needs to work to support the household⁹⁴ and indicates the presence of children. This group includes women in all marital status categories. This dummy variable takes on a value of 1 if a woman is head of household and a value of 0 otherwise.

Socio-economic status

These dummy variables are derived from an index calculated by the Modified Graffar method (Hernan Mendez Castellano and Maria Cristina de Mendez, 1994).⁹⁵ This index defines socio-economic classes based on specific living conditions of families. There are five classes: high, medium high, average, relative poverty, and critical poverty. For purposes of this analysis the lowest two classes are combined.

Nonlabor income

Nonlabor income is a continuous variable that enters in the labor force participation equations to capture the effects of wealth on the likelihood of working. The Venezuelan currency is the Bolivar. However, for purposes of this study, nonlabor income is converted into U.S. dollars per month. Although in many studies the husband's income is considered nonlabor income for the wife, it is not included here, nor is the income of other family members.

⁹⁴ As mentioned in footnote 90, one important limitation of this study is the difficulty of identifying women with children. A growing group of single women with children has been identified lately, a trend also observed in developed countries.

⁹⁵ A detailed description of the Graffar-Mendez Castellano method is found in Appendix A.

Survey date

Five dummy variables are used to control for the time when the survey was taken, to capture the influence of short-term variation in economic activity.

Interaction terms

These continuous variables capture the impact of the combined effects of two variables: nonlabor income variable and survey dates. Four interaction variables are considered: nonlabor income * 1997-1, nonlabor income * 1997-2, nonlabor income * 1998-1, and nonlabor income * 1998-2. These variables allow nonlabor income have differing impacts for the different surveys.

4.4.3 Testing Hypothesis No. 1

Using the two-way choice model, the full sample of women will be used to regress the labor force participation equation on individual or demographic factors, geographic factors, and socio-economic conditions.

Regressors' expected signs

Individual and demographic factors:

Age

The youngest group 15 to 20 years of age is the omitted category. Women of these ages are probably students and consequently they are more likely to be out of the labor force. Empirical evidence also suggests that the oldest women are more likely to be out of the labor force. I expect that the coefficients on the dummy variables for other age groups will be positive indicating a greater probability of participation in the labor force than the youngest group. Moreover, according to the National Census (1991), Venezuelan

women ages 30-39 showed the highest labor force participation rate. Therefore, I expect the highest probabilities of participating in the labor market for women between 30 to 50 years of age.

Education

The omitted category in the labor force participation equation is the group of women with no education. We anticipate that the coefficients on all the other education variables will have positive signs and that there will be larger coefficients for higher levels of education.

Marital status

In this study, the omitted category is single women. We expect that the coefficient on the dummy variable indicating a woman is married will be negative since her husband or partner provides the income needed to support the household. We also expect negative coefficients on the dummies variable for divorced and widowed women because usually they receive some kind of legal child support and inheritance, respectively. We expect no significant differences in the coefficient on the dummy variable for “cohabitators” compared to single women.

Geographic location factors:

Urban

Positive coefficients are expected on this variable, reflecting a greater likelihood of market work for women living in urban areas compared to those living in rural areas.

Region

The omitted category is the North-Eastern region which is characterized by low population density, agricultural and oil production activities. Therefore, I expect that the

coefficients on the dummy variables representing residence in areas such as the Capital, Central-Western, Zulian and Andean regions with greater populations and with more industrial and service activities will be positive and significant, indicating higher probabilities of women's participation in the labor force. A priori it is not clear what signs to expect on the coefficients on the dummy variables representing the other regions.

Variables indicating socio-economic conditions:

Heads of household

The study expects the coefficient on the dummy variable indicating that a woman is head of household to be positive and significant, indicating a higher likelihood of labor force participation.

Socio-economic status

It has been suggested that those in the lowest socio-economic status are less likely to work than those in higher classes due to negative attitudes toward work and lack of ambition. Since the omitted category is poverty, we may anticipate positive and successively higher probabilities of participating in the labor force as women achieve higher socio-economic status.

Nonlabor income

According to the neoclassical theory of labor, higher amounts of nonlabor income are associated with higher reservation wage and a lower the probability of participation. Thus, a negative sign on the coefficient for nonlabor income is expected.

Survey date

This study of women's labor force participation corresponds to the period after the financial crisis of 1994 and the further application of the macroeconomic adjustment

program of the Venezuelan Agenda. Since the omitted category is the 1995 survey, we anticipate that the coefficients of the other dummy variables will be positive indicating a greater need of women to supplement lost income due to the economic crisis.

Interaction terms

These terms are entered in the labor force participation equation to allow the effect of nonlabor income to differ between survey dates. It is not clear a priori what the signs the coefficients of these variables will be.

4.4.4 Testing Hypothesis No. 2

This study relies heavily on Hill's (1984) paper in which she emphasized the necessity of considering a third choice with respect to labor force participation, working in the informal sector, in countries such as Japan. Using data from a survey of married women, she found that education and market experience were significantly associated with a greater probability of working in the formal sector. In contrast, she found that husband's income was significantly associated with a greater probability of being out of the labor force. The number of small children increased the probability of being employed in the informal sector or out of the labor force.

I will use the three-way choice model on the sample of women between the ages 15 to 60 to test the second hypothesis about women's decisions to work in the formal or informal sector. The informal sector became more important during the period under analysis because of the deteriorating economic conditions and the shrinkage of the industrial sector, which caused a loss of employment in the formal sector.

Regressors' expected signs

This trichotomous model attempts to explain women's decision to work in both the formal and the informal market sectors. The predicted signs for the same group of regressors are discussed below.

Individual and demographic factors:

Age

As with Hypothesis No. 1, empirical evidence suggests that the youngest and the oldest women are more likely to be out of the labor force. The omitted category is the youngest group, those 15 to 20 years old. I expect that the coefficients on the dummy variables indicating women between 20 and 50 years of age will be positive and significant indicating a greater probability of participating in the labor force than women 15 to 20 years in both the formal and informal sector. However, a priori it is not clear which age groups will be more likely or less likely to work in either sector, compared to the youngest women.

Education

According to human capital theory, education is positively related to labor force participation. I believe it also plays an important role in whether working woman will choose the formal or informal sector. Since the omitted category is women with no education, I expect that higher schooling attainments are associated with higher probabilities of participating in the formal sector compared to women no education. However, an increased likelihood of being employed in the formal sector may mean a negative likelihood of being employed in the informal sector.

Marital status

The omitted category is the single women. As with Hypothesis No.1, we expect that the coefficient on the dummy variable indicating a woman is married will be negative indicating that she will be less likely to participate in either the formal or informal sector. We also expect negative coefficients on the dummy variables for divorced and widowed women because they usually receive some kind of legal child support and inheritance, respectively. However, it is not clear, a priori their preferences to work in the formal or informal sector. With respect to the “cohabitators,” the coefficient on this dummy variable is not expected to be significant from that of single women.

Geographic location factors:

Urban

Guy Standing (1982) reported that in Latin America young single women moved to the towns and cities to take better and higher-paying jobs, or to have access to job training. Consequently, we expect that the coefficients on the dummy variable for urban residence will be positive and higher for women’s labor force participation in the formal sector than in the informal sector since there are more job opportunities in those areas than in rural areas.

Region

Orlando (2001) suggests that, in general, formal and informal workers in Venezuela are concentrated in different economic activities according to the level of capital, technology and scale required. Formal workers are employed mainly in the public sector, in manufacturing, and in intermediate activities (wholesale, financial and insurance services, real estate, communications and transportation). Informal workers are

mainly employed in retail commerce, services for the community and agriculture. In general, there is not a clear-cut separation of activities to be performed by workers of the formal and informal sector. The omitted category is the North-Eastern region which is characterized by low population density, agricultural and oil production activities. However, signs and magnitudes of the coefficients on the dummy variables of the other seven regions will depend on the capacity of the region to generate jobs and the special characteristics of their economies in the period under analysis. I expect that women living in the most industrialized regions of the country will be more likely to participate in the formal sector; and, women living in agricultural and rural areas are more likely to participate in the informal sector.⁹⁶

In the Capital region where the predominant activities are those of the public sector, industry, commerce and finance, I expect that the coefficients will be positive in the formal sector but negative in the informal sector. The Central region is the most important industrial center in the country. Commercial activities have also taken important role as an economic activity in this region. I expect that the coefficient on the dummy variable will show a positive probability of participating in the formal sector compared to the North-Eastern region because the formal sector dominates this region. The Plains region has a long agricultural tradition compared to the others. Therefore we expect a positive coefficient on this dummy variable in the informal sector estimation and a negative coefficient for the formal sector, compared to the North-Eastern region because the informal sector dominates this region. In the Zulian region beside the agricultural and oil production activities, commercial activities and a large underground

⁹⁶ Appendix A contains detailed description of each region.

economy associated with drug trafficking, alcohol, cigarettes and other contraband goods play key roles in the economy. Thus, we expect that the coefficients on this dummy variable will be positive in both labor markets although higher for the informal sector. In the Andean region economic activities are concentrated mainly around agriculture and tourism. So I expect positive signs for the coefficients on this dummy variable indicating that women are more likely to participate in the informal sector. In the Insular region, the predominant activities are fishing, commerce, and tourism. It is expected that the coefficients on this dummy variable will be positive in the informal sector compared to the North-Eastern region. Finally, in the Central-Western region where agriculture, and oil refining are the principal economic activities, it is anticipated that the expected signs of the coefficients on this dummy variable will be positive for both labor markets compared to the North-Eastern region because of generally greater economic activity.

Socio-economic conditions factors:

Heads of household

Female heads of household need to work for pay to support their family's dependents. I expected that the coefficients on this dummy variable will be positive indicating that women are more likely to participate in both labor markets. Given the inability of the Venezuelan economy to supply enough jobs in the period under study, we expect that coefficient will be higher in the informal sector than in the formal one.

Socio-economic status

The omitted category is poverty. We expect that the coefficients on the other dummy variables will be positive, indicating a greater likelihood of participating in both labor markets as women achieve higher status in the socio-economic structure.

Nonlabor income

According to the neoclassical theory of labor, the higher the amount of the nonlabor income, the higher the reservation wage and the lower the probability of labor force participation. Therefore, I expect negative signs for this variable indicating that women are less likely to participate in both sectors.

Survey date

The period under study was characterized by high rates of inflation, successive depreciations of the bolivar with respect to the American dollar, and, in general, employment suffered as a result of the implementation of the Venezuelan Agenda. Since the omitted category is 1995, I expect that the coefficients on the dummy variables for the surveys conducted in 1997 and 1998 will be positive, indicating that women are more likely to participate in both labor markets compared to their behavior in 1995. Moreover, given the structural disequilibrium of the labor market, I expect that those coefficients will be higher in the informal sector than those for the formal sector for all periods.

Interaction terms

This interaction variable is designed to capture the combined effects of nonlabor income and survey dates. I expect to find that the higher value of the combined interaction of nonlabor income and the survey date, the lower women's labor force participation will be in both market sectors.

4.4.5 Testing Hypothesis No. 3a

The binomial logit model is used to examine the decision to participate in the labor force during the 1995-1998 period of three subsamples: married women, single

women, and women heads of household. To test this hypothesis the three subsamples are regressed on the same set of variables as described in section 4.4.3. It is assumed that factors considered in this study affect each subsample in the same manner regardless of the group to which they belong. Consequently, the predicted signs for the subsamples are the same as those for the sample as a whole. However, in keeping with the predictions for the marital status dummy variables, on the variables where positive coefficients were predicted for the whole sample, we might expect to see smaller values for married women than for the other two groups because it is assumed that wives have spousal income. Moreover, we also expect that women heads of household will show larger values for the same variables since they need to support their dependents.

4.4.6 Testing Hypothesis No. 3b

The multinomial logit model is again used to analyze the decision about whether to work in the formal or informal sector of the labor market or be out of the labor force for subsamples of married women, single women, and women heads of household. For each of the three subsamples, the three labor force participation decision options are regressed on the same set of variables as described in section 4.4.4. The predicted signs for the coefficients of the regressors of the three subsamples are the same as those for the sample as a whole, since it is assumed those factors affected Venezuelan women from these three groups in the same manner.

Chapter Five

Research Results

The results of the testing of the three hypotheses about Venezuelan women's labor force participation are presented in this chapter.

The chapter is divided in two sections. The first section describes the samples used for the statistical analyses. The second section presents the empirical results of the binomial and the multinomial logit models.

5.1 Description of the Samples Used for the Regression Equations

Table 1 shows the means and proportions of the variables for the main sample, i.e. women aged 15 to 60 years old, and for the subsamples: married women, single women and women heads of household. All variables were tested for the significance of differences between the means and proportions of married and single women.⁹⁷ The results indicate significant differences at a 1 percent level or greater for nearly all variables.

The results from the entire sample indicate that the largest proportion of women (27 percent) is between 21 and 30 years of age. The largest proportion of married women (32 percent) is between 31 and 40 years old, whereas the majority of single women (45

⁹⁷ Tests of differences in proportions and means between women heads of households and the other two subsamples were not performed because of some coincidences of observations among them. For instance, a woman head of household may be either married or single.

percent) are in the youngest age group, 15 to 20 years of age. The largest percentage of women heads of household (36 percent) is between the ages of 41 and 50.

When we compare the subsamples, we find that as expected, there are more 15 to 20 year-old women among single women than among married women or heads of household. There are also significantly more single women aged 21 to 30 (31 percent). Among married women, the largest percentage is between the ages of 31 to 40 (32 percent), greater than among single women (13 percent), and greater than among heads of household (27 percent). The results also indicate that there is a significantly greater number of women heads of household between the ages of 41 to 60 than among the other subsamples.

Table 1 also shows that less than half of all women have more than a primary education. Twenty-three percent have completed secondary or high school education and still fewer (11 percent) have graduated from college. Those who have completed a technical education represent only 4 percent of the sample. Two-thirds of the married subsample has no more than a primary education. Single women have the most education: 26 percent have a high school education; 7 percent have a technical education; and 15 percent have a college education. Women heads of household have the highest proportion of women with no education, 11 percent.

Half of the total group of women is married, 38 percent are single, and 13 percent are heads of household. Among women heads of household, 36 percent are divorced and 32 percent are single. Eighty-eight percent of women in the sample live in urban areas. With respect to geographic location, the largest proportion of women lives in the Capital

region (24 percent). The smallest proportions are found in the Insular and the Plains regions, 1 and 3 percent, respectively.⁹⁸

For the sample as a whole, 68 percent of women are of high and medium high socio-economic status, 38 percent and 30 percent, respectively. Similar proportions are observed in each of the subsamples. Finally, mean nonlabor income (which does not include the income of other family members) is extremely small. Indeed, 92.4 percent of the sample has none at all.

Table 1 also summarizes main differences in percentages of women working in the formal or informal sector, and not working in the labor market at all. A larger percentage of single women are out of the labor force than among any of the other subsamples (45 percent). This group also has the lowest percentage of women working in the informal sector of any of the other subsamples (12 percent), most likely because so many of this group are young and still in school. Heads of household have the largest percentage in the labor force, over 87 percent. Of these, most (56 percent) work in the formal sector. Finally, 67 percent of married women participate in the labor market. In general, more women from all three subsamples work in the formal sector than in the informal sector, twice as many among married women and heads of household, and more than three times as many among single women.⁹⁹

⁹⁸ See Appendix A for more details about the characteristics and locations of the administrative regions in Venezuela.

⁹⁹ These results contradict what the current literature suggests, i.e. that in Latin American countries, women's participation in the informal sector is greater than in the formal sector (CEPAL, 1999).

Table 1
Description of Samples Used for Regression Equations
(standard deviations in parentheses)

Variable ¹	All Women 15-60	Married Women	Single Women	Women Heads of Household
Age groups				
15 to 20	.210	.064	.454 ^a	.011
21 to 30	.273	.265	.310 ^a	.091
31 to 40	.241	.323	.131 ^a	.265
41 to 50	.179	.236	.070 ^a	.358
51 to 60	.101	.113	.044 ^a	.275
Education				
No education	.055	.060	.041 ^a	.114
Primary	.561	.615	.483 ^a	.604
Secondary	.227	.204	.264 ^a	.158
Technical	.044	.031	.065 ^a	.024
College	.113	.090	.147 ^a	.099
Marital status				
Married	.496			.141
Cohabitors	.012			.035
Widows	.023			.139
Divorced	.087			.362
Single	.382			.323
Urban residence				
	.877	.869	.883 ^a	.889
Regions				
Andean	.115	.115	.118 ^a	.119
Capital	.239	.233	.241 ^a	.263
Central	.127	.131	.127 ^a	.116
Central-Western	.185	.181	.197 ^a	.182
Insular	.012	.013	.010 ^a	.010
North-Eastern	.093	.093	.093	.090
Plains	.027	.029	.025 ^a	.032
Zulian	.202	.205	.190 ^a	.189
Head of household				
	.132	.037	.112 ^a	
Socio-economic status				
High	.379	.365	.390 ^a	.391
Medium High	.303	.297	.307 ^a	.295
Average	.171	.178	.166 ^a	.164
Poverty	.147	.160	.137 ^a	.149
Nonlabor income (US\$/month)				
	0.06 (0.001)	0.03 (0.001)	0.05 ^a (0.001)	0.25 (0.004)
Interaction terms				
Nonlabor income * 1997-1	0.010 (0.0004)	0.004 (0.0003)	0.008 ^a (0.0005)	0.040 (0.002)
Nonlabor income * 1997-2	0.010 (0.0004)	0.005 (0.0004)	0.008 ^a (0.0005)	0.046 (0.002)
Nonlabor income * 1998-1	0.010 (0.0004)	0.005 (0.0004)	0.008 ^a (0.0005)	0.044 (0.002)
Nonlabor income * 1998-2	0.011 (0.0004)	0.006 (0.0005)	0.008 ^a (0.0005)	0.047 (0.002)
Survey date				
1995-1st half	.236	.242	.239 ^a	.211
1997-1st half	.221	.216	.227 ^a	.217
1997-2nd half	.173	.174	.167 ^a	.181
1998-1st half	.186	.184	.185	.197
1998-2nd half	.184	.184	.183	.194
N	86,199	42,791	32,906	11,365 ^d
Formal sector (%)	45.3	44.8	42.2	55.7
Informal sector (%)	18.9	22.1	12.4	31.5

¹ For exact definitions of variables see Appendix A.

^a Significantly different from married women at 1% level. ^b Significantly different from married women at 5% level.

^c Significantly different from married women at 10% level. ^d Includes women of all categories of marital status.

5.2 Determinants of Women Labor Force Participation in Venezuela

Regression results are reported in four different sub-sections in accordance with the hypothesis being tested.

5.2.1 Results of the Testing of Hypothesis No. 1

In this section, the determinants of women's labor force participation and their decision whether to work or not to work are discussed. There are 86,199 observations of which 64.2 percent are in the labor market.

Tables 2 and 3 depict the results of the logistic regression using the sample of women between 15 and 60 years old.¹⁰⁰ Due to the nonlinear nature of the model, the discussion of the results focuses on the marginal probabilities of the variables instead of on their coefficients. The most important factors determining Venezuelan women's propensity to participate in the labor force are the individual characteristics of age, education and marital status. However, interesting insights can also be drawn from the results of the other variables.

Examining first the age variables, we find that, as expected, women between 21 to 60 years old are more likely to participate than are the youngest women; among those, women 31-40 years old are most likely with a marginal probability of 28.1 percent, followed by women 41 to 50 years old with 25.2 percent.¹⁰¹ Consistent with the general theory of human capital investment literature, the results show that education has a powerful impact on labor force participation, and that the probability of participation

¹⁰⁰ Similar results were found using a binomial probit model. See Tables B-1 and B-2 in Appendix B.

¹⁰¹ The lower labor force participation rate among women in their fifties is consistent with the empirical evidence of retirement from the labor force by women of this age group.

increases with a greater educational attainment. There are very similar marginal probabilities of participation, 21 to 23 percent, for women who have completed secondary, technical and college education, compared to women with no education. Marital status also influences a woman's decision to participate in the labor force since all dummy variables' coefficients are statistically significant. Contrary to what was expected, married and divorced women are more likely to participate in the labor market than single women. Cohabitors' marginal probability of labor force participation, unexpectedly, is positive and significant. They are 13.3 percent more likely than single women to participate in the labor market. Widows are 4 percent less likely to participate in the labor market. Finally, the marginal probability of participation for divorced women (16 percent) exhibits the largest difference from the single group of women, four times as large as that of married women.¹⁰² Women living in urban areas are 3 percent more likely to be in the labor market than rural residents. As for the geographic areas of Venezuela, as expected, marginal effects of these dummy variables are positive and significantly different from the North-Eastern area, except for the Insular region. The highest marginal probabilities of labor force participation are found for women living in the Andean, Central, and Central-Western regions with 8.1, 6.6, and 6.2 percentages respectively. The Capital region has the smallest marginal probability with 2.4 percent.

¹⁰² The presence of children is a constraint on the participation of married women. Unfortunately, the data used in this project does not have this variable available.

Table 2
Binomial Logistic Regression Results
Coefficients
Sample: All Women 15-60

Variable	Coefficients	Standard Deviations	z-values
Age groups^a			
21 to 30	1.218***	0.021	56.77
31 to 40	1.573***	0.025	63.52
41 to 50	1.406***	0.025	50.74
51 to 60	0.773***	0.033	23.88
Education^b			
Primary	0.671***	0.034	19.48
Secondary	1.089***	0.038	28.70
Technical	1.392***	0.053	26.07
College	1.234***	0.042	29.10
Marital status			
Married	0.198***	0.019	10.19
Cohabitors	0.698***	0.085	8.18
Widows	-0.184***	0.060	-3.06
Divorced	0.870***	0.040	21.80
Urban residence	0.143***	0.025	5.83
Regions^d			
Andean	0.387***	0.034	11.26
Capital	0.111***	0.030	3.69
Central	0.314***	0.033	9.37
Central-Western	0.290***	0.031	9.38
Insular	0.022	0.073	0.30
Plains	0.124**	0.053	2.33
Zulian	0.186***	0.031	6.02
Head of household	1.381***	0.036	38.19
Socio-economic status			
High	0.085***	0.025	3.38
Medium High	-0.017	0.026	-0.66
Average	-0.0001	0.028	-0.00
Nonlabor income (US\$/ month)	-0.144***	0.045	-3.20
Interaction terms			
Nonlabor income * 1997-1	0.037	0.093	0.40
Nonlabor income * 1997-2	0.012	0.091	0.14
Nonlabor income * 1998-1	0.119	0.094	1.26
Nonlabor income * 1998-2	0.167*	0.094	1.78
Survey date^f			
1997-1st half	0.094***	0.023	4.04
1997-2nd half	0.254***	0.027	9.46
1998-1st half	0.374***	0.027	14.11
1998-2nd half	0.455***	0.027	17.00
Constant	-2.077***	0.054	-38.74
N		86,199	
-2* log likelihood ratio		97,140***	

*** (**, *) = coefficients significant at 1% (5%, 10%) level.

a=omitted category is women 15 to 20 years old.

b=omitted category is women with no education.

c=omitted category is single women.

d=omitted category is the North-Eastern region.

e=omitted category is poverty.

f=omitted category is the 1995-1 period.

Table 3
Binomial Logistic Regression Results
Marginal Effects
Sample: All Women 15-60

Variable	Marginal Effects	Standard Deviations	z-values
Age groups^a			
21 to 30	0.237***	0.004	64.64
31 to 40	0.281***	0.004	78.50
41 to 50	0.252***	0.004	64.54
51 to 60	0.150***	0.005	27.89
Education^b			
Primary	0.149***	0.008	19.49
Secondary	0.211***	0.006	33.68
Technical	0.227***	0.006	39.76
College	0.219***	0.006	38.58
Marital status^c			
Married	0.044***	0.004	10.20
Cohabitors	0.133***	0.014	9.83
Widows	-0.042***	0.014	-2.99
Divorced	0.164***	0.006	26.74
Urban residence	0.032***	0.006	5.73
Regions^d			
Andean	0.081***	0.007	12.00
Capital	0.024***	0.007	3.73
Central	0.066***	0.007	9.84
Central-Western	0.062***	0.006	9.73
Insular	0.005	0.016	0.30
Plains	0.027**	0.011	2.38
Zulian	0.040***	0.007	6.15
Head of household	0.241***	0.005	52.75
Socio-economic status^e			
High	0.019***	0.006	3.38
Medium High	-0.004	0.006	-0.66
Average	-0.000	0.006	-0.00
Nonlabor income (US\$/ month)	-0.032***	0.010	-3.20
Interaction terms			
Nonlabor income * 1997-1	0.008	0.021	0.40
Nonlabor income * 1997-2	0.003	0.020	0.14
Nonlabor income * 1998-1	0.026	0.021	1.26
Nonlabor income * 1998-2	0.037*	0.021	1.78
Survey date^f			
1997-1st half	0.020***	0.005	4.08
1997-2nd half	0.054***	0.006	9.77
1998-1st half	0.079***	0.005	14.79
1998-2nd half	0.095***	0.005	18.06
N		86,199	
-2* log likelihood ratio		97,140***	

*** (**, *) = coefficients significant at 1% (5%, 10%) level.

a=omitted category is women 15 to 20 years old.

b=omitted category is women with no education.

c=omitted category is single women.

d=omitted category is the North-Eastern region.

e=omitted category is poverty.

f=omitted category is the 1995-1 period.

As expected, women heads of household are more likely to participate in the labor market with a marginal probability of 24 percent. Contrary to what was expected, women

of medium high and average status are not more likely to participate in the labor market than are women of poverty status. Women of high status are only 2 percent more likely to participate in the labor market. The reason for these unexpected outcomes may be either that the impact of education overwhelms the variables¹⁰³ or that the variables used to construct the socio-economic index are not sufficient proxies of wealth.¹⁰⁴ As predicted by neoclassical theory, nonlabor income has a negative impact on labor force participation. An additional dollar of nonlabor income per month is predicted to reduce labor force participation by 3 percent. However, when this variable is interacted with the survey dates, the net marginal probability of nonlabor income for the second survey of 1998 becomes positive, but very small, 0.5 percent. Finally, as expected, the marginal probabilities of the dummies for the survey dates are increasingly positive, and significantly different from 1995-1, ranging from 2 to 10 percent in the last period. This behavior might be explained by women's need to preserve the real income of the family during this period, when the economic crisis deepened due to successive periods of inflation and the devaluation of the bolívar.

¹⁰³ However, the correlations between education and the socio-economic variables are not high enough to preclude including both sets of variables.

¹⁰⁴ Javier Parra (2004) asserts that most studies of socio-economic status in Venezuela use measures and definitions that are not exhaustive, and do not apply well to the current characteristics of the Venezuelan economy. According to the author, it is imperative that more research be conducted in this area to allow for comparative analyses of the living conditions of people and to contribute to an understanding of ways to overcome the economic difficulties faced by the majority of the population. Better measures will facilitate decision-making on social policies and income redistribution.

5.2.2 Results of the Testing of Hypothesis No. 2

The full sample contains 86,199 observations. Forty-five percent of the women work in the formal sector and 19 percent work in the informal sector.¹⁰⁵ The dependent variable in the labor force participation equation is a trichotomous variable, which takes the value of zero if the woman is out of the labor market, one if she works in the informal sector, and two if she works in the formal sector. A logit function is used for the estimations. The regressors measure personal and demographic characteristics of the individual women, as well as geographic factors and socio-economic conditions. As discussed in the previous section, because coefficients are more difficult to interpret given the nonlinear nature of the model, the discussion in this section will focus on the marginal effects. Tables 4 and 5 illustrate the coefficients and marginal effects from the multinomial logit regression using the entire sample of women 15 to 60 years of age.¹⁰⁶ In terms of individual and demographic factors, the results indicate that women in all age groups are significantly more likely to participate in the labor market than women 15 to 20 years old. However, the pattern is different in the informal and formal sectors. In the informal sector, the participation of women in the labor force increases with age with the highest marginal effects for the two oldest groups, 41 to 50, and 51 to 60 years of age, with 12 and 11 percent, respectively. In the formal sector, however, the peak marginal impact for age is for the two youngest groups of 21 to 30, and 31 to 40 years of age with marginal probabilities of 19 and 18 percent, respectively. As expected, women 51 to 60 years old are only 4 percent more likely to work in the formal sector compared to the

¹⁰⁵ See Table B-6 in the Appendix B for details.

¹⁰⁶ Similar results using a multinomial probit model were found. See Tables B.3 and B.4 in Appendix B for the results.

youngest women. However, contrary to what was expected, women 51 to 60 years old are just about as likely to work in the informal sector as women 31 to 50 years old. This is probably because women of those ages do not receive the retirement benefits which are available to women who have worked in the formal sector. Finally, for all age groups except for the oldest, the marginal impacts of age on labor force participation are greater in the formal sector than in the informal one.

With respect to education, as expected, all the dummy variables exhibit positive marginal probabilities of labor force participation in the formal sector, but generally negative, much smaller effects in the informal sector. The exception is women with only primary education who are slightly more likely to participate in the informal sector than are women with no education. As the level of education increases, women become more and more likely to participate in the formal sector with marginal effects ranging from 15 to 34 percent. Women with technical and college degrees exhibit the highest marginal probabilities of participation, 34 percent and 32 percent, respectively. These two groups are also the least likely to participate in the informal sector. This is probably due to the fact that employment in the formal sector is considered more desirable because of higher wages and fringe benefits.

Table 4
Multinomial Logit Regression Results
Formal Sector
Sample: All Women 15-60

Variable	Coefficients	Standard Deviations	Marginal Effects	Standard Deviations
Age groups^a				
21 to 30	1.246***	0.023	0.192 ***	0.005
31 to 40	1.522***	0.026	0.182***	0.006
41 to 50	1.307***	0.030	0.133***	0.007
51 to 60	0.621***	0.036	0.036***	0.008
Education^b				
Primary	0.792***	0.040	0.150***	0.009
Secondary	1.361***	0.043	0.278***	0.008
Technical	1.725***	0.057	0.335***	0.008
College	1.554***	0.047	0.315***	0.008
Marital status^c				
Married	0.109***	0.021	-0.012***	0.005
Cohabitors	0.726***	0.088	0.111***	0.017
Widows	-0.223***	0.065	-0.047***	0.013
Divorced	0.881***	0.041	0.122***	0.007
Urban residence	0.176***	0.026	0.039***	0.006
Regions^d				
Andean	0.375***	0.036	0.053***	0.008
Capital	0.189***	0.032	0.058***	0.007
Central	0.266***	0.036	0.024***	0.008
Central-Western	0.327***	0.033	0.064***	0.007
Insular	0.115	0.077	0.050***	0.017
Plains	0.091	0.057	0.003	0.013
Zulian	0.013	0.033	-0.047***	0.007
Head of household	1.292***	0.038	0.126***	0.007
Socio-economic status^e				
High	0.066***	0.027	0.005	0.006
Medium High	0.005	0.028	0.008	0.006
Average	0.012	0.030	0.005	0.007
Nonlabor income (US\$/month)	-0.151***	0.048	-0.028***	0.010
Interaction terms				
Nonlabor income * 1997-1	0.029	0.099	0.002	0.020
Nonlabor income * 1997-2	0.054	0.094	0.022	0.020
Nonlabor income * 1998-1	0.190**	0.098	0.053***	0.020
Nonlabor income * 1998-2	0.235***	0.098	0.058***	0.020
Survey date^f				
1997-1 st half	0.073***	0.025	0.004	0.006
1997-2 nd half	0.243***	0.028	0.033***	0.006
1998-1 st half	0.321***	0.028	0.031***	0.006
1998-2 nd half	0.357***	0.028	0.019***	0.006
Constant	-2.506***	0.059		
N	86,199		39,036	
% of total			45.3	
-2 * log likelihood ratio			160,147.98***	

*** (**, *) = coefficients significant at 1% (5%, 10%) level.

a=omitted category is women 15 to 20 years old.

b=omitted category is women with no education.

c=omitted category is single women.

d=omitted category is the North-Eastern region.

e=omitted category is poverty.

f=omitted category is the 1995-1 period.

Table 5
Multinomial Logit Regression Results
Informal Sector
Sample: All Women 15-60

Variable	Coefficients	Standard Deviations	Marginal Effects	Standard Deviations
Age groups^a				
21 to 30	1.119***	0.031	0.047***	0.004
31 to 40	1.701***	0.033	0.110***	0.005
41 to 50	1.611***	0.037	0.122***	0.006
51 to 60	1.051***	0.043	0.113***	0.008
Education^b				
Primary	0.528***	0.042	0.011*	0.004
Secondary	0.523***	0.048	-0.053***	0.006
Technical	0.496***	0.075	-0.093***	0.006
College	0.466***	0.055	-0.081***	0.005
Marital status^c				
Married	0.444***	0.027	0.057***	0.004
Cohabitors	0.645***	0.107	0.025*	0.014
Widows	-0.095	0.071	0.005	0.009
Divorced	0.880***	0.048	0.047***	0.006
Urban residence	0.051	0.034	-0.008	0.005
Regions^d				
Andean	0.416***	0.046	0.029***	0.007
Capital	-0.123***	0.042	-0.034***	0.005
Central	0.430***	0.045	0.043***	0.007
Central-Western	0.195***	0.042	-0.0008	0.006
Insular	-0.266**	0.109	-0.045***	0.012
Plains	0.206***	0.071	0.024**	0.010
Zulian	0.521***	0.041	0.084***	0.006
Head of household	1.583***	0.042	0.119***	0.006
Socio-economic status^e				
High	0.129***	0.330	0.014***	0.004
Medium High	-0.074**	0.350	-0.011***	0.004
Average	-0.025	0.038	-0.005	0.005
Nonlabor income (US\$/month)	-0.109*	0.058	-0.003	0.007
Interaction terms				
Nonlabor income * 1997-1	0.058	0.116	0.006	0.014
Nonlabor income * 1997-2	-0.096	0.116	-0.019	0.014
Nonlabor income * 1998-1	-0.067	0.118	-0.027*	0.014
Nonlabor income * 1998-2	0.004	0.112	-0.020	0.013
Survey date^f				
1997-1 st half	0.152***	0.032	0.017***	0.005
1997-2 nd half	0.291***	0.037	0.022***	0.005
1998-1 st half	0.510***	0.036	0.050***	0.005
1998-2 nd half	0.693***	0.036	0.078***	0.005
Constant	-3.296***	0.072		
N	86,199		16,303	
% of total			18.91	
-2 * log likelihood ratio			160,147.98***	

*** (**, *) = coefficients significant at 1% (5%, 10%) level.

a=omitted category is women 15 to 20 years old.

b=omitted category is women with no education.

c=omitted category is single women.

d=omitted category is the North-Eastern region.

e=omitted category is poverty.

f=omitted category is the 1995-1 period.

Marital status affects women's labor force participation in various ways. As expected, compared to single women, being married has a small negative impact on labor force participation in the formal sector. However, contrary to what was expected, we found that married women are 6 percent more likely to participate in the informal sector than single women. Cohabiting women also show unexpected behavior. Their marginal probabilities of labor force participation are positive and significant in both sectors although the marginal effect is higher in the formal sector (11 percent) than in the informal sector (3 percent). Widows, as expected, are less likely than single women to participate in the formal sector but, unexpectedly, their labor market behavior is not significantly different from that of single women in the informal sector. Moreover, contrary to what was expected, divorced women are more likely than single women to participate in both sectors but the marginal probability is considerably higher in the formal sector (12 percent) than in the informal sector (5 percent). The highest marginal impacts of marital status on labor force participation are for divorced women in the formal sector and for married women in the informal sector with 12 and 6 percent, respectively. Finally, in general, all the effects of marital status are considerably larger in the formal sector.

In terms of the impact of geographical factors on labor force participation, as expected, women living in urban areas have a significantly positive marginal effect of participating in the formal sector. However, there are no significant differences between women living in rural areas and those living in urban areas with respect to being employed in the informal sector. As for the geographic areas, as expected, in most regions the marginal probabilities of labor force participation are statistically significantly

different from those of women living in the North-Eastern region. The exceptions are for the Plains region in the formal sector and the Central-Western region in the informal sector. The signs were almost all expected, except for the Insular region in the formal sector. Women from the Central, Zulian, Andean and the Plains regions are more likely to participate in the informal sector than women from the North-Eastern region. The Zulian region exhibits the highest marginal probability of 8 percent and the Plains region the lowest, with 2 percent. On the other hand, women living in the Capital and Insular regions are less likely to participate in the informal sector with marginal effects of 3 percent and 5 percent, respectively. In the formal sector, women in almost all regions are significantly more likely to participate in the labor market than women from the North-Eastern region. The Capital and the Central-Western regions exhibit the highest marginal effects of labor force participation of approximately 6 percent. However, women in the Zulian region are 5 percent less likely to participate in the formal sector. The Central region shows the smallest significant difference from the North-Eastern region with a marginal effect of only 2 percent.¹⁰⁷

Women heads of household, as expected, are significantly more likely to participate in both the informal and formal sectors; the marginal effects are almost identical with 13 percent for the formal sector and 12 percent for the informal sector. With respect to socio-economic status, contrary to what was expected, we find no significant impact of these variables on the marginal probabilities of participating in the formal sector. However, in the informal sector the pattern is different: women of the

¹⁰⁷ For detailed information about women's sector-employment by regions, see Table B.5 in Appendix B.

highest status are slightly more likely to participate, and those of medium high status are slightly less likely to participate than are women of poverty status.

The nonlabor income variable shows the expected negative marginal effect on labor force participation only in the formal sector. Labor force participation is reduced by 3 percent for every additional dollar of nonlabor income per month.¹⁰⁸ When this variable is interacted with the survey dates, the net marginal probabilities become positive and significantly different from 1995-1 for the two survey periods in 1998.¹⁰⁹ The only significant marginal effect in the informal sector is for the first survey of 1998. At that time, an additional dollar of nonlabor income per month is predicted to reduce labor force participation by 3 percent.

Expected but interesting results are observed for the dummy variables associated with the survey dates. In the informal sector, we see marginal probabilities of participation increasing from 2 percent to 8 percent between the first survey of 1997 to the second survey of 1998. Conversely, in the formal sector, the marginal effects decrease slightly over these periods. All the probabilities of participation in the informal sector are positive and increasingly greater than the probabilities of participating in the formal sector. This increasing participation of women in the informal labor market through the successive years is related to the level of economic activity during the period of this analysis.¹¹⁰ In addition, the ability of the formal sector to provide jobs decreased due to

¹⁰⁸ This result seems like a very strong effect, but mean nonlabor income is only 6 cents per month.

¹⁰⁹ The same reasons pointed out for the results in the first hypothesis apply here, with net marginal effects of around 3 percent in the formal sector.

¹¹⁰ During this period the remedial policy entitled the Venezuelan Agenda was still being implemented. Miguel A. Santos (2003) asserts that its implementation had an immediate negative effect on the GDP per capita of -2.3%. The Venezuelan Agenda was accompanied by a small negative effect on the GDP in 1996 (0.2%), and positive effect in 1997 (6.1%) although there was some improvement of the oil activity due to the increase in oil prices and due to

the costs associated with providing these jobs, i.e. contracting costs, health and retirement benefits, etc.

5.2.3 Results of the Testing of Hypothesis No. 3a

In this section the determinants of labor force participation of married, single, and women heads of household are discussed.

5.2.3.1 Results for Married Women

The subsample of married women includes 42,791 observations of which 67 percent participate in the labor market. Tables 6 and 7 show the coefficients and marginal effects from the binomial logit regression for this group. The most important factors affecting Venezuelan married women's decision to participate in the labor market are age, education, being heads of household, and the survey date. Many of these results are similar to those of the full sample of women but there are some differences. For example Table 7 shows no significant difference between the propensity to participate of women 51 to 60 years old and that of the youngest group. However, in the full sample, the marginal effect of that age group is positive and highly significant at 15 percent.

The highest marginal probability of participation is among those married women 31 to 40 years old, and the lowest probability is among women 21 to 30 years old, prime child-

subsequent investment in this sector. Since the oil industry is a capital-intensive activity, this recovery was not able to reduce the rates of unemployment in relation to the pre-adjustment period (second half of 1995). On the contrary, the employment rate registered a sustained decrease from 1996 until the end of 1999. The unemployment rate of 10.2% before the launching of the Venezuelan Agenda increased still further. During the seven periods of this study (first half of 1996 to the first half of 1999), a total of 742,139 jobs were eliminated, 667,221 in the formal sector of the economy, and 73,262 in the informal sector. During these three years, there was also a change in the composition of the population employed in the informal sector, which increased from 48% of total employment in the second half of 1995 to 51% in the first half of 1999 (Santos 2003).

bearing years. But even women in this age group are 7 percent more likely to participate in the labor market than are the youngest women.

With respect to education, we found that the probabilities of labor force participation for all levels of education are positive, increasing with the level of education, and significantly different from the group of married women with no education. The largest probability is shown for married women with a college degree, with 28 percent, which is 6 percentage points higher than the marginal probability for same group of women in the full sample. The lowest marginal probability of labor force participation is found to be for married women with a primary education, who are still 10 percent more likely to participate in the labor force than those with no education.

Table 6
Binomial Logistic Regression Results
Coefficients
Subsample: Married Women

Variable	Coefficients	Standard Deviations	z-values
Age groups^a			
21 to 30	0.351***	0.035	10.14
31 to 40	0.697***	0.034	20.34
41 to 50	0.515***	0.038	13.71
51 to 60	-0.031	0.044	-0.71
Education^b			
Primary	0.472***	0.044	10.66
Secondary	1.106***	0.050	21.90
Technical	1.672***	0.090	18.55
College	1.916***	0.067	28.67
Urban residence	0.181***	0.033	5.51
Regions^d			
Andean	0.412***	0.048	8.64
Capital	-0.037	0.041	-0.90
Central	0.324***	0.046	7.01
Central-Western	0.303***	0.043	7.06
Insular	0.141	0.099	1.43
Plains	0.083	0.071	1.17
Zulian	0.048	0.042	1.13
Head of household	1.060***	0.071	14.97
Socio-economic status			
High	0.110***	0.034	3.20
Medium High	-0.031	0.035	-0.88
Average	0.018	0.038	0.48
Nonlabor income (US\$/ month)	-0.136*	0.078	-1.74
Interaction terms			
Nonlabor income * 1997-1	0.859***	0.211	4.08
Nonlabor income * 1997-2	0.485***	0.183	2.65
Nonlabor income * 1998-1	0.547	0.182	3.01
Nonlabor income * 1998-2	0.553***	0.174	3.19
Survey date^f			
1997-1st half	0.101***	0.031	3.23
1997-2nd half	0.302***	0.037	8.26
1998-1st half	0.445***	0.037	12.18
1998-2nd half	0.551***	0.037	14.90
Constant	-1.030***	0.072	-14.22
N		42,791	
-2* log likelihood ratio		50,386.58***	

*** (**, *) = coefficients significant at 1% (5%, 10%) level.

a=omitted category is women 15 to 20 years old.

b=omitted category is women with no education.

c=omitted category is single women.

d=omitted category is the North-Eastern region.

e=omitted category is poverty.

f=omitted category is the 1995-1 period.

Table 7
Binomial Logistic Regression Results
Marginal Effects
Subsample: Married Women

Variable	Marginal Effects	Standard Deviations	z-values
Age groups^d			
21 to 30	0.073***	0.007	10.52
31 to 40	0.142***	0.007	21.70
41 to 50	0.104***	0.007	14.63
51 to 60	-0.007	0.009	-0.70
Education^b			
Primary	0.103***	0.010	10.52
Secondary	0.204***	0.008	26.34
Technical	0.241***	0.007	33.27
College	0.276***	0.005	50.40
Urban residence	0.040***	0.007	5.39
Regions^d			
Andean	0.083***	0.009	9.31
Capital	-0.008	0.009	-0.90
Central	0.066***	0.009	7.41
Central-Western	0.062***	0.008	7.37
Insular	0.030	0.020	1.47
Plains	0.018	0.015	1.19
Zulian	0.010	0.009	1.14
Head of household	0.180***	0.009	20.53
Socio-economic status^e			
High	0.023***	0.007	3.22
Medium High	-0.007	0.007	-0.88
Average	-0.004	0.008	0.48
Nonlabor income (US\$/ month)	-0.029*	0.017	-1.74
Interaction terms			
Nonlabor income * 1997-1	0.184***	0.045	4.08
Nonlabor income * 1997-2	0.104***	0.039	2.65
Nonlabor income * 1998-1	0.117***	0.039	3.01
Nonlabor income * 1998-2	0.119***	0.037	3.19
Survey date^f			
1997-1st half	0.021***	0.007	3.27
1997-2nd half	0.062***	0.007	8.63
1998-1st half	0.090***	0.007	13.03
1998-2nd half	0.110***	0.007	16.25
N		42,791	
-2* log likelihood ratio		50,386.58***	

*** (**, *) = coefficients significant at 1% (5%, 10%) level.

a=omitted category is women 15 to 20 years old.

b=omitted category is women with no education.

c=omitted category is single women.

d=omitted category is the North-Eastern region.

e=omitted category is poverty.

f=omitted category is the 1995-1 period.

We find that married women living in urban areas have a slightly higher marginal probability of participation than the full sample of women. Although almost all regional dummy variables' marginal probabilities for the full sample of women are significant and positive, we find that marginal effects for married women are significantly different from

the North-Eastern region only for the Central, Central-Western, and the Andean regions, all of which are quite similar, varying only from 6 to 8 percent for the Central-Western and the Andean regions, respectively.

Married women heads of household are 18 percent more likely to participate in the labor market than married women who are not. This is 6 percentage points lower than for the full sample of women. Results for the socio-economic status variables are similar to that of the full sample of women: only married women of the highest status are more likely to participate in the labor market than those of lowest status. Nonlabor income shows a negative marginal probability similar to that of the whole sample. However, when we interact the latter variable with the survey date (the interaction term variable) for the subsample of married women, the net probabilities of participating in the labor market are all significantly and, (inexplicably) strongly positive compared to 1995-1, for all periods. (For the whole sample, the interaction terms were generally not significant.) An additional dollar of nonlabor income per month is predicted to increase married women's labor force participation from 7.5 to 15.5 percentage points during the entire period. Finally, survey date variables for married women exhibit positive and increasing marginal probabilities ranging from 2 to 11 percent significantly different from the 1995-1 period. These marginal effects are generally stronger than those of the full sample of women. The main reason for these stronger effects is the increases in the unemployment rate, which affected the husbands' income in the period under study, forcing married women to increase their participation in the labor force to compensate for the loss of family income.

5.2.3.2 Results for Single Women

The subsample of single women contains 32,906 observations of whom 55 percent are in the labor market. Tables 8 and 9 show the coefficients and marginal effects from the binomial logit regression using this subsample. Many of the marginal probabilities are similar to those we found for the full sample of women. However, in general, the effects are much stronger. With respect to the age variable, all age groups are more likely to participate in the labor force than those ages 15-20. The marginal probabilities range from 32 percent for the oldest women, to 42 percent for those between 31 and 40 years old. Women with all levels of education are significantly more likely to participate in the labor force than are those with none. The highest marginal probability is for those with a technical education, 32 percent; the lowest is among those with a college education, at 26 percent.

Single women living in urban areas are 3 percent more likely to participate in the labor market than are those living in rural areas, a result similar to that from the full sample. As for the marginal effects of regional variables, we see positive marginal probabilities for all regions, similar to those found for the full sample, although considerably stronger. For instance, single women living in the Andean region are 11 percent more likely to participate in the labor force than those in the North-Eastern region, versus 8 percent for the whole sample.

Table 8
Binomial Logistic Regression Results
Coefficients
Subsample: Single Women

Variable	Coefficients	Standard Deviations	z-values
Age groups^a			
21 to 30	1.821***	0.031	59.60
31 to 40	2.480***	0.049	50.12
41 to 50	2.629***	0.073	36.16
51 to 60	1.778***	0.080	22.10
Education^b			
Primary	1.499***	0.073	20.63
Secondary	1.607***	0.076	21.21
Technical	1.694***	0.088	19.16
College	1.206***	0.079	15.36
Urban residence	0.117***	0.042	2.75
Regions^d			
Andean	0.484***	0.058	8.40
Capital	0.351***	0.051	6.84
Central	0.418***	0.057	7.40
Central-Western	0.347***	0.052	6.66
Insular	0.063	0.137	0.46
Plains	0.359***	0.093	3.86
Zulian	0.526***	0.053	9.92
Head of household	1.523***	0.070	21.87
Socio-economic status			
High	0.043	0.043	1.02
Medium High	-0.026	0.045	-0.58
Average	-0.019	0.049	-0.40
Nonlabor income (US\$/ month)	-0.257***	0.081	-3.17
Interaction terms			
Nonlabor income * 1997-1	-0.592***	0.177	-3.34
Nonlabor income * 1997-2	0.079	0.169	0.47
Nonlabor income * 1998-1	0.229	0.185	1.24
Nonlabor income * 1998-2	0.256	0.187	1.37
Survey date^f			
1997-1st half	0.091**	0.039	2.33
1997-2nd half	0.145***	0.045	3.20
1998-1st half	0.254***	0.044	5.75
1998-2nd half	0.330***	0.044	7.45
Constant	-3.055***	0.100	-30.40
N		32,906	
-2* log likelihood ratio		35,458.24***	

*** (**, *) = coefficients significant at 1% (5%, 10%) level.

a=omitted category is women 15 to 20 years old.

b=omitted category is women with no education.

c=omitted category is single women.

d=omitted category is the North-Eastern region.

e=omitted category is poverty.

f=omitted category is the 1995-1 period.

Table 9
Binomial Logistic Regression Results
Marginal Effects
Subsample: Single Women

Variable	Marginal Effects	Standard Deviations	z-values
Age groups^d			
21 to 30	0.389***	0.005	71.34
31 to 40	0.423***	0.005	86.04
41 to 50	0.406***	0.005	75.51
51 to 60	0.322***	0.009	35.59
Education^b			
Primary	0.349***	0.015	22.63
Secondary	0.344***	0.013	26.03
Technical	0.318***	0.011	29.60
College	0.258***	0.014	18.75
Urban residence	0.029***	0.010	2.73
Regions^d			
Andean	0.113***	0.013	8.87
Capital	0.084***	0.012	7.00
Central	0.099***	0.013	7.73
Central-Western	0.083***	0.012	6.84
Insular	0.015	0.033	0.46
Plains	0.084**	0.021	4.04
Zulian	0.123***	0.012	10.42
Head of household	0.304***	0.010	30.75
Socio-economic status^e			
High	0.011	0.010	1.02
Medium High	-0.006	0.011	-0.58
Average	-0.005	0.012	-0.40
Nonlabor income (US\$/ month)	-0.063***	0.020	-3.17
Interaction terms			
Nonlabor income * 1997-1	-0.144***	0.043	-3.34
Nonlabor income * 1997-2	0.019	0.041	0.47
Nonlabor income * 1998-1	0.056	0.045	1.24
Nonlabor income * 1998-2	0.062	0.045	1.37
Survey date^f			
1997-1st half	0.022**	0.009	2.34
1997-2nd half	0.035***	0.011	3.23
1998-1st half	0.061***	0.010	5.85
1998-2nd half	0.079***	0.010	7.65
N		32,906	
-2* log likelihood ratio		35,458.24***	

*** (**, *) = coefficients significant at 1% (5%, 10%) level.

a=omitted category is women 15 to 20 years old.

b=omitted category is women with no education.

c=omitted category is single women.

d=omitted category is the North-Eastern region.

e=omitted category is poverty.

f=omitted category is the 1995-1 period.

Socio-economic status has no significant impact on labor force participation for this group. The impact of nonlabor income is twice as large for single women as for the sample as a whole. However in this regression the interaction term between nonlabor income and the period 1997-1 is significant and has the expected negative sign. An

additional dollar of nonlabor income per month is predicted to reduce labor force participation by 21 percent relative to first half of 1995. The coefficient on the interaction term for the second half of 1998 is not significantly in this regression, in contrast to the results for the whole sample. Regarding the survey date dummy variables, as expected, the marginal probabilities are increasingly positive, and significantly different from 1995-1 ranging from 2 to 8 percent in the last period. These results are similar to those for the whole sample.

5.2.3.3 Results for Women Heads of Household

Finally, the subsample of women heads of household consists of 11,365 observations of which 87 percent are in the labor market. Tables 10 and 11 display the coefficients and marginal effects from the binomial logit regression using this subsample.

As noted earlier, this group has the highest rate of labor force participation of any of the subsamples. We see a number of differences in the marginal effects of the marital status variables, urban residence, regions, socio-economic status, interactions terms, and the survey date, compared to the full sample of women.

Age variables again show positive marginal probabilities of labor force participation compared to the youngest women. However, the group 41 to 50 years old exhibits the highest marginal probability: they are 16 percent more likely to be in the labor force whereas those of 31 to 40 years old have the highest marginal probability for the full sample of women.

Table 10
Binomial Logistic Regression Results
Coefficients
Subsample: Women Heads of Household

Variable	Coefficients	Standard Deviations	z-values
Age groups^a			
21 to 30	1.644***	0.215	7.65
31 to 40	2.295***	0.205	11.18
41 to 50	2.092***	0.201	10.42
51 to 60	1.247***	0.200	6.23
Education^b			
Primary	0.727***	0.079	9.17
Secondary	1.554***	0.128	12.12
Technical	1.948***	0.328	5.95
College	1.673***	0.163	10.24
Marital status			
Married	-0.740***	0.090	-8.25
Cohabitors	0.036	0.171	0.21
Widows	-0.833***	0.083	-10.08
Divorced	0.124	0.085	1.46
Urban residence	0.013	0.094	0.14
Regions^d			
Andean	0.147	0.132	1.12
Capital	-0.089	0.116	-0.77
Central	0.198	0.135	1.47
Central-Western	0.098	0.120	0.82
Insular	-0.401	0.279	-1.44
Plains	-0.263	0.178	-1.48
Zulian	-0.044	0.118	-0.37
Socio-economic status			
High	-0.049	0.099	-0.50
Medium High	-0.189*	0.100	-1.89
Average	-0.155	0.109	-1.42
Nonlabor income (US\$/ month)	-0.191**	0.082	-2.32
Interaction terms			
Nonlabor income * 1997-1	-0.542***	0.149	-3.63
Nonlabor income * 1997-2	-0.410***	0.144	-2.84
Nonlabor income * 1998-1	-0.493***	0.156	-3.17
Nonlabor income * 1998-2	-0.347**	0.149	-2.33
Survey date^f			
1997-1st half	0.018	0.098	0.18
1997-2nd half	0.196*	0.113	1.73
1998-1st half	0.367***	0.114	3.22
1998-2nd half	0.444***	0.116	3.83
Constant	-0.333	0.258	-1.29
N		11,365	
-2* log likelihood ratio		7,634.36***	

*** (**, *) = coefficients significant at 1% (5%, 10%) level.

a=omitted category is women 15 to 20 years old.

b=omitted category is women with no education.

c=omitted category is single women.

d=omitted category is the North-Eastern region.

e=omitted category is poverty.

f=omitted category is the 1995-1 period.

Table 11
Binomial Logistic Regression Results
Marginal Effects
Subsample: Women Heads of Household

Variable	Marginal Effects	Standard Deviations	z-values
Age groups^a			
21 to 30	0.087***	0.007	12.96
31 to 40	0.145***	0.010	13.85
41 to 50	0.157***	0.014	11.03
51 to 60	0.089***	0.012	7.38
Education^b			
Primary	0.068***	0.008	8.46
Secondary	0.092***	0.005	17.80
Technical	0.085***	0.006	14.47
College	0.089***	0.005	17.58
Marital status^c			
Married	-0.080***	0.012	-6.88
Cohabitors	0.031	0.015	0.21
Widows	-0.093***	0.011	-8.17
Divorced	0.011	0.007	1.49
Urban residence	0.001	0.008	0.14
Regions^d			
Andean	0.012	0.010	1.17
Capital	-0.008	0.010	-0.75
Central	0.016	0.010	1.56
Central-Western	0.008	0.010	0.84
Insular	-0.041	0.033	-1.24
Plains	-0.025	0.018	-1.34
Zulian	-0.004	0.011	-0.37
Socio-economic status^e			
High	-0.004	0.009	-0.49
Medium High	-0.017*	0.009	-1.83
Average	-0.014	0.010	-1.37
Nonlabor income (US\$/ month)	-0.017**	0.007	-2.32
Interaction terms			
Nonlabor income * 1997-1	-0.047***	0.013	-3.63
Nonlabor income * 1997-2	-0.036***	0.013	-2.85
Nonlabor income * 1998-1	-0.043***	0.014	-3.17
Nonlabor income * 1998-2	-0.030**	0.013	-2.33
Survey date^f			
1997-1st half	0.002	0.008	0.19
1997-2nd half	0.016*	0.009	1.83
1998-1st half	0.029***	0.008	3.53
1998-2nd half	0.035***	0.008	4.28
N		11,365	
-2* log likelihood ratio		7,634.36***	

*** (**, *) = coefficients significant at 1% (5%, 10%) level.

a=omitted category is women 15 to 20 years old.

b=omitted category is women with no education.

c=omitted category is single women.

d=omitted category is the North-Eastern region.

e=omitted category is poverty.

f=omitted category is the 1995-1 period.

Turning to the education variables, we see considerably smaller effects than the whole sample. The highest marginal effects are for secondary education, technical education, and college degrees, all approximately 9 percent. For the sample as a whole,

the marginal effects for technical education and college education were both around 22 percent.

With respect to marital status, married and widowed heads of household are 8 and 9 percent, respectively, less likely to participate in the labor market than are single heads of household. Cohabitors and divorced heads of household are not statistically different from single heads of household, in contrast to the results from the full sample of women, where they were significantly more likely to participate in the labor market.

Examining next geographical factors, we find that for women heads of household, living in an urban area has no impact on labor force participation, in contrast to the full sample for whom living in an urban area has a positive and significant effect. As for the region variables, none of the marginal probabilities are significant. This contrast sharply with the numerous regional differences found for the full sample of women.

Among the socio-economic status variables, only the marginal probability for medium high status is significant, the negative sign indicates that women in this group are less likely to participate in the labor force than heads of household classified as being in poverty. These results differ considerably from those from the full sample of women where we found a significant marginal probability only for women with high status, indicating that they are 2 percent *more* likely to participate in the labor market. The nonlabor income variable shows a negative marginal probability of 2 percent, similar to the result obtained from the full sample of women. When we interact the nonlabor income variable with the survey date, we find significant negative marginal probabilities for all the periods under study, with the highest net effect on labor participation for the first half of 1997 and the first half of 1998. For these periods, an additional dollar of

nonlabor income per month *decreases* the likelihood of labor participation of women heads of household by 6 percent. In contrast, the marginal effects of the interaction terms in the full sample are not significantly different from the first half of 1995, except for the second half of 1998 when there is a net positive effect on labor participation of 0.5 percent.

Finally, with respect to the survey dates, three of the four marginal probabilities are positive and increasing with successive periods, a pattern similar to that of the full sample.

5.2.3.4 Comparisons Among the Three Subsamples

Tables 7, 9, and 11 show the results of the binomial regressions for married women, single women, and women heads of household.

Regarding age, we find similar results among the three subsamples although the marginal effects are stronger for single women. As for education, the relative marginal effects are similar for the three subsamples, but the magnitudes are considerably less for women heads of household. For example, the marginal effect of having a secondary education is 34 percent for single women, but only 9 percent for women heads of household.

With respect to geographic factors, urban residence has a positive impact on the labor force participation of married and single women but not of women heads of household. As for the region dummy variables, we found considerable differences in marginal probabilities of labor force participation for the three subsamples. Only for single women did we find positive and significant probabilities of labor force

participation for all regions, except for the insular region (which is not significant for any of the three subsamples), compared to the North-Eastern region. None of the marginal probabilities for the regional dummy variables are significant for women heads of household.

Regarding the socio-economic status variables, we find positive marginal probabilities for married women with high socio-economic status but negative marginal probabilities for women heads of household compared to women living in poverty. The marginal effects of the interaction term variables are positive and significant for married women, but negative and significant for women heads of household. For single women, only one of the interaction terms had a significant negative impact, for the period of 1997-1. Finally, turning to the survey date variables, we find all three subsamples of women showing positive, significant, and increasing probabilities of participation in the labor force compared to the 1995-1 period. Again, the Venezuelan economic crisis during this period explains these impacts on the labor force participation.

5.2.4 Results of the Testing of Hypothesis No. 3b

In this section, regression results for married women, single women, and women heads of household are discussed. In this case, the women's decisions are whether to work in the formal sector, the informal sector, or to be out of the labor force entirely.

5.2.4.1 Results for Married Women

The subsample of married women includes 42,791 observations of which 45 percent work in the formal sector, and 22 percent work in the informal sector. Tables 12

and 13 show the coefficients and marginal effects from the multinomial logit regression for married women.¹¹¹

Married women in all age groups are significantly more likely to work in the informal sector than are those 15 to 20 years old, as are those 21 to 50, in the formal sector. Those 51 to 60 are 10 percent less likely and those 21-30 are more likely to be employed in the formal sector. Older married women are more likely to work in the informal sector with marginal probabilities fairly constant at around 10 percent for all age groups. In the formal sector, we see the highest probabilities of participating for the two youngest groups (at approximately 5 percent). In general, the marginal effects of age are smaller in both regressions than for the full sample. The greatest differences show up in the formal sector where the marginal effects are less than one third the size as the corresponding effects for the whole sample among women 40 and younger, and become non-significant or negative for the older age groups.

As for education, nearly all the marginal probabilities of labor force participation in both markets are significantly different from those with no education. These results are similar to those obtained for the full sample of women, except that women with only a primary education are no longer more likely to work in the informal sector than are women with no education. As in the whole sample, more education makes it more likely that married women will participate in the formal sector and less likely to work in the informal sector. The marginal effects of having a college or a technical degree are somewhat stronger among married women with respect to the formal sector than among the full sample.

¹¹¹ This group is comprised of cohabitating women (in the American sense of the term) and women whose husbands are living in the same household.

The results show that living in an urban area has a positive, significant impact on being employed in the formal sector but not in the informal sector, as for the whole sample. Geographic region does have an important impact on the labor market behavior of married women. For instance, those in the Capital and Insular regions are 4 to 5 percent less likely to participate in the informal sector than those in the North-Eastern region. Conversely, married women in the Zulian and Central regions exhibit the highest marginal probabilities of participating in the informal sector with 9 and 6 percent, respectively. In the formal sector, married women living in the Capital, Andean, and Central-Western regions are more likely to be employed, with marginal probabilities of 3, 5 and 7 percentages, respectively. Finally, married women from the Zulian region are the most likely to work in the informal sector, and the least likely to be employed in the formal sector. These results are similar to those obtained from the full sample, except that in the formal sector the marginal probabilities of living in the Central and Insular regions are not significant.

Table 12
Multinomial Logit Regression Results
Formal Sector
Subsample: Married Women

Variable	Coefficients	Standard Deviations	Marginal Effects	Standard Deviations
Age groups^a				
21 to 30	0.354***	0.037	0.052***	0.008
31 to 40	0.599***	0.037	0.048***	0.008
41 to 50	0.365***	0.041	0.001	0.009
51 to 60	-0.258***	0.049	-0.100***	0.011
Education^b				
Primary	0.551***	0.052	0.098***	0.012
Secondary	1.381***	0.058	0.270***	0.012
Technical	2.041***	0.095	0.363***	0.013
College	2.296***	0.073	0.388***	0.010
Urban residence	0.208***	0.036	0.039***	0.008
Regions^c				
Andean	0.405***	0.052	0.053***	0.011
Capital	0.042	0.045	0.031***	0.010
Central	0.242***	0.050	0.006	0.011
Central-Western	0.354***	0.046	0.066***	0.010
Insular	0.263***	0.105	0.082	0.023
Plains	0.026	0.079	-0.014	0.017
Zulian	-0.184***	0.047	-0.086***	0.010
Head of household	1.041***	0.075	0.114***	0.013
Socio-Economic status^d				
High	0.065*	0.037	-0.003	0.008
Medium-High	-0.012	0.038	0.004	0.008
Average	0.022	0.041	0.005	0.009
Nonlabor income (US\$/month)	-0.1026	0.085	-0.005	0.020
Interaction terms				
Nonlabor income * 1997-1	0.914***	0.222	0.148***	0.044
Nonlabor income * 1997-2	0.596***	0.193	0.127***	0.041
Nonlabor income * 1998-1	0.671***	0.191	0.139***	0.039
Nonlabor income * 1998-2	0.690***	0.182	0.143***	0.037
Survey date^e				
1997-1st half	0.068**	0.034	-0.001	0.008
1997-2nd half	0.279***	0.040	0.030***	0.009
1998-1st half	0.392***	0.039	0.035***	0.009
1998-2nd half	0.450***	0.040	0.026	0.009
Constant	-1.469***	0.081		
N	19,161			
%	44.8			
-2 * log likelihood	84,714.50***			

*** (**,*) = coefficients significant at 1% (5%, 10%) level.

a=omitted category is women 15 to 20 years old.

b=omitted category is women with no education.

c=omitted category is the North-Eastern region.

d=omitted category is poverty.

e=omitted category is the 1995-1 period.

Table 13
Multinomial Logit Regression Results
Informal Sector
Subsample: Married Women

Variable	Coefficients	Standard Deviations	Marginal Effects	Standard Deviations
Age groups^a				
21 to 30	0.334***	0.046	0.021***	0.007
31 to 40	0.895***	0.045	0.096***	0.007
41 to 50	0.795***	0.049	0.107***	0.009
51 to 60	0.350***	0.057	0.095***	0.011
Education^b				
Primary	0.384***	0.055	0.012	0.009
Secondary	0.590***	0.064	-0.055***	0.009
Technical	0.776***	0.097	-0.111***	0.010
College	1.053***	0.083	-0.101***	0.008
Urban residence	0.122***	0.044	0.0007	0.007
Regions^c				
Andean	0.425***	0.061	0.031***	0.010
Capital	-0.211***	0.055	-0.040***	0.008
Central	0.475***	0.059	0.061***	0.019
Central-Western	0.204***	0.056	-0.002	0.009
Insular	-0.163	0.140	-0.052***	0.018
Plains	0.192**	0.091	0.032**	0.015
Zulian	0.385***	0.054	0.092***	0.010
Head of household	1.085***	0.080	0.068***	0.012
Socio-Economic status^d				
High	0.185***	0.043	0.026***	0.007
Medium-High	-0.072	0.045	-0.011*	0.007
Average	0.010	0.048	-0.0005	0.007
Nonlabor income (US\$/month)	-0.201*	0.114	-0.024	0.019
Interaction terms				
Nonlabor income * 1997-1	0.774***	0.260	0.041	0.036
Nonlabor income * 1997-2	0.205	0.249	-0.025	0.037
Nonlabor income * 1998-1	0.263	0.237	-0.023	0.034
Nonlabor income * 1998-2	0.280	0.219	-0.022	0.031
Survey date^e				
1997-1st half	0.171***	0.042	0.023***	0.007
1997-2nd half	0.356***	0.048	0.033***	0.008
1998-1st half	0.549***	0.047	0.056***	0.008
1998-2nd half	0.732***	0.047	0.084***	0.008
Constant	-2.146***	0.094		
N	9,474			
%	22.1			
-2 * log likelihood	84,714.50***			

*** (**,*) = coefficients significant at 1% (5%, 10%) level.

a=omitted category is women 15 to 20 years old.

b=omitted category is women with no education.

c= omitted category is the North-Eastern region.

d=omitted category is poverty.

e=omitted category is the 1995-1 period.

Married heads of household are significantly more likely to participate in both markets, although the marginal effect is considerably stronger in the formal sector with 11 percent compared to 7 percent. The magnitude of the marginal effect in this case is

virtually identical to that of the whole sample in the formal sector but considerably smaller in the informal sector.

As for the whole sample, socio-economic status has no significant effect on the probability of married women participating in the formal sector. Also similar to the whole sample, high status married women are more likely to participate in the informal sector but those of medium-high status are less likely to do so. Although all of these marginal effects are small, the positive effect for high-status women is slightly larger for married women than for the sample as a whole.

Unexpectedly, nonlabor income by itself is not statistically significant for married women in either sector. However, for the interaction terms between the survey date and nonlabor income, contrary to our expectations, we see *positive* marginal effects on labor force participation for the formal sector. An additional dollar of nonlabor income per month is predicted to increase the likelihood of being employed in the formal sector by 13 to 15 percent. The interaction variables have no impact on women's labor force participation in the informal sector. Compared to the whole sample, the marginal effects of nonlabor income for married women have become significant for all 4 variables, compared with only the latest two we saw in Table 4. Moreover, the coefficients are more than twice as large. In any case, the signs of the coefficients and marginal effects are counter to the predictions of economic theory and require additional explanation.

Examining finally the survey date variables, we find that the likelihood of participating in the informal sector is positive and increasing throughout. By the second half of 1998, married women are 8 percent more likely to work in the informal sector. The magnitudes of these effects are similar to those of the whole sample. However,

probabilities of being employed in the formal sector are positive and significant only for the second half of 1997 and for the first half of 1998 at which times they were around 3 percent more likely to participate, marginal effects very similar to those of the entire sample. The main difference we see is that for married women the dummy variable for the last period is no longer significant.

5.2.4.2 Results for Single Women

The subsample of single women contains 32,906 observations of which 42 percent work in the formal sector, and 12 percent work in the informal sector. Tables 14 and 15 show the results from the multinomial logit regression for this group. The tables illustrate that the marginal effects are, in general, significantly different from the omitted categories of the age, education, urban residence and head of household dummy variables in both markets. The impact of age on labor force participation is stronger in the formal sector where marginal probabilities ranging from 21 to 33 percent, compared to the informal sector where they range from 7 to 12 percent. However, in the formal sector the lowest marginal effect on labor force participation is among those 51 to 60 years old, while in the informal sector the lowest probability is found for the youngest age group. Compared to the whole sample, the marginal probabilities of the age variables on participation in the formal sector are much higher, while for informal sector are almost identical.

Table 14
Multinomial Logit Regression Results
Formal Sector
Subsample: Single Women

Variable	Coefficients	Standard Deviations	Marginal Effects	Standard Deviations
Age groups^a				
21 to 30	1.846***	0.032	0.326***	0.007
31 to 40	2.451***	0.051	0.318***	0.009
41 to 50	2.570***	0.075	0.289***	0.012
51 to 60	1.688***	0.084	0.211***	0.012
Education^b				
Primary	1.649***	0.065	0.325***	0.016
Secondary	1.865***	0.083	0.381***	0.015
Technical	1.996***	0.095	0.389***	0.013
College	1.585***	0.070	0.319***	0.016
Urban residence	0.154***	0.045	0.040***	0.010
Regions^c				
Andean	0.496***	0.060	0.096***	0.014
Capital	0.427***	0.054	0.106***	0.012
Central	0.409***	0.059	0.073***	0.014
Central-Western	0.381***	0.055	0.082***	0.012
Insular	0.115	0.143	0.036	0.034
Plains	0.392***	0.097	0.083***	0.022
Zulian	0.432***	0.056	0.054***	0.013
Head of household	1.475***	0.086	0.179***	0.012
Socio-Economic status^d				
High	0.042	0.045	0.008	0.010
Medium-High	-0.001	0.047	0.006	0.011
Average	-0.001	0.052	0.004	0.012
Nonlabor income (US\$/month)	-0.256***	0.084	-0.051***	0.018
Interaction terms				
Nonlabor income * 1997-1	-0.646***	0.189	-0.135***	0.042
Nonlabor income * 1997-2	0.010	0.176	0.015	0.038
Nonlabor income * 1998-1	0.274	0.189	0.065	0.040
Nonlabor income * 1998-2	0.260	0.192	0.052	0.041
Survey date^e				
1997-1st half	0.091**	0.041	0.017*	0.009
1997-2nd half	0.160***	0.047	0.035***	0.011
1998-1st half	0.209***	0.046	0.026***	0.010
1998-2nd half	0.251***	0.046	0.023**	0.010
Constant	-3.524***	0.108		
N			13,882	
%			42.2	
-2 * log likelihood			53,647.16***	

*** (**, *) = coefficients significant at 1% (5%, 10%) level.

a=omitted category is women 15 to 20 years old.

b=omitted category is women with no education.

c=omitted category is the North-Eastern region.

d=omitted category is poverty.

e=omitted category is the 1995-1 period.

Table 15
Multinomial Logit Regression Results
Informal Sector
Subsample: Single Women

Variables	Coefficients	Standard Deviations	Marginal Effects	Standard Deviations
Age groups^a				
21 to 30	1.706***	0.049	0.065***	0.005
31 to 40	2.597***	0.064	0.110***	0.008
41 to 50	2.800***	0.088	0.122***	0.011
51 to 60	1.988***	0.099	0.113***	0.014
Education^b				
Primary	1.263***	0.048	0.040***	0.008
Secondary	0.949***	0.080	-0.019***	0.008
Technical	0.768***	0.126	-0.053***	0.008
College	0.507***	0.105	-0.039***	0.008
Urban residence	-0.038	0.064	-0.012*	0.007
Regions^c				
Andean	0.447***	0.086	0.018**	0.009
Capital	0.012	0.080	-0.022***	0.007
Central	0.458***	0.085	0.026***	0.009
Central-Western	0.226***	0.079	0.002	0.008
Insular	-0.148	0.241	-0.020	0.020
Plains	0.244*	0.144	0.003	0.014
Zulian	0.811***	0.078	0.069***	0.010
Head of household	1.816***	0.079	0.124***	0.009
Socio-Economic status^d				
High	0.51	0.062	0.003	0.006
Medium-High	-0.110	0.067	-0.011*	0.006
Average	-0.77	0.073	-0.008	0.007
Nonlabor income (US\$/month)	-0.238**	0.107	-0.011	0.010
Interaction terms				
Nonlabor income * 1997-1	-0.457**	0.229	-0.013	0.021
Nonlabor income * 1997-2	0.318	0.215	0.033*	0.019
Nonlabor income * 1998-1	-0.058	0.244	-0.009	0.021
Nonlabor income * 1998-2	0.198	0.226	-0.007	0.019
Survey date^e				
1997-1st half	0.095	0.061	0.005	0.006
1997-2nd half	0.092	0.072	0.0008	0.007
1998-1st half	0.433***	0.067	0.036***	0.007
1998-2nd half	0.621***	0.066	0.057***	0.008
Constant	-4.092***	0.140		
N			4,078	
%			12.4	
-2 * log likelihood			53,647.16***	

*** (**, *) = coefficients significant at 1% (5%, 10%) level.

a=omitted category is women 15 to 20 years old.

b=omitted category is women with no education.

c=omitted category is the North-Eastern region.

d=omitted category is poverty.

e=omitted category is the 1995-1 period.

Turning to the education variables, we see similar strong positive marginal effects of education in the formal sector, ranging from 32 to 39 percent, compared to those with no education. In the informal sector, as in the two previous regressions, negative marginal

probabilities were found, except for those with only a primary education, who were 4 percent more likely to participate. These negative effects are greater for higher levels of education. For both sectors, the most significant effects are observed amongst single women with a technical education, who are 39 percent more likely to be employed in the formal sector and 5 percent less likely to work in the informal sector. In the formal sector the positive marginal effects are generally stronger than those observed for the sample as a whole whereas in the informal sector the negative marginal effects are weaker.

Single women living in urban areas are 4 percent more likely to be employed in the formal sector, an almost identical result as that found for the whole sample. They are 1 percent less likely to work in the informal sector than are those living in rural areas. In most geographic areas of Venezuela, single women are 5 to 11 percent more likely to participate in the formal sector than in the North-Eastern region. The highest marginal probability of 11 percent is found for those from the Capital region; the lowest probability of 5 percent is exhibit by those from the Zulian region. For the whole sample, women from the latter region are less likely to participate in the formal sector compared to women living in the North-Eastern region while the marginal effect for single women is positive.

Examining in more detail the informal sector, we find that, as expected, single women living in the Capital region are less likely to participate than those women living in the North-Eastern region. Positive and significant marginal probabilities of labor force participation were observed among those from the Central, the Andean and the Zulian regions with 3, 2, and 7 percent, respectively. These differences can be attributed to the varying availability of resources and economic activities that exist in each region.

Compared to the full sample, in general the marginal effects of region for single women are larger in the formal sector but smaller and less significant in the informal sector.

Single women heads of household are significantly more likely to participate in both sectors although the likelihood is higher in the formal sector with 18 percent compared to 12 percent found in the informal sector, virtually the same pattern as in the full sample. Also as in the full sample, socio-economic status has virtually no impact on labor force participation in the formal sector.¹¹² However, in the informal sector, single women with medium-high socio-economic status show negative marginal probabilities of participation indicating that they are less likely to participate than those living in poverty. This unexpected result is also similar to that found for the full sample. The effect of nonlabor income is negative, as expected, in the formal sector, but is not statistically significant in the informal sector, as with the full sample. However, the negative effect is nearly twice as large for single women. When we examine the interaction terms, in the formal sector we find that only for the first half of 1997 is the variable significant. The net effect of nonlabor income is particularly strong for this period: an additional dollar of nonlabor income per month is predicted to reduce labor force participation 19 percent. In contrast, for the whole sample, only the interaction terms for the last two periods (1998-1 and 1998-2) are significant (but positive). In the informal sector, the interaction terms are generally insignificant as in the full sample.

Finally, the survey date variable shows greater marginal probabilities of participating in the formal sector for single women after 1995. The highest marginal

¹¹² Free education in Venezuela might explain this behavior. In other words, higher education allows women to have access to employment in the formal sector regardless of socio-economic status. The so-called democratization of education facilitated the entrance of women into the labor force.

effect occurs during the second half of 1997 with 4 percent. This is generally the same pattern observed for the whole sample. In the informal sector, the effects of time are smaller and less significant than for the full sample with significant positive marginal effects only for the last two periods of 1998, at 4 and 6 percent, respectively.

5.2.4.3 Results for Women Heads of Household

The final subsample of women heads of household accounts for 11,365 observations of which 55.7 percent work in the formal sector, and 31.5 percent, in the informal sector.¹¹³ Tables 16 and 17 show the coefficients and marginal probabilities from the multinomial logit regression for women heads of household.

There are considerable differences between the results for this subsample and the results for the full sample. For example, this study finds that heads of household over 20 are no more likely to participate in either sector than are younger women. This lack of significance may be due to the extremely small percentage of heads of household 20 and younger.¹¹⁴

¹¹³ Table B.6 in Appendix B provides aggregate information from the three subsamples.

¹¹⁴ The results would doubtless be different if the omitted category were changed, but it was left the same as in the previous regressions to facilitate comparisons between results for the three subsamples.

Table 16
Multinomial Logit Regression Results
Formal Sector
Subsample: Women Heads of Household

Variable	Coefficients	Standard Deviations	Marginal Effects	Standard Deviations
Age groups^a				
21 to 30	1.661***	0.231	0.057	0.057
31 to 40	2.303***	0.221	0.086	0.055
41 to 50	2.080***	0.217	0.081	0.054
51 to 60	1.204***	0.217	0.021	0.056
Education^b				
Primary	0.947***	0.088	0.140***	0.016
Secondary	1.974***	0.134	0.263***	0.015
Technical	2.376***	0.332	0.262***	0.023
College	2.148***	0.168	0.296***	0.015
Marital Status^c				
Married	-0.809***	0.073	-0.075***	0.016
Cohabiters	0.031	0.180	0.009	0.027
Widows	-0.944***	0.092	-0.102***	0.016
Divorced	-0.027	0.084	-0.005	0.012
Urban residence	0.130	0.099	0.060***	0.016
Regions^d				
Andean	0.147	0.137	0.008	0.021
Capital	0.048	0.121	0.070***	0.018
Central	0.220	0.140	0.019	0.021
Central-Western	0.188	0.125	0.051***	0.019
Insular	-0.216	0.291	0.066	0.050
Plains	-0.309	0.188	-0.040	0.032
Zulian	-0.309***	0.125	-0.123***	0.020
Socio-Economic status^e				
High	-0.087	0.103	-0.024	0.016
Medium High	-0.164	0.104	0.0002	0.016
Average	-0.184	0.114	-0.025	0.018
Nonlabor income (US\$/month)	-0.213***	0.087	-0.022	0.015
Interaction terms				
Nonlabor income * 1997-1	-0.581***	0.160	-0.052*	0.031
Nonlabor income * 1997-2	-0.374***	0.151	-0.002	0.028
Nonlabor income * 1998-1	-0.379***	0.151	0.038	0.030
Nonlabor income * 1998-2	-0.312**	0.157	0.002	0.027
Survey date^f				
1997-1st half	-0.005	0.102	-0.009	0.017
1997-2nd half	0.216*	0.117	0.016	0.018
1998-1st half	0.312***	0.118	-0.014	0.018
1998-2nd half	-0.338***	0.120	-0.037**	0.018
Constant	-0.927***	0.200		
N	6,330			
%	55.7			
-2 * log likelihood	19,929.12***			

***, (**, *) = coefficients significant at 1% (5%, 10%) level.

a=omitted category is women 15 to 20 years old.

b=omitted category is women with no education.

c=omitted category is single women.

d=omitted category is the North-Eastern region.

e=omitted category is poverty.

f=omitted category is the 1995-1 period.

Table 17
Multinomial Logit Regression Results
Informal Sector
Subsample: Women Heads of Household

Variables	Coefficients	Standard Deviations	Marginal Effects	Standard Deviations
Age groups^a				
21 to 30	1.663***	0.278	0.033	0.058
31 to 40	2.352***	0.268	0.065	0.055
41 to 50	2.192***	0.264	0.082	0.054
51 to 60	1.385***	0.264	0.073	0.056
Education^b				
Primary	0.500***	0.087	-0.064***	0.015
Secondary	0.930***	0.139	-0.165***	0.014
Technical	1.249***	0.349	-0.172***	0.022
College	0.836***	0.178	-0.201***	0.014
Marital Status^c				
Married	-0.707***	0.102	-0.011	0.015
Cohabitators	-0.009	0.188	-0.008	0.025
Widows	-0.748***	0.096	0.002	0.015
Divorced	0.060**	0.088	0.008	0.011
Urban residence	-0.145	0.102	-0.058***	0.016
Regions^d				
Andean	0.149	0.143	0.005	0.020
Capital	-0.325***	0.128	-0.077***	0.017
Central	0.033	0.146	-0.002	0.020
Central-Western	-0.033	0.131	-0.041**	0.018
Insular	-0.713**	0.332	-0.104***	0.043
Plains	-0.194	0.195	0.014	0.030
Zulian	0.244**	0.127	0.115***	0.020
Socio-Economic status^e				
High	0.016	0.107	0.020	0.015
Medium High	-0.218**	0.109	-0.017	0.015
Average	-0.110	0.118	0.010	0.017
Nonlabor income (US\$/month)	-0.159*	0.093	0.005	0.015
Interaction terms				
Nonlabor income * 1997-1	-0.482***	0.171	0.003	0.030
Nonlabor income * 1997-2	-0.479***	0.169	-0.035	0.028
Nonlabor income * 1998-1	-0.699***	0.182	-0.082***	0.029
Nonlabor income * 1998-2	-0.398**	0.165	-0.029	0.026
Survey date^f				
1997-1st half	0.053	0.107	0.011	0.016
1997-2nd half	0.194	0.124	0.002	0.017
1998-1st half	0.471***	0.124	0.045***	0.017
1998-2nd half	0.614***	0.125	0.073***	0.018
Constant	-1.057***	0.317		
N			3,579	
%			31.5	
-2 * log likelihood			19,929.12***	

***, (**, *) = coefficients significant at 1% (5%, 10%) level.

a=omitted category is women 15 to 20 years old.

b=omitted category is women with no education.

c=omitted category is single women.

d=omitted category is the North-Eastern region.

e=omitted category is poverty.

f=omitted category is the 1995-1 period.

The education variables exhibit strong positive marginal probabilities in the formal sector, and strong negative impacts in the informal sector.¹¹⁵ The marginal probabilities of participation increase in magnitude with the level of education in both sectors. For instance, a woman head of household with a college education has the highest marginal probability of participating, 30 percent in the formal sector, and -20 percent in the informal sector. In the formal sector, the marginal impacts of education are slightly larger in this subsample than in the full sample. In the informal sector, the negative impacts are considerably larger for this group.

Married and widowed heads of household are 8 and 10 percent, respectively, less likely to participate in the formal sector than single heads of household, similar results as for the full sample but with larger magnitudes for this subsample. However, unlike the full sample, cohabitators and divorced heads of household are not significantly more likely to participate in the formal sector than single heads of household.

Also unlike in the full sample, for heads of household marital status is not significantly related to participation in the informal sector. This result may be due to the extremely small percentage of single heads of household working in the informal sector (3 percent).¹¹⁶

Living in an urban area increases the likelihood that a woman head of household will be employed in the formal sector by 6 percent, and decreases the probability of

¹¹⁵ Thus their incentive to acquire more education, as it allows them to earn more competitive wages. This is not the topic of this study but it is important to mention it.

¹¹⁶ Only 117 single heads of household participate in the informal sector from a total of 3,670 single women heads of household working in both sectors.

working in the informal sector by the same amount, larger and more significant impacts than for the whole sample.

Turning to the regional variables, we find positive marginal probabilities of participation in the formal sector for women heads of household living in the Capital and Central-Western regions, indicating that they are more likely to participate than those living in the North-Eastern region. In contrast, women heads of household living in the Zulian region are 12 percent less likely to work in the formal sector. As we compare these results to those from the full sample of women, we find that fewer regions from the subsample are significant but the signs and magnitudes of these coefficients are generally consistent with those of the larger sample. As for the informal sector, on the other hand, women living in the Zulian region are 12 percent *more* likely to work in the informal sector, and those from the Capital, the Central-Western and Insular regions are less likely to do so, with marginal probabilities of -8, -4, and -10 percent, respectively. Although results from the full sample show statistical significance for more of the region variables, the coefficients for these four regions are larger and more significant in this subsample. As in the full sample, socio-economic status for women heads of household is not significantly related to labor force participation in the formal sector. However, unlike in the full sample, neither does socio-economic status impact participation in the informal sector.

Nonlabor income by itself does not impact participation in either sector for this subsample, unlike the full sample where it has the expected negative influence on being employed in the formal sector.

Examining nonlabor income interacted with the survey date, negative probability of participation in the formal sector is found for women heads of household only for the first half of 1997, indicating that an additional dollar of nonlabor income per month variable decreases the probability of participation by 5 percent. These results differ considerably from those for the full sample where it is interaction terms for 1998 that are significant in the formal sector. Women heads of household show a negative marginal probability of participation in the informal sector only in the first half of 1998, indicating that an additional dollar of nonlabor income per month decreases the probability of participation by 8 percent compared to 1995. This result is similar to that for the full sample except the impact is over twice as larger for women heads of household.

Turning to the survey date variables, we see that women heads of household are 4 percent less likely to participate in the formal sector for the second half of 1998 than during the first half of 1995. This contrasts with results from the full sample that show positive marginal probabilities of participation in the formal sector *after* the second half of 1997. As for the informal sector, women heads of household are 5 to 7 percent more likely to participate in 1998-1 and 1998-2 than in 1995-1. The coefficients are slightly smaller and generally less significant than those for the same variables for the full sample. As discussed earlier, the reason for these outcomes is likely the increases in the unemployment rate during those time periods and the inability of the formal sector to absorb labor.

5.2.4.4 Comparisons Among the Three Subsamples

Tables 12, 14, and 16 show the results of the multinomial regressions for the labor market behavior of married, single, and women heads of household in the formal sector.

These results show that among both married and single women age generally has a strong impact on their participation in this sector, although the marginal effects of the latter group are considerably stronger than in the former. For instance, single women 31-40 are 32 percent more likely to participate in this sector, whereas married women of the same ages are only 5 percent more likely to do so. Among both subsamples those of all ages are more likely to be participate than the youngest women except for married women 51 to 60 who are 10 percent less likely to do so.¹¹⁷

Turning to the education variables, women from all three subsamples are more likely to work in the formal sector than those with no education, with marginal probabilities increasing with the level of education. Married women with a college education and single women with a technical education exhibit the highest marginal effects on participation. In general, education has a somewhat smaller impact on participation in the formal sector among women heads of household than among the other two groups.

Living in an urban area has similar effects for all three subsamples with marginal probabilities varying only from 4 to 6 percent. As for the geographic areas, living in the Insular region has no significant impact on participation in the formal sector for any of

¹¹⁷ As discussed in the previous section, the age variables may not be significant for heads of household because the sample size of the omitted category is so small: only 1 percent of heads of household are under 21 years old.

the subsamples. As for the other regions, we see generally the largest marginal effects among single women: those in all regions are 5 to 11 percent more likely to participate than single women living in the North-Eastern region. Fewer of the marginal effects are significant among married women and women heads of household but among both of these groups we see a significant negative effect for living in the Zulian region.

Ceteris paribus, socio-economic status has no impact on the labor force participation in the formal sector for women of any of the three subsamples.

To see the full effect of nonlabor income we need to examine the net effect of the nonlabor income variable plus the interaction terms. Nonlabor income has the expected negative impact generally only among single women, one that is particularly strong in the first half of 1997. Unexpectedly, it has a strong *positive* impact among married women.¹¹⁸

Finally, the survey date variable has positive and significant marginal effects on the participation of single women for all periods, indicating greater participation than in 1995. The results for the other subsamples are mixed and less consistent.

Tables 13, 15, and 17 show the results of the multinomial regressions for married, single, and women heads of household with respect to their participation in the informal sector. As in the formal sector, age has a significant impact only for the subsample of single and married women. However, unlike in the formal sector, the marginal effects of age are generally quite similar for the two groups.

Education has a strong impact on labor force participation in this sector as well as in the formal sector. However, unlike in the formal sector, the impact is generally negative. These marginal effects are considerably stronger among heads of household: a

¹¹⁸ This result may be caused by the atypical nature of households with any nonlabor income, only 7 percent of the whole sample. Recall that spouse's income is not included in this variable.

woman head of household with a college degree is 20 percent less likely to participate in the informal sector whereas a single woman with the same education is only 4 percent less likely to do so.

Single women and women heads of household living in urban areas are significantly less likely to participate in the informal sector than are those living in rural areas. This effect is considerably stronger for the latter group.

As for the geographic areas, we see some similarities in the results for all three subsamples. For example, women living in the Capital and Insular regions are less likely to participate in the informal sector, and those living in the Zulian region are significantly more likely to do so. Although there is considerable variability in the levels of significance of the results for the other dummy variables, women living in the Central, Andean and Plains regions seem more likely to participate in this sector and those in the Central-Western region, less likely to do so. More of the regional dummy variables are significant for married women than for women in the other subsamples, probably since this group is more likely to be place-bound. In general the marginal effects are largest among women heads of household and smallest among single women.

Socio-economic status (as measured by this survey) seems to have no consistent impact on participation in the informal sector for any of the subsamples. High status married women are slightly more likely to be employed in the informal sector than those of poverty status. However, both single and married women of medium high status are slightly less likely to do so. Nonlabor income (either alone or interacted with the survey date) also has no consistent impact on participation in the informal sector.

Finally, marginal probabilities associated with dates of the survey are all positive generally significant, and increasing with time for all three subsamples. These effects are particularly pronounced among married women.

Chapter Six

Conclusions

This chapter summarizes the main findings regarding the determinants of female labor force participation in Venezuela during the second half of 1990s. Limitations and opportunities for future research are also discussed.

6.1 Main Findings

This dissertation is the first attempt to investigate the labor behavior of Venezuelan women at the end of the last century using micro data from 1995-1998. The decision to participate or not to participate in the labor market is studied for the whole sample of women 15-60 years old and also for subsamples of married women, single women and women heads of household. Labor force participation in the formal and informal sectors is also analyzed using the same groups.

The main findings drawn from this study are summarized below, organized by the explanatory variables:

6.1.1 Age

Age is one of the most important determinants of labor force participation of women. With respect to the simplest decision of whether to work or to be out of the labor market, as expected, the results indicate that women of all ages are significantly more

likely to participate in the labor market than are women 15 to 20 years old. Women 31 to 40 years old show the highest marginal probability, 28 percent. In general, married and single women follow the same pattern although the marginal effects are much stronger in the latter group. For example, the marginal probability associated with the 31-40 year age group is three times higher (42 percent versus 14 percent). In contrast, among women heads of household, those 41 to 50 years old are the ones exhibiting the highest marginal probability of participation. We also note some differences between the full sample of women and women from the three subsamples with respect to the lowest probability of participation. For the whole sample, women 51 to 60 years old are the ones with the lowest marginal probability, only 15 percent more likely to participate than those 15-20 years old. We see the same pattern among single women and women heads of household; for married women the marginal probability is insignificant. As before, the impact is considerably larger for single women, with a marginal probability of 32 percent compared with only 9 percent for women heads of household.

When women face a three-way choice, to participate in the formal sector, to participate in the informal sector, or to be out of the labor market, age impacts women's labor force participation in the formal and informal sectors differently. The impact of age on labor force participation is generally greater in the formal sector than in the informal sector. A number of other differences can be seen. For example, for the full sample, participation in the informal sector increases with age whereas those 21 to 40 are most likely to participate in the formal sector. Turning to the subsamples, the results show that among married women, the marginal effects of age are smaller in both sectors than in the full sample. The greatest differences are found in the formal sector where the marginal

effects are less than one third the size of the corresponding effects for the whole sample among women 21 to 40 years old, and become insignificant or negative for the older groups. However, in the informal sector, married women over 30 years old are significantly more likely to participate than the youngest women, with generally larger marginal effects than in the formal sector. In contrast, the impact of age on the participation of single women is stronger in the formal sector than in the informal sector and stronger than for the sample as a whole.

Contrary to what was expected, women heads of household over 20 are no more likely to participate in either sector than are younger women. The extremely small percentage of women heads of household 20 years old and younger doubtless explains this lack of significance.

6.1.2 Education

In general, consistent with the theory of human capital investment literature, the results of this study show that education has a strong impact on women's decision to participate in the labor market. Examining first the two-way choice, we find that the marginal probabilities are positive and generally increasing with greater educational attainment both for the whole sample and for the three subsamples. However, there are some interesting differences. In general, the highest marginal probabilities are found for women with a technical or a college education (22-23 percent). Examining next the subsamples, we find that among married women the highest marginal effect (28 percent) is clearly for those with a college degree. Among single women, the highest probabilities are for those with only a primary or secondary education, with 34-35 percent marginal

probabilities. It is noteworthy that education exerts considerably smaller effects on women heads of household than among women from the other subsamples. Among this group the highest marginal probabilities are only 9 percent for those with secondary, technical and college educations.

When women face a three-way decision, the education variables exhibit positive marginal probabilities of labor force participation in the formal sector ranging from 15 to 34 percent, generally increasing with level of education. In contrast, for levels of education higher than primary we find negative effects in the informal sector ranging from 5 to 9 percent with the largest marginal effects associated with the highest level of education. For the sample as a whole, both the largest positive and largest negative marginal probabilities are found for women with technical degrees in the formal and informal sector, respectively. Considering next the results of the three subsamples, we find similar patterns in the formal and informal sectors as for the full sample: women from all three subsamples are more (less) likely to participate in the formal (informal) sector than those with no education, with marginal probabilities increasing in magnitude with the level of education. For example, married women exhibit positive and increasing significant probabilities of participation in the formal sector with the highest marginal probability of 39 percent for those with a college degree, higher than the 32 percent for the whole sample. In the informal sector, the highest negative effects are found among married women with technical and college educations with marginal probabilities of 10-11 percent, slightly larger effects than we find for the whole sample. Among single women in the formal sector the marginal effects of education are larger than among the full sample. The greatest difference is for those with a primary education where the

marginal effect is 33 percent compared to 15 percent for the whole sample. The general negative impacts of education upon participation in the informal sector are smaller among single women than among the whole sample. However, single women with only a primary education are three times as likely to work in the informal sector as was true for the whole sample. Finally, for women heads of household in the formal sector the marginal probabilities associated with education are somewhat smaller than those of the full sample. In the informal sector, magnitudes of the marginal effects are all negative and considerably larger for this subsample than for the whole sample.

Comparing the results among the three subsamples, single women with technical degrees and married women with college degrees exhibit the highest marginal probabilities of participation in the formal sector with 39 percent each. These two groups are also among those least likely to participate in the informal sector. In general, education has a somewhat smaller impact on participation in the formal sector among women heads of household than among women of the other two groups. In the informal sector, on the other hand, the negative impacts are considerably larger for this group. For instance, a woman head of household with a college degree is 20 percent less likely to participate in the informal sector whereas a single woman with the same education is only 4 percent less likely to do so.

6.1.3 Marital Status

Considering first the impact of the marital status variable on women's decision to participate in the labor market for the full sample of women, we see results that are contrary to what expected. For instance, *ceteris paribus*, married and divorced women are

more likely to participate in the labor market than single women with marginal probabilities of 4 and 16 percent, respectively, and cohabitators' marginal probability of labor force participation is positive and significant (13 percent). However, some results are as expected: widows are less likely to participate in the labor market (-4 percent). Examining the subsample of heads of household, we see that married and widowed heads of household are less likely to participate in the labor market than are single heads of household with marginal probabilities of 8 and 9 percent, respectively. Cohabitators and divorced heads of household are not statistically different from single heads of household, in contrast to the results from the full sample of women, where they were significantly more likely to participate in the labor market.

Considering next the three-way choice of women to participate in the formal sector, informal sector, or not to participate at all, we find that being married or widowed has a small negative impact on participation in the formal sector with marginal probabilities of -1 percent and -5 percent, respectively. However, married women are more likely to participate in the informal sector than are single women. Cohabiting women are more likely than single women to participate in both sectors, although the marginal effect is higher in the formal sector (11 percent versus 3 percent). Widows, as expected, are less likely than single women to participate in the formal sector but, unexpectedly, their labor market behavior is not significantly different from that of single women in the informal sector. Divorced women are also more likely than single women to participate in both sectors but the marginal probability is considerably higher in the formal sector (12 percent versus 5 percent). The highest marginal impacts of marital status on labor force participation are for divorced women in the formal sector where they

are 12 percent more likely to participate than single women. The effects of marital status are generally considerably larger in the formal than in the informal sector.

Finally, with respect to the head of household subsample, married and widowed heads of household are less likely to participate in the formal sector than single heads of household, similar results as for the full sample but with larger magnitudes for this subsample. However, unlike in the full sample, cohabitators and divorced heads of household are not significantly more likely to participate in the formal sector than single heads of household. Also unlike in the full sample, for heads of household marital status is not significantly related to participation in the informal sector. This result may be due to the extremely small percentage of single heads of household (the omitted category) working in the informal sector.

6.1.4 Urban Residence

Living in an urban area increases the likelihood that women as a whole participate in the labor market by 3 percent. Results for married and single women show similar marginal probabilities, but for women heads of household this variable has no significant effect.

Regarding the decision to participate in the formal or in the informal sector, we find considerable differences between the sectors. The marginal effect of living in an urban area on participation in the formal sector is positive for the full sample (4 percent), whereas the variable has no significant impact in the informal sector. When we compare these results to those from the subsamples, we find similar positive marginal probabilities of participation in the formal sector with the highest one among women heads of

household at 6 percent. However, there is considerable disparity among the subsamples with respect to participation in the informal sector. Single women and women heads of household living in urban areas are significantly *less* likely to participate in the informal sector than are those living in rural areas. This effect is considerably stronger for the latter group and definitively contrary to what was found in the full sample. However as in the full sample, the variable is not significant for the subsample of married women.

6.1.5 Regions

We find considerable differences among regions that can be attributed to the varying availability of resources and economic activities that exist in each region. In general, for all women, as expected, almost all of the marginal effects of these dummy variables are positive and significantly different from the North-Eastern area. The highest marginal probabilities of labor force participation are found for women living in the Andean, Central, and Central-Western regions. The Capital region has the smallest marginal probability. As for the three subsamples, we also find considerable differences. Only among single women did we find positive and significant probabilities of labor force participation for all regions, except for the Insular region (which is not significant for any of the three subsamples), compared to the North-Eastern region. None of the marginal probabilities for the regional dummy variables are significant for women heads of household. This contrasts sharply with the numerous regional differences found for the full sample of women. Probably women who are heads of household have little choice about working, regardless of where they live.

For the whole sample facing a three-way choice decision, those living in all regions except for the Zulian and Plains regions are more likely to be employed in the formal sector than those living in the North-Eastern region. Only the Zulian region are women less likely to be employed in the formal sector. As for the informal sector, positive significant marginal probabilities are found for women living in the Central, Zulian, Andean and the Plains regions. Those in the Zulian region are 8 percent more likely to be employed in this sector; those in the Plains region are only 2 percent more likely. Negative marginal effects are found for women living in the Capital and the Insular regions.

Comparing results of each subsample to those from the full sample, the marginal effects of region on participation in the formal sector are almost all significant, all larger than in the full sample, and all positive, even in the Zulian region. Among married women fewer of the regional variables are significant than in the full sample, but the signs are generally consistent. Only three of the marginal probabilities for women heads of household are significant, but their signs are consistent with those of the whole sample. However, heads of household living in the Zulian region are considerably less likely to be employed in the formal sector than for the sample as a whole, -12 percent compared to -5 percent.

As for the marginal probabilities of participation in the informal sector, for married women we find generally similar but larger marginal effects than the results from the full sample. For women heads of household, only 4 out of the 7 regional marginal probabilities are significant but the signs are consistent with those of the full sample. In

general, the marginal effects for this subsample are stronger than those from the whole sample.

Turning next to a comparison of results from the subsamples, in the formal sector, we see generally the largest marginal effects among single women, all positive effects varying from 5 to 11 percent. Fewer of the marginal effects are significant among married women and women heads of household but among both of these groups we see a significant negative effect associated with living in the Zulian region.

As for the impact of region on the decision to participate in the informal sector, we also see some similarities in the results for all three subsamples. For example, women living in the Capital and Insular regions are less likely to participate in the informal sector and those living in the Zulian region are significantly more likely to do so. Although there is considerable variability in the levels of significance of the results for the other variables, women living in the Central, Andean and Plains regions seem more likely to participate in this sector and those in the Central-Western region, less likely to do so. More of the regional dummy variables are significant for married women than for women in the other subsamples, probably since this group is more likely to be place-bound. In general the marginal effects are largest among women heads of household and smallest among single women.

6.1.6 Heads of Household

Our analysis of the whole sample indicates that women heads of household are 24 percent more likely to participate in the labor force than are those who are not. As expected, we find significant results for the subsamples as well, but with widely disparate

magnitudes: a marginal probability of 30 percent for single women but only 18 percent for married women.

With respect to the three-way choice model, we find that all women heads of household are significantly more likely to participate in both sectors, with marginal probabilities of 11-12 percent. In the subsamples of both married and single women, being head of household has a similar effect, although the marginal effect is considerably stronger in the formal sector, 11 percent for married heads of household and 18 percent for single heads of household. For married heads of household the magnitude of the marginal effect is virtually identical to that of the whole sample in the formal sector but considerably smaller in the informal sector. For single heads of household the marginal effect in the formal sector is very close to that of the whole sample, but considerably larger in the informal sector.

6.1.7 Socio-economic Status

Considering first the decision of women whether to participate in the labor market or not, we don't find much impact for socio-economic status. The only significant marginal effect is for women of high socio-economic status who are 2 percent more likely to participate than women living in poverty. Results for the three subsamples are not consistent: married women exhibit results nearly identical to those of the full sample, women heads of household of medium high status are 2 percent less likely to participate, but the set of variables has no significant impact on the labor force participation of single women.

With respect to the three-way choice, this variable has no impact on participation in the formal sector either for the whole sample or for any of the subsamples. High status married women are slightly more likely to be employed in the informal sector than those of poverty status. However, there is no consistent effect on participation in the informal sector for any subsample: both single and married women of medium high status have negative marginal probabilities but socio-economic status has no impact for women heads of household.

6.1.8 Nonlabor Income and the Interaction Terms

To see the full effect of nonlabor income we need to examine the net effect of the nonlabor income variable plus the interaction terms. The results for the whole sample of women in their decision to participate in the labor force are generally negative, as expected, indicating that women in general are 3 percent less likely to participate for every additional dollar of income per month.¹¹⁹ As for the subsamples, similar patterns are found for single women and women heads of household with negative marginal probabilities for all periods. Unexpectedly, marginal probabilities are positive for married women for all periods after 1995.

Turning next to the 3-way choice model, we find conflicting results. The net marginal probabilities of participation in the formal sector for the whole sample of women are negative for the survey periods of 1995 and 1997, but become positive and significantly different from 1995-1 for the two survey periods in 1998. Single women show the expected negative marginal probabilities for the entire period including a

¹¹⁹ This sounds like a large impact but recall that 92 percent of the sample has no nonlabor income at all.

particularly strong effect during the first half of 1997. Unexpectedly, married women exhibit positive strong marginal effects on participation in this sector throughout all periods. Nonlabor income has, in general, no impact on participation in the formal sector by women heads of household.

Nonlabor income generally has no impact on participation in the informal sector, either for the whole sample of women or for the subsamples.

6.1.9 Survey Date

This variable is used to see the effect of time on the labor force participation decision of women in Venezuela. Results for the two-way choice model show, as expected, that the marginal probabilities of the dummies for the survey dates are increasingly positive and significantly different from 1995-1 for the whole sample. Similar results are found for the three subsamples. Married women show generally stronger marginal probabilities than those of other subsamples. This behavior might be explained by wives' desire to preserve the real income of the family during this period when the economic crisis deepened due to successive periods of inflation and the devaluation of the bolívar.

Considering next the 3-way choice model, for the full sample, in both the formal and informal sectors, the survey date variable generally has positive, significant increasing marginal effects for all periods, indicating greater participation than in 1995. The effects which are generally stronger, more significant and monotonically increasing in the informal sector can be attributed to increases in the unemployment rate in the

formal sector during those time periods and the increasing inability of the formal sector to absorb labor.

The regressions for the subsamples yield mixed and less consistent results. Married and single women are generally more likely to participate in the formal sector over time. Women heads of household seem less likely to do so, but only one of the marginal probabilities is significant. However, the results for the informal sector generally resemble those of the whole sample in that the marginal probabilities are significant and increase over time. These effects are stronger, more significant and clearly monotonically increasing among married women.

6.2 Limitations

6.2.1 The Presence of Children

Although, the Venezuelan data contains information about children, there is no means of linking this data to that of individual women. Consequently, this study cannot shed any light on the impact of children on labor force participation in general or in a particular sector by those who are mothers.

6.2.2 Socio-economic Status

This variable was selected as an explanatory variable to capture the effect of socio-economic conditions, generally a proxy for wealth, on women's labor force participation. The results reported above show little or no impact of socio-economic status on participation in the labor market either as a whole or in individual sectors. These puzzling results may be attributed to a problem in building the index used in this project

(Parra, J., 2003). Thus this study can add little to knowledge about the impact of wealth on labor force participation among women in Venezuela.

6.2.3 Nonlabor Income

In many cases we find either unexpectedly large or counter-intuitive effects of nonlabor income on women's labor force participation in Venezuela. These results may be due to the high percentage of women (92 percent) who report none at all. Although the data set does contain information about spouses, since there are no indicators linking women to their spouses, spouses' income is not included in this variable. Consequently, the present study probably adds little to our knowledge about the impact of nonlabor income on women's labor force participation.

6.3 Future Research

Further insight into Venezuelan women's labor force participation will be provided by performing Times-Series analysis for a period of 30 years, something else which has not been done previously. In particular, this analysis will answer these questions:

- To what extent is the decision of Venezuelan women affected by the business cycle? In other words, what is the relationship between women's labor force participation and macroeconomic fluctuations?
- Among Venezuelan women, does the added-worker effect dominate the discouraged-worker effect in times of recessions?

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Appendices

Appendix A: Definition of Variables

A.1 The Formal Sector versus the Informal Sector

Technically, whether a market sector is classified as informal or formal depends on whether labor activities are subject to taxation and other regulations. For the purpose of this project, the informal sector includes self-employed workers,¹²⁰ owners of micro enterprises, helpers. The formal sector includes all other workers.

A.2 Urban Area

This variable includes women living in the metropolitan area of Caracas, in the main cities of Venezuela, and in cities with 25,000 residents or less if they are close to a metropolitan area. Rural areas include residents of cities with less than 25,000 residents not belonging to the metropolitan areas of Venezuela.

A.3 Administrative Regions of Venezuela

The nine political-administrative regions are described below.

A.3.1 Andean Region

The Andean region includes the states of Táchira, Mérida, Trujillo, Barinas and the Paez municipality in the state of Apure. The region has a long agricultural tradition of producing coffee, vegetables, flowers, peaches, plantains and Yuca. Cattle raising is

¹²⁰ This dissertation uses the methodology used by the Office of Statistics and Information (OCEI) to define the informal sector and the formal sector. For instance, the self-employed worker category does not include professionals or technicians.

predominant in the south of the Lake of Maracaibo, in Barinas and in the Paez district where about 30 percent of the cattle in Venezuela are located, as well as the principal milk powder producing plants. However, residents have been leaving the region because of a lack of land for the expansion of agriculture. There are also other activities such as tourism, mining, craftwork, fish farming, and small and medium sized industries.

A.3.2 Capital Region

The capital region is composed of the federal capital (Caracas), and the states of Vargas and Miranda. It is the center of political power as well as of commercial, industrial and financial activities in the country. There are also other traditional activities, such as agriculture, in this region. However, agricultural activity has progressively decreased and exists only in the periphery of the district, in the Barlovento sub region, and in the Miranda slopes. The growth of cacao, flowers and vegetables and the raising of pigs, represents the survival of agricultural activities which have been able to take advantage of the proximity of large markets.

Traditionally, the capital region also operated as a reception center for immigrants which contributed to serious urban planning problems characterized by water shortages, air and noise pollution, a shortage of services and a lack of recreational areas.

A.3.3 Central Region

The central region is composed of the Carabobo, Cojedes and Aragua states. The main characteristic of this region is its industrial activity, although it is less developed in the Cojedes state. It was historically the basis of the most prosperous agricultural

activities in the country. However, with the emergence of the oil economy, most of the agricultural land was taken over for urban and industrial use. The agricultural activity that still exists is linked to the production of food, drinks, textiles and tobacco. In the state of Cojedes, cattle-raising is important, as well as the cultivation of rice, sorghum and ajonjolí seed. The presence of Puerto Cabello as the main national port linked the region to the other more industrialized areas.

A.3.4 Central-Western Region

This region is composed of the states of Lara, Falcón, Yaracuy and Portuguesa. It has great geographical diversity that allows for a variety of economic activities, including agriculture, oil and mining.

Barquisimeto an important urban-industrial center is found in this region. Oil and petrochemical activities are found in Falcón and Punto Fijo whereas mining activities are concentrated in Lara. An important agricultural area in Portuguesa produces sorghum, rice and cotton. Onions, potatoes, sugar cane, maize and poultry are produced in the valleys of Quibor.

A.3.5 Guyana Region

The Guyana region includes the states of Bolívar, Amazonas, and Delta Amacuro. It represents the greatest forest reservoir and water resources of the country. It is identified as a mining region, producer of hydroelectric energy and forestal resources.

The region contains almost 50 percent of the land in Venezuela but has less than 6 percent of the total population of the country. More than 60 percent of the regional

population lives between Ordaz Port and Ciudad Bolivar. One-third of the country's indigenous people live in this region. Mining is developed around the basic industries of iron and aluminum. There is also agricultural industries, cattle raising, logging, fishing and tourism industries. Guayana was dropped from the analysis because it has the newest cities of Venezuela for the residents of which socio-economic status codes have not been established.

A.3.6 Insular Region

The insular territories that compose the region are the state of Nueva Esparta (Margarita Island), the islands located in the Caribbean Sea, the islands located in the Gulf of Paria.

The state of Nueva Esparta is at the heart of the Insular region that has traditionally specialized in fishing, commercial activities and especially tourism due to the tax free zone on Margarita Island. Moreover, the many people moving to Margarita Island have caused a boom in the construction activities.

A.3.7 North-Eastern Region

The North-Eastern region is composed of the states of Anzoátegui, Sucre and Monagas. Historically, the main agricultural activity was the production of cacao and coffee as well as tobacco and citrus products. The emergence of oil as an activity took prominence over agricultural activities creating a new axis of development around hydrocarbons, especially in the south and center of Monagas and Anzoátegui. Agricultural activities have survived with the inclusion of new crops such as peanuts,

sorghum, sunflowers, and the growth of pines for paper pulp. Tourism is also important given the beauty of the beaches in the region.

A.3.8 Plains Region

The Plains region is comprised of the states of Guarico, and Apure except for the Paéz Municipality. Around 40 percent of the population is concentrated in 5 populated centers: San Juan de los Morros, Altagracia, Calabozo, Zaraza, and San Fernando. The rest of the population is dispersed around this extensive region's area.

This region has a predominantly agricultural character. Sales of beef, rice, corn, cotton, and tobacco are especially important. Mining is a promising activity due to the existence of the oil band in the Orinoco River and of the limestone that the construction industry demands.

A.3.9 Zulian Region

The Zulian region is composed only of the state of Zulia. It is characterized not only by its great oil potential, but also by other economic activities such as agriculture, mining, commerce, craftwork, petro-chemical industries, and coal mining. Zulia is also one of the main producers of agricultural and cattle products including milk, meat, cheese, sugar cane, and coconut. Trade is also an important activity, especially in the large cities such as Maracaibo, Cabimas, and Lagunillas. Because it is a border region, trade with neighboring Colombia is active and growing. However, the region also has problems with contraband, drug trafficking, and kidnappings, which have increased due to the effects of the civil war in Colombia.

A.4 Socio-economic Status

These four variables depict the social stratification of people living in Venezuela. They are based on an index constructed using the Mendez Castellano-Graffar Method which categorizes households according to different levels of economic and social well-being. The index is derived from four variables: the profession of head of household, level of education of the spouse or partner of head of household, the main source of income of the household, and the physical condition of the house.¹²¹ Each one of these variables is composed of five items which have been assigned different weights; the summation of the items' weights determines the distribution of the households into five socio-economic strata. The greater the number of points, the lower the socio-economic strata. The first three strata (with the fewest points) compose the group of the non-poor. Stratum IV, "relative poverty", is the next to poorest. It does not imply absolute deprivation but contains the unemployed working class with some education. Stratum V corresponds to critically poor households suffering a very high level of deprivation (Hernan Méndez Castellano and Maria Cristina de Méndez, 1994). For purposes of this study, the later two categories are combined as "poverty level."

¹²¹ This categorization includes a combination of the sanitary conditions, the degree of luxury, and the size of the house.

A.5 Nonlabor Income

This variable includes a pension given to the survivor after the death of a family member, financial assistance of a family member to another member, a pension received through social security, retirement funds, rental income, and interests or dividends. Labor income of a spouse or other family members is not included.

Appendix B: Tables

Table B.1
Binomial Probit Regression Results
Coefficients
Sample: All Women 15-60

Variable	Coefficients	Standard Deviations	z-values
Age groups^a			
21 to 30	0.723***	0.013	56.86
31 to 40	0.938***	0.014	64.99
41 to 50	0.850***	0.017	51.53
51 to 60	0.469***	0.019	24.09
Education^b			
Primary	0.399***	0.021	19.26
Secondary	0.654***	0.023	28.74
Technical	0.843***	0.032	26.63
College	0.749***	0.025	29.51
Marital status^c			
Married	0.121***	0.012	10.42
Cohabitors	0.401***	0.048	8.29
Widows	-0.090***	0.035	-2.58
Divorced	0.497***	0.022	22.29
Urban residence	0.085***	0.015	5.75
Regions^d			
Andean	0.228***	0.021	11.07
Capital	0.065***	0.018	3.60
Central	0.189***	0.020	9.40
Central-Western	0.172***	0.019	9.26
Insular	0.013	0.044	0.29
Plains	0.067**	0.032	2.11
Zulian	0.109***	0.019	5.87
Head of household	0.793***	0.020	39.60
Socio-economic Status^e			
High	0.053***	0.015	3.51
Medium High	-0.008	0.016	-0.53
Average	-0.0002	0.017	-0.01
Nonlabor income (US\$/ month)	-0.085***	0.026	-3.23
Interaction terms			
Nonlabor income * 1997-1	0.006	0.054	0.12
Nonlabor income * 1997-2	-0.017	0.052	-0.32
Nonlabor income * 1998-1	0.036	0.053	0.68
Nonlabor income * 1998-2	0.067*	0.053	1.27
Survey date^f			
1997-1 st half	0.056***	0.014	4.00
1997-2 nd half	0.152***	0.016	9.47
1998-1 st half	0.225***	0.016	14.14
1998-2 nd half	0.273***	0.016	17.09
Constant	-1.238 ***	0.032	-38.63
N		86,199	
-2* log likelihood ratio		97,140***	

*** (**, *) = coefficients significant at 1% (5%, 10%) level.

a=omitted category is women 15 to 20 years old.

b=omitted category is women with no education.

c=omitted category is single women.

d=omitted category is the North-Eastern region.

e=omitted category is poverty.

f=omitted category is 1995-1 period.

Table B.2
Binomial Probit Regression Results
Marginal Effects
Sample: All Women 15-60

Variable	Marginal Effects	Standard Deviations	z-values
Age groups^a			
21 to 30	0.238***	0.004	63.95
31 to 40	0.293***	0.004	79.47
41 to 50	0.261***	0.004	64.52
51 to 60	0.154***	0.006	27.42
Education^b			
Primary	0.146***	0.008	19.29
Secondary	0.215***	0.007	32.93
Technical	0.239***	0.006	38.75
College	0.228***	0.006	37.86
Marital status^c			
Married	0.044***	0.004	10.42
Cohabitors	0.131***	0.014	9.52
Widows	-0.034***	0.013	-2.54
Divorced	0.161***	0.006	25.99
Urban residence			
	0.031***	0.006	5.68
Regions^d			
Andean	0.079***	0.007	11.62
Capital	0.024***	0.006	3.63
Central	0.066***	0.007	9.75
Central-Western	0.061***	0.006	9.51
Insular	0.005	0.016	0.29
Plains	0.024**	0.011	2.14
Zulian	0.039***	0.007	5.97
Head of household			
	0.241***	0.005	51.55
Socio-economic Status^e			
High	0.019***	0.005	3.51
Medium High	-0.003	0.006	-0.53
Average	-0.00007	0.006	-0.01
Nonlabor income (US\$/ month)			
	-0.031***	0.010	-3.23
Interaction terms			
Nonlabor income * 1997-1	0.002	0.020	0.12
Nonlabor income * 1997-2	-0.006	0.019	-0.32
Nonlabor income * 1998-1	0.013	0.019	0.68
Nonlabor income * 1998-2	0.024	0.019	0.68
Survey date^f			
1997-1 st half	0.020***	0.005	4.03
1997-2 nd half	0.054***	0.006	9.70
1998-1 st half	0.079***	0.005	14.71
1998-2 nd half	0.095***	0.005	17.98
-2* log likelihood ratio		97,140***	

*** (**, *) = coefficients significant at 1% (5%, 10%) level.

a=omitted category is women 15 to 20 years old.

b=omitted category is women with no education.

c=omitted category is single women.

d=omitted category is the North-Eastern region.

e=omitted category is poverty.

f=omitted category is 1995-1 period.

Table B.3
Multinomial Probit Regression Results
Formal Sector

Sample: All Women 15-60

Variable	Coefficients	Standard Deviations	Marginal Effects	Standard Deviations
Age groups^a				
21 to 30	0.992***	0.018	0.193***	0.005
31 to 40	1.205***	0.020	0.197***	0.005
41 to 50	1.048***	0.024	0.141***	0.006
51 to 60	0.502***	0.028	0.043***	0.008
Education^b				
Primary	0.612***	0.031	0.140***	0.008
Secondary	1.090***	0.034	0.272***	0.008
Technical	1.407***	0.045	0.338***	0.009
College	1.269***	0.037	0.315***	0.008
Marital status^c				
Married	0.087***	0.017	-0.011***	0.004
Cohabiters	0.561***	0.067	0.112***	0.017
Widows	-0.150***	0.050	-0.039***	0.013
Divorced	0.667***	0.031	0.119***	0.007
Urban residence				
	0.141***	0.021	0.038***	0.006
Regions^d				
Andean	0.294***	0.029	0.052***	0.008
Capital	0.154***	0.026	0.057***	0.007
Central	0.210***	0.029	0.024***	0.007
Central-Western	0.262***	0.027	0.062***	0.007
Insular	0.094	0.063	0.047***	0.017
Plains	0.057	0.046	0.0008	0.012
Zulian	-0.005	0.027	-0.049***	0.007
Head of household				
	0.966***	0.028	0.121***	0.006
Socio-Economic Status^e				
High	0.053***	0.021	0.005	0.006
Medium High	0.007	0.022	0.008	0.006
Average	0.009	0.024	0.005	0.007
Nonlabor income (US\$/ month)				
	-0.113***	0.038	-0.023***	0.010
Interaction terms				
Nonlabor income * 1997-1	-0.002	0.076	-0.003	0.020
Nonlabor income * 1997-2	0.010	0.073	0.014	0.019
Nonlabor income * 1998-1	0.103	0.075	0.041**	0.019
Nonlabor income * 1998-2	0.137*	0.073	0.046***	0.019
Survey date^f				
1997-1st half	0.059***	0.020	0.005	0.005
1997-2nd half	0.195***	0.023	0.033***	0.006
1998-1st half	0.257***	0.023	0.032***	0.006
1998-2nd half	0.281***	0.023	0.020***	0.006
Constant				
	-1.995***	0.047		
N 86,199				
% of total 39,036				
45.3				
-2 * log likelihood 160,264.84***				

*** (**, *) = coefficients significant at 1% (5%, 10%) level.

a=omitted category is women 15 to 20 years old.

b=omitted category is women with no education.

c=omitted category is single women.

d=omitted category is the North-Eastern region.

e=omitted category is poverty.

f=omitted category is 1995-1 period.

Table B.4
Multinomial Probit Regression Results
Informal Sector

Sample: All Women 15-60

	Coefficients	Standard Deviations	Marginal Effects	Standard Deviations
Age groups^a				
21 to 30	0.830***	0.022	0.048***	0.004
31 to 40	1.261***	0.024	0.111***	0.005
41 to 50	1.212***	0.027	0.124***	0.006
51 to 60	0.785***	0.031	0.112***	0.007
Education^b				
Primary	0.407***	0.032	0.014**	0.002
Secondary	0.436***	0.036	-0.046***	0.006
Technical	0.448***	0.053	-0.088***	0.006
College	0.427***	0.041	-0.074***	0.006
Marital status^c				
Married	0.321***	0.019	0.056***	0.004
Cohabiters	0.450***	0.077	0.022	0.014
Widows	-0.057	0.053	0.005	0.009
Divorced	0.622***	0.034	0.046***	0.006
Urban residence				
	0.041*	0.025	-0.008	0.005
Regions^d				
Andean	0.307***	0.034	0.029***	0.007
Capital	-0.081***	0.030	-0.034***	0.005
Central	0.320***	0.033	0.043***	0.007
Central-Western	0.152***	0.039	0.0002	0.006
Insular	-0.171**	0.078	-0.043***	0.012
Plains	0.137***	0.052	0.023**	0.010
Zulian	0.377***	0.030	0.085***	0.006
Head of household				
	1.154***	0.030	0.123***	0.005
Socio-Economic Status^e				
High	0.097***	0.024	0.014***	0.004
Medium High	-0.051**	0.025	-0.011***	0.005
Average	-0.021	0.028	-0.005	0.005
Nonlabor income (US\$/ month)				
	-0.091**	0.043	-0.006	0.008
Interaction terms				
Nonlabor income * 1997-1	0.021	0.085	0.005	0.015
Nonlabor income * 1997-2	-0.093	0.083	-0.020	0.014
Nonlabor income * 1998-1	-0.084	0.085	-0.029**	0.015
Nonlabor income * 1998-2	-0.032	0.081	-0.023*	0.014
Survey date^f				
1997-1st half	0.109***	0.024	0.016***	0.004
1997-2nd half	0.216***	0.027	0.022***	0.005
1998-1st half	0.377***	0.026	0.050***	0.005
1998-2nd half	0.514***	0.026	0.078***	0.005
Constant				
	-2.482***	0.053		
N 86,199				
% 100.0				
			16,303	
			18.9	
-2 * log likelihood			160,264.84***	

*** (**, *) = coefficients significant at 1% (5%, 10%) level.

a=omitted category is women 15 to 20 years old.

b=omitted category is women with no education.

c=omitted category is single women

d=omitted category is the North-Eastern region.

e=omitted category is poverty.

f=omitted category is 1995-1.

Table B.5
Women's Labor Force Participation by Geographical Areas of Venezuela

REGION	N	Out of the Labor Force (%)	FORMAL			INFORMAL		
			Public Sector (%)	Private Sector (%)	Total (%)	Self-Employed (%)	Other (%)	Total (%)
Andean	9,905	33.92	16.03	30.75	46.78	16.36	2.94	19.30
Capital	20,601	35.06	15.10	35.33	50.43	13.78	0.74	14.52
Central	10,988	35.26	11.20	34.06	45.26	18.47	2.00	20.47
Central-Western	15,293	35.48	13.48	33.79	47.27	15.75	1.97	17.72
Insular	1,063	41.10	15.20	31.10	46.30	10.90	1.70	12.60
North-Eastern	8,045	41.55	14.72	26.91	41.63	14.74	2.08	16.82
Plains	2,332	39.37	17.24	24.10	41.34	17.15	2.14	19.29
Zulian	17,342	35.50	9.30	29.30	38.60	23.80	2.10	25.90

Source: Household Sample Survey (1995-1998) and the author's calculations.

Table B.6
Venezuelan Women's Labor Force Participation by Samples^a

Samples	N	Out of Labor Force (%)	Labor Force (%)	Formal Sector	Informal Sector
All Women	86,199	35.8	64.2	45.3	18.9
Married	42,791	33.1	66.9	44.8	22.1
Single	32,906	45.4	54.6	42.2	12.4
Head of Household	11,365 ^a	12.8	87.2	55.7	31.5

^a Includes women of all categories of marital status.

Source: Household Survey Samples (1995-1998) and the author's calculations.

Table B.7
Multinomial Logit Regression Results
Marginal Effects-Formal Sector
(standard deviations in parentheses)

Variable	All women 15-60		Married Women		Single Women		Women Heads of Household	
Age groups^a								
21 to 30	0.192***	(0.005)	0.052***	(0.008)	0.326***	(0.007)	0.057	(0.057)
31 to 40	0.182***	(0.006)	0.048***	(0.008)	0.318***	(0.009)	0.086	(0.055)
41 to 50	0.133***	(0.007)	0.001	(0.009)	0.289***	(0.012)	0.081	(0.054)
51 to 60	0.036***	(0.007)	-0.100***	(0.011)	0.211***	(0.016)	0.021	(0.056)
Education^b								
Primary	0.150***	(0.009)	0.098***	(0.012)	0.325***	(0.016)	0.140***	(0.016)
Secondary	0.278***	(0.008)	0.270***	(0.012)	0.381***	(0.015)	0.263***	(0.015)
Technical	0.335***	(0.008)	0.363***	(0.013)	0.389***	(0.013)	0.262***	(0.023)
College	0.315***	(0.008)	0.388***	(0.010)	0.319***	(0.016)	0.296***	(0.015)
Marital status^c								
Married	-0.012***	(0.005)					-0.075***	(0.016)
Cohabitors	0.111***	(0.017)					0.009	(0.027)
Widows	-0.047***	(0.013)					-0.102***	(0.016)
Divorced	0.122***	(0.007)					-0.005	(0.012)
Urban residence	0.039***	(0.006)	0.039***	(0.008)	0.040***	(0.010)	0.060***	(0.016)
Regions^d								
Andean	0.053***	(0.008)	0.053***	(0.011)	0.096***	(0.014)	0.008	(0.021)
Capital	0.058***	(0.007)	0.031***	(0.010)	0.106***	(0.012)	0.070***	(0.018)
Central	0.024***	(0.008)	0.006	(0.011)	0.073***	(0.014)	0.019	(0.021)
Central-Western	0.064***	(0.007)	0.066***	(0.010)	0.082***	(0.012)	0.051***	(0.019)
Insular	0.050***	(0.017)	0.082	(0.023)	0.036	(0.034)	0.066	(0.050)
Plains	0.003	(0.013)	-0.014	(0.017)	0.083***	(0.022)	-0.040	(0.032)
Zulian	-0.047***	(0.007)	-0.086***	(0.010)	0.054***	(0.013)	-0.123***	(0.020)
Head of household	0.126***	(0.007)	0.114***	(0.013)	0.179***	(0.012)		
Socio-economic Status^e								
High	0.005	(0.006)	-0.003	(0.008)	0.008	(0.010)	-0.024	(0.016)
Medium High	0.008	(0.006)	0.004	(0.008)	0.006	(0.011)	0.0002	(0.016)
Average	0.005	(0.007)	0.005	(0.020)	0.004	(0.012)	-0.025	(0.018)
Nonlabor income (US\$/ month)	-0.028***	(0.010)	-0.005	(0.020)	-0.051***	(0.018)	-0.022	(0.015)
Interaction terms								
Nonlabor income * 1997-1	0.002	(0.020)	0.148***	(0.044)	-0.135***	(0.042)	-0.052*	(0.031)
Nonlabor income * 1997-2	0.022	(0.020)	0.127***	(0.041)	0.015	(0.038)	-0.002	(0.028)
Nonlabor income * 1998-1	0.053***	(0.020)	0.139***	(0.039)	0.065	(0.040)	0.038	(0.030)
Nonlabor income * 1998-2	0.058***	(0.020)	0.143***	(0.037)	0.052	(0.041)	0.002	(0.027)
Survey date^f								
1997-1st half	0.004	(0.006)	-0.001	(0.008)	0.017*	(0.009)	-0.009	(0.017)
1997-2nd half	0.033***	(0.006)	0.030***	(0.009)	0.035***	(0.011)	0.016	(0.018)
1998-1st half	0.031***	(0.006)	0.035***	(0.009)	0.026***	(0.010)	-0.014	(0.018)
1998-2nd half	0.019***	(0.006)	0.026	(0.009)	0.023**	(0.010)	-0.037**	(0.018)
N	39,036		19,161		13,882		6,330	

*** (** *) = coefficients significant at 1% (5%, 10%) level.

a=omitted category is women 15 to 20 years old.

b=omitted category is women with no education.

c=omitted category is single women.

d=omitted category is the North-Eastern region.

e=omitted category is poverty.

f=omitted category is 1995-1 period.

Table B.8
Multinomial Logit Regression Results
Marginal Effects- Informal Sector
(standard deviations in parentheses)

Variable	All women 15-60		Married Women		Single Women		Women Heads of Household	
Age groups^a								
21 to 30	0.047 ^{***}	(0.004)	0.021 ^{***}	(0.007)	0.065 ^{***}	(0.005)	0.033	(0.058)
31 to 40	0.110 ^{***}	(0.005)	0.096 ^{***}	(0.007)	0.110 ^{***}	(0.008)	0.065	(0.055)
41 to 50	0.122 ^{***}	(0.006)	0.107 ^{***}	(0.009)	0.122 ^{***}	(0.011)	0.082	(0.054)
51 to 60	0.113 ^{***}	(0.008)	0.095 ^{***}	(0.011)	0.113 ^{***}	(0.014)	0.073	(0.056)
Education^b								
Primary	0.011 [*]	(0.004)	0.012	(0.009)	0.040 ^{***}	(0.008)	-0.064 ^{***}	(0.015)
Secondary	-0.053 ^{***}	(0.006)	-0.055 ^{***}	(0.009)	-0.019 ^{***}	(0.008)	-0.165 ^{***}	(0.014)
Technical	-0.093 ^{***}	(0.006)	-0.111 ^{***}	(0.010)	-0.053 ^{***}	(0.008)	-0.172 ^{***}	(0.022)
College	-0.081 ^{***}	(0.005)	-0.101 ^{***}	(0.008)	-0.039 ^{***}	(0.008)	-0.201 ^{***}	(0.014)
Marital status^c								
Married	0.057 ^{***}	(0.004)					-0.011	(0.015)
Cohabitors	0.025 [*]	(0.014)					-0.008	(0.025)
Widows	0.005	(0.009)					0.002	(0.015)
Divorced	0.047 ^{***}	(0.006)					0.008	(0.011)
Urban residence	-0.008	(0.005)	0.0007	(0.007)	-0.012 [*]	(0.007)	-0.058 ^{***}	(0.016)
Regions^d								
Andean	0.029 ^{***}	(0.007)	0.031 ^{***}	(0.010)	0.018 ^{**}	(0.009)	0.005	(0.020)
Capital	-0.034 ^{***}	(0.005)	-0.040 ^{***}	(0.008)	-0.022 ^{***}	(0.007)	-0.077 ^{***}	(0.017)
Central	0.043 ^{***}	(0.007)	0.061 ^{***}	(0.019)	0.026 ^{***}	(0.009)	-0.002	(0.020)
Central-Western	-0.0008	(0.006)	-0.002	(0.009)	0.002	(0.008)	-0.041 ^{**}	(0.018)
Insular	-0.045 ^{***}	(0.012)	-0.052 ^{***}	(0.018)	-0.020	(0.020)	-0.104 ^{***}	(0.043)
Plains	0.024 ^{***}	(0.010)	0.032 ^{**}	(0.015)	0.003	(0.014)	0.014	(0.014)
Zulian	0.084 ^{***}	(0.006)	0.092 ^{***}	(0.010)	0.069 ^{***}	(0.010)	0.115 ^{***}	(0.020)
Head of household	0.119 ^{***}	(0.006)	0.068 ^{***}	(0.012)	0.124 ^{***}	(0.009)		
Socio-economic Status^e								
High	0.014 ^{***}	(0.004)	0.026 ^{***}	(0.007)	0.003	(0.006)	-0.024	(0.016)
Medium High	-0.011 ^{***}	(0.004)	-0.011 [*]	(0.007)	-0.011 [*]	(0.006)	0.0002	(0.016)
Average	-0.005	(0.005)	-0.0005	(0.007)	-0.008	(0.007)	-0.025	(0.018)
Nonlabor income (US\$/ month)	-0.003	(0.007)	-0.024	(0.019)	-0.011	(0.010)	0.005	(0.015)
Interaction terms								
Nonlabor income * 1997-1	0.006	(0.014)	0.041	(0.036)	-0.013	(0.021)	0.003	(0.030)
Nonlabor income * 1997-2	-0.019	(0.014)	-0.025	(0.037)	0.033 [*]	(0.019)	-0.035	(0.028)
Nonlabor income * 1998-1	-0.027 [*]	(0.014)	-0.023	(0.034)	-0.009	(0.021)	-0.082 ^{***}	(0.029)
Nonlabor income * 1998-2	-0.020	(0.013)	-0.022	(0.031)	-0.007	(0.019)	-0.029	(0.026)
Survey date^f								
1997-1 st half	0.017 ^{***}	(0.005)	0.023 ^{***}	(0.007)	0.005	(0.006)	0.011	(0.016)
1997-2 nd half	0.022 ^{***}	(0.005)	0.033 ^{***}	(0.008)	0.0008	(0.007)	0.002	(0.017)
1998-1 st half	0.050 ^{***}	(0.005)	0.056 ^{***}	(0.008)	0.036 ^{***}	(0.007)	0.045 ^{***}	(0.017)
1998-2 nd half	0.078 ^{***}	(0.005)	0.084 ^{***}	(0.008)	0.057 ^{***}	(0.008)	0.073 ^{***}	(0.018)
N	16,303		9,474		4,078		3,579	

*** (**, *) = coefficients significant at 1% (5%, 10%) level.

a=omitted category is women 15 to 20 years old.

b=omitted category is women with no education.

c=omitted category is single women.

d=omitted category is the North-Eastern region.

e=omitted category is poverty.

f=omitted category is 1995-1 period.

About the Author

Betilde Rincón de Munoz graduated as an Economist from the University of Zulia in Maracaibo, Venezuela in 1969. She completed her Law Degree at the same university in 1989, graduating Summa Cum Laude. She has a Master's degree in Business Administration specializing in Finance completed in 1992, and another Master's in Economics from the University of South Florida's College of Business Administration completed in 1995. She became a Full Professor in the College of Economics at the University of Zulia in 1991. She retired from her work as a Professor teaching both graduate and undergraduate-level courses in 1999 after more than 25 years of experience. She entered the PhD program in Economics at the University of South Florida's Department of Economics in 2000 and has served as Adjunct Professor for the Department since 2004. She has been a devoted wife for 36 years, and is the happy mother of four grown and beautiful children who made her a grandmother of five also beautiful grandchildren. She lives in Tampa, FL, but her heart is in Venezuela.