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Sectoral labor choice in post-revolutionary Nicaragua: The evolution of the informal labor sector in the 1990s

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SECTORAL LABOR CHOICE IN POST-REVOLUTIONARY NICARAGUA: THE EVOLUTION OF THE INFORMAL LABOR SECTOR IN THE 1990s

A Dissertation

by

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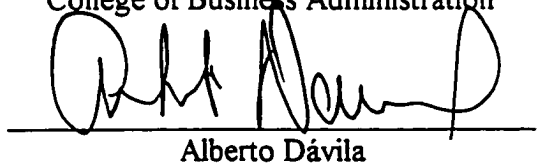

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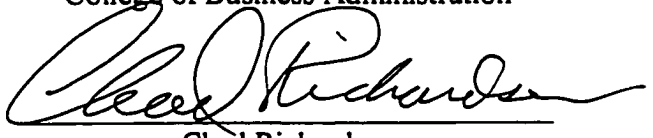

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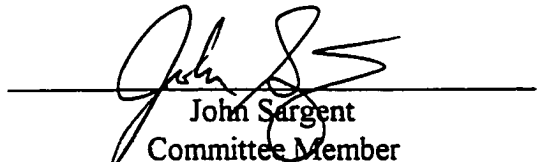

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ABSTRACT

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This dissertation focuses on the contemporary informal labor sector in Nicaragua. Central to the study are four research questions concerning the informal labor sector in Nicaragua; they are: 1) Are Nicaraguans positively or negatively selected into the informal/formal sector? That is, do Nicaraguans participate in their respective sector by choice (e.g., positive selection) or by force (e.g., negative selection)? 2) Are Nicaraguans working in the informal sector queued to work in the formal sector? 3) How has the queue changed, if any, for informal sector workers desiring formal sector employment over the course of the 1990s? and, 4) How have informal/formal sector returns responded to labor market reforms in the 1990s?

In an attempt to answer these questions, two Nicaraguan national household surveys, the 1993 and 1998 *Encuesta de Medición de Nivel de Vida* or Living Standards Measurement Survey, containing individual level socio-economic information, were used to conduct econometric analysis and hypotheses testing. The results suggest that both informal and formal sector workers were positively selected—that is, informal sector

workers choose informal sector employment as do formal sector workers when selecting formal sector employment. Furthermore, informal sector workers were found to queue for formal sector work with the queue becoming more pronounced over time. Lastly, formal sector earnings have responded favorably under the national economic transition to changes in the structure of the labor market, enlarging the wage gap between the formal and informal sectors over the 1990s. As expected, higher levels of education act as the primary determinant of formal sector employment driving a knowledge and earnings wedge between the two sectors.

A supplemental analysis of the self-employed was conducted revealing that the self-employed respond positively to downturns in the economy by becoming entrepreneurs. Conversely, when the economy improves, the self-employment sector becomes a refuge for workers.

DEDICATION

This dissertation is dedicated to my family– my wife, Jana, my kids William, Carina and Geoffrey, my mother (in loving memory) and my father. Each have contributed significantly and in special ways:

To Jana:

- For becoming, in all ways, my partner in life;
- For sharing a passion for life-long learning; and
- For understanding my interest in Latin America.

To William, Carina and Geoffrey:

- For enriching my life with the magic of your lives;
- For the countless smiles, giggles and laughs; and
- For being inquisitive, intelligent and good-natured.

To Mom:

- For your unconditional love, support and encouragement;
- For your passion for learning and involvement; and
- For your steadfast belief in my abilities.

To Dad:

- For pointing the way to hard work and success;
- For showing by example (walk the talk); and
- For your love and generosity.

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My interest in Latin America and, in particular, Nicaragua has been facilitated by many wonderful people from my hometown of Winters, California rich in the Hispanic tradition to the subsistence villagers of Teotecacinte, Nicaragua who opened their hearts to a Gringo and his family from the north. Special thanks and admiration go to Dave Harmon who walks the talk and who has changed the lives of thousands providing hope and instilling a "can-do" spirit wherever he goes.

The data employed in this study could not have been obtained without the timely assistance of the Nicaraguan National Institute of Statistics and Census (INEC) and the Poverty and Human Resources Division (PHRD) of the World Bank. Special thanks go to Luis Benavides Romero and Margel Beteta Herrera both of INEC, and Diane Steele of the PHRD section of the World Bank.

I wish to acknowledge the financial support of a summer research grant from the Texas A&M International University's College of Business which allowed me to dedicate the entire summer of 2000 toward completing the dissertation. I also wish to thank my faculty colleagues in the departments of Economics & Finance and Social Sciences at Texas A&M International University and my Ph.D. student brethren for their support and encouragement. The challenge of completing a Ph.D. from Laredo was made far easier by the support of the University of Texas - Pan American Ph.D. office; many thanks go to Melinda Zuniga and Dr. Jane LeMaster.

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CHAPTER I

INTRODUCTION

Casual observation will note a dichotomous sectoral composition of labor in Latin America— where employment possibilities range from unprotected employment as an itinerant street vendor or as a garbage dump scavenger to protected employment as a systems engineer designing advanced microchips or as a central bank economist. Unprotected employment, or informal sector employment, in Latin America as well as other developing regions, has received increasing scholarly attention. Recent studies reveal that the informal sector employs about half of Latin America's urban workforce and accounts for about a third of total urban income (Tokman, 1993). In such an economic environment, it is critical to understand the nature of the informal sector, not only as an academic exercise, but also to assist national policy makers allocate scarce resources in the most efficient and effective manner. That is, a better understanding of the informal sector may help direct resources toward or away from the informal sector as a policy tool for stimulating economic growth and poverty alleviation. It is the nature of the informal sector in Nicaragua as a case study, then, that this dissertation strives to understand.

Although there are many alternate definitions of informality, the informal sector definition employed in this study includes "income-earning activities unregulated by the state in a context where similar activities are so regulated" (Portes & Schauffler, 1993,

48). The division between informal and formal sectors is neither absolute nor without interdependence. It is suggested that a close relationship exists between the formal and informal sectors where "rather than existing in opposition to each other, what are known as informal activities are argued to be central to the successful operation of well-established businesses that are categorized as part of the formal sector" (Seligmann, 1998, 66).

In general, there is much agreement as to the basic characteristics of an informal sector business. These characteristics include: 1) small scale operation, often employing family members; 2) high labor intensiveness; 3) minimum capital inputs; 4) local market focused and driven; 5) evasion of taxes and other government regulations; and 6) flexibility of employment relationships (Yamada, 1996, Portes & Schauffler, 1993, De Soto, 1989, Acción Internacional, 1988). Similarly, Rakowski (1994b, 4) has defined the nature of the informal sector more specifically within the Latin American context as characterized by:

> ...small firms, workshops, and microenterprises with low capital inputs where production levels depend on intensive use of labor; nonprofessional self-employed, subcontracted put-out workers, disguised wage workers; unprotected or partially protected work, illegal contractual arrangements, not fully regulated or registered or extralegal activities; activities that escape standard fiscal and accounting mechanisms; domestic service; cooperatives and associated activities with little or no separation between labor and ownership of the means of production; casual trade, street vendors, and market sellers, regardless of the source of goods; direct subsistence production.

Although the informal sector as a whole is very heterogeneous (Tokman, 1989),

informals share much in common: "They are unprotected by health benefits, insurance, or job stability" and may be tied together through a dense network of "social organization" (Seligmann, 1998, 67). For informal sector market women in Cuzco, Peru, Seligmann (1998, 67) describes the social organization as one which resembles "patron-clientelism" where "patrons provide credit and other valuable kinds of resources and protection; in return, market women and their union leaders will often vote accordingly, sometimes for the patrons themselves."

However, Peattie (1987, 858) argues that the term "informal sector" is too fuzzy to use in scientific inquiry adding that "as a category of accounting it [the informal sector] is attractive in principle, but flimsy in execution. Since it is so impossible to define, it is naturally impossible to bound in a real world where data is to be gathered; furthermore, by identifying it with the unregulated and therefore unenumerated activities in the economy, it is by definition going to be rather out of reach of measurement." Peattie's (1987) view is a minority one among those investigating the informal sector, yet her comments are important to heed when conducting research in the informal sector. On the other hand, Bromley (1978a, 1035) suggests that the "formal and informal sectors are good 'buckets' to hold together, and to focus attention upon, particular groups of activities, and the plethora of research on the informal sector has added to our knowledge of many relatively little-known economic activities."

Gilbert outlines the growing nature and importance of the informal sector in Latin America, especially for policy-makers within the urban Latin American setting. Gilbert

(1997, 1057-1058) suggests that even within the dynamic economy of Colombia, and especially Bogotá where GDP since 1970 has enjoyed three decades of continuous growth, informal sector rates have risen: from 46.9% (1984), 48.0% (1990), 50% (1992), to 50.9% (1994). That is, even under the best of economic circumstances in Latin America (such as the case of Bogotá), the informal sector is not withering away, but instead growing. Hence, Gilbert (1997) argues that policy-makers in the region must not ignore the informal sector or pretend the informal sector does not exist, rather policy-makers would be better served acknowledging the importance of the informal sector within the overall economy and should encourage rigorous study of the informal sector phenomena.

Yet the informal sector phenomena is not solely a Latin American spectacle. Maloney (1999, 275) estimates that 40% of the economically active urban population in developing countries "are not protected by labor legislation and work in small, informal firms." And estimates for Central America are similar (Sainz Pérez & Larin, 1994, D'Avila, 1992). Funkhouser (1996, 1746) adds that "the informal sector— whether a refuge sector or a dynamic sector— is a significant part of the labor force in each of the Central American countries, with the size being inversely related to the level of development of the country." There is little doubt as to the presence of the informal sector, but there is still much consternation among investigators as to the relative contribution the informal sector makes in an economy. Specifically, the question posed becomes: does the informal sector add or detract from national economic performance?

This question is currently a hotly debated one not only within the literature, but also within the halls of Latin American governments. This study seeks to, in part, address this issue within the national context of Nicaragua.

Nicaragua provides an excellent case study in which to examine the dynamics of the informal sector.[1] Not only is the research stream on the informal sector phenomenon relatively young, but also this research stream is relatively absent on Central America generally and Nicaragua in particular. Additionally, the recent political, social and economic upheavals in Nicaragua provide an interesting "laboratory" in which to examine a small economy in transition. That is, the introduction of market-based economic policies, which began in 1990, replaced the "old" state-centered policies of self-reliant growth. This transition resulted in eventual macroeconomic stability and growth, however, this stability came at the expense of extensive social costs, such as increased "poverty, unemployment, and underemployment" (Chavez Metoyer, 2000, 2). Walker (1997, 299) argues that "the losers [under neoliberalism] included peasants, the huge *informal economic sector*, and other small- and medium-sized producers" [italics added]. Lastly, the Nicaraguan government in conjunction with the World Bank have conducted

[1] Nicaragua is situated in Central America, nestled between El Salvador and Costa Rica. Although the largest country in Central America (49,998 square miles or about the size of Louisiana), Nicaragua is by hemispheric standards a small nation: from north to south Nicaragua is only 290 miles long and from east to west just 310 miles wide. Nicaragua is the most sparsely populated nation in Central America with a predominately mestizo population of about five million people. Nicaragua is also known for its natural wonders: active volcanoes, fresh water lakes and rivers, extensive Pacific and Atlantic ocean coasts, and lush tropical jungle. More recently, Nicaragua made news headlines for its political machinations, revolution and counter-revolution, and natural disasters— the devastating earthquake in the capital of Managua in 1972 and the unwelcome arrival of Hurricane Mitch in 1998. Poverty is evident throughout Nicaragua where perhaps 44% of the population lives on less than $1 a day and 75% live on less than $2 a day and per capita income rivals that of Haiti at $410 (The International Bank for Reconstruction and Development, 1999).

two national surveys in 1993 and 1998 which allow enhanced study of the informal sector beyond rough percentages and educated guesses.[2]

The four primary research questions that this dissertation seeks to answer concerning the informal sector in Nicaragua are: 1) Are Nicaraguans positively or negatively selected into the informal/formal sector? That is, do Nicaraguans participate in their respective sector by choice (e.g., positive selection) or by force (e.g., negative selection). 2) Are Nicaraguans working in the informal sector queued to work in the formal sector? For example, if queuing were found to exist for informal sector workers desiring formal sector jobs, then this would signify that informal sector workers would rather be working in the formal sector, but as yet have not found employment in the formal sector. Thus, then, for the time being, informal sector workers are "temporarily" employed in the informal sector while awaiting a formal sector position. Hence the usage of the term queue and the research question; that is, are informal sector workers queued (or are in line) for formal sector employment? 3) How has the queue changed, if any, for informal sector workers desiring formal sector employment over the course of the 1990s? And 4) How have informal/formal sector returns responded to market-based reforms in the 1990s? Of critical importance for research questions three and four, the 1990s were a decade of intense economic transition within Nicaragua and these research questions seek

[2] The author would also like to indicate a personal preference for using Nicaragua as the country of study in this research. The author has traveled and conducted traditional research, action-oriented research, volunteer work, and/or taught class sessions in Nicaragua during each year of the 1994-1999 time period.

to uncover the dynamics of informal sector/formal sector interplay during this time period.

Additionally, this research contributes to the research stream on the informal sector in three important ways: 1) by considering selectivity and queuing issues, empirical weight is provided to the overall debate as to whether the informal sector is a "rising star" or a "scourge" of developing economies; 2) by examining a transitional economy over time undergoing the rigors of economic change from an economy previously dominated by the public sector to an economy which the factors of production are predominately privatized and individualized, the results of this research may assist other investigators in their study of different transitional economies, such as those in Eastern Europe; and 3) by offering to national economic policy makers in Nicaragua timely findings which provide a better understanding of more than half the economically active population (e.g., the informal sector) as well as potential policy implications and recommendations which may expedite the national goals of economic growth and development and poverty alleviation.[3]

Chapter Summary

This opening chapter introduced the informal sector in Nicaragua as the focus of this research study. The informal sector is defined as "income-earning activities unregulated by the state in a context where similar activities are so regulated" (Portes & Schauffler, 1993, 48). Specifically, four research questions were posed: 1) Are Nicaraguans positively or negatively selected into the informal/formal sector? 2) Are

[3] For example, one such public policy issue bears consideration: what is the implication of a large informal sector on the ability to effectively engage in the use of fiscal policy? That is, if the informal sector mitigates the nation's ability to enact effective tax policy and hence manipulate aggregate demand in the face of the informal sector's ability to avoid taxes, what alternative policy considerations might restore some fiscal management

Nicaraguans working in the informal sector queued to work in the formal sector? 3) How has the queue changed, if any, for informal sector workers desiring formal sector employment over the course of the 1990s? and 4) How have informal/formal sector returns responded to market-based reforms in the 1990s? More generally, these research questions seek to shed light on the informal sector's contribution to national economic performance.

The remainder of this dissertation is organized as follows: chapter two lays out the literature review and research hypotheses; chapter three discusses the data, research design, and basic descriptive statistics of the data; chapter four details the empirical methodology employed in testing the hypotheses; chapter five describes the results. chapter six concludes the dissertation which is followed by a listing of references and supporting documents (in appendices).

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tools?

CHAPTER II

LITERATURE REVIEW AND RESEARCH HYPOTHESES

Castells and Portes (1989, 12) define the informal sector "as a process of income-generation" which "is unregulated by the institutions of society, in a legal and social environment in which similar activities are regulated." Yet, there has been much discussion and debate about the definition and heterogeneous characteristics of the informal sector over the last thirty years since the phrase was first coined by Keith Hart from his work in Ghana (Hart, 1973, 1970). Although the study of the informal sector remains in its infancy, Khudker (1988, 1264-1265) has called for "more and better analyses" of the informal sector and claims "that the concept of the informal sector has served a useful purpose in directing research to occupations and groups that have a marginal position in the power structure of society" while the general acceptance of the term itself has "allowed researchers to frame broader questions as to the constraints and scope of income generation within" the developing world.

The study of the informal sector has taken on a multi-disciplinary quality where important contributions have been made from economics, sociology, anthropology, political science, urban studies and business administration. Within this multi-disciplinary milieu, this chapter seeks to: 1) provide a brief overview of the global informal sector literature; 2) detail the informal sector literature within Latin America with special

consideration for Central America; 3) discuss the informal sector within the Nicaraguan historical and economic context; and 4) propose research hypotheses in which to test the nature and form of the informal/formal sector dichotomy as to selectivity, queuing, evolution, and gender differences in Nicaragua for the 1990s using national census data collected in 1993 and 1998 in hopes of adding to the knowledge on the informal sector debate.

Brief Overview of the Global Informal Sector Literature

Nobel-prize wining economist Arthur Lewis in his classic 1954 study of "Economic Development with Unlimited Supplies of Labour" distinguished between thee "capitalist" and "subsistence" sectors where the subsistence sector consists of "that part of the economy which is not using reproducible capital" (147). That is, Lewis noted a twin economy— one which was productive (capitalist) and the other which was counterproductive (subsistence)— that persisted in the developing world. In their seminal paper, Harris and Todaro (1970) noted that Third World employment in the "traditional" (informal) sector resulted from market failure in the formal sector. That is, higher urban wages relative to rural wages induced rural to urban migration. The new migrants often were not able to find employment in the formal sector because the growth and development of formal sector jobs could not keep pace with the additional supply of migrant labor and, thereby "forcing" these workers into the residual or shadow economy (e.g., the informal sector). However, Harris and Todaro (1970, 127) noted that "rural-urban migration will continue so long as the expected urban real income at the margin

exceeds real agricultural product— i.e., prospective rural migrants behave as maximizers of expected utility."

Implicitly, Geertz (1978, 1963) also uncovered the trappings of a dualistic economy characterized by the formal and informal sectors during field research conducted in Indonesia. Geertz (1963) used the terms "firm" and "bazaar" instead of present-day nomenclature— formal and informal labor sectors— in his study of two Indonesian towns. In essence, Geertz (1963) suggested that the "bazaar" economy employed the surplus labor which the "firm" economy could not fully utilize. In concert with Lewis (1954), Geertz' (1963) dichotomy revealed the productive capacity of the "firm" economy while the economy was constrained by the unproductive nature and activity of the "bazaar." Hart (1973, 1970), on the other hand, suggested from his work in Ghana that the legitimate informal sector was not necessarily backward, marginal or a drain on the economy as Geertz had described for the "bazaar" economy, but rather the informal sector could be entrepreneurial and productive in activity.

With Hart's (1973, 1970) findings, a wave of studies emerged in the 1970s and 1980s which sought to better understand the intricacies of the informal sector. Moser (1994) and Rakoswki (1994a) have provided excellent review essays covering this time period greatly facilitating the synthesis of the informal sector research stream. The research effort expended in the 1970s reflected the "newness" of the informal sector field of study and primarily focused on: 1) recognition of the phenomena; 2) definitions (that is, were informals part of a dualistic economy or were informals part of a greater continuum

delimited by degrees of informality/formality?); 3) productive (in)capacity of the sector—that is are individuals "pushed" or "pulled" into the sector; and 4) research methodology (Clark & Drinkwater, 1998, Moser, 1994, Rakowski, 1994a). Moser (1994) has summarized the key issues from the literature for the years 1970-1983; these issues appear in Table 2.1.

Rakowski (1994b, 32) in her review essay suggested that the research emphasis of the informal sector in the 1970s shifted in the 1980s to include a broader and deeper study of: 1) "the phenomenon regardless of what it was called:"[4] 2) the impact the informal sector has on the microeconomic environment (e.g., the firm) and the macroeconomy; and 3) the specialization of study within the informal sector, such as microenterprise finance. Attention to the informal sector has not been limited to the scholarly community, policy agents and activists as well as practitioner-oriented non-governmental organizations (NGOs) such as the Grameen Bank in Bangladesh and BancoSol in Bolivia have been extremely active in the developing as well as the developed world in bringing scarce resources to bear on those engaged in informal activity.[5]

Rakowski (1994b) has clearly identified four major research thrusts of the current informal sector debate: 1) the structuralist approach; 2) the underground (neo-Marxist) approach; 3) the legalist approach; and 4) the microenterprise approach. Not surprisingly,

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[4] Rakowski (1994b, 32) notes the following terms have been used interchangeably to describe the informal sector– informal activity, self-employment, subcontracting, microenterprise, the underground economy, the black market economy, casual work, economic dualism, continuum, petty commodity production, marginality, the traditional sector– while informals (those individuals engaged in the informal sector) have been called: the poor, unprotected workers, entrepreneurs, petty producers, and casual labor.

[5] For detailed information on the Grameen Bank and BancoSol, see Bornstein (1997) and Navajas and Schreiner (1998), respectively.

Table 2.1: Summary of the Key Issues of the Informal Sector Debate

1) The Informal Sector Definitional Debate
Competing views of the informal sector were delineated as a function of measuring technique.
Informal sector viewed ...
as a problem or solution?
as a dichotomy or continuum?
as a sector or segmented labor market?
as a mode of production or scale of operation?
as an occupational category or a way of organizing production?
2) Cause and Function of the Informal Sector...
The informal sector acts as a survival strategy during economic crisis, especially for the poor and those with low human capital endowments.
The informal sector absorbs labor surplus due to failure of development paradigms.
The informal sector works to towards labor market segmentation in order to keep labor costs low.
3) Capacity of the Informal Sector to Generate Employment, Income, and Growth
... dynamic entrepreneurship or survival strategy?
... internal or external constraints to growth?
... the nature of growth as involutionary or evolutionary?
4) Nature of the Links of the Informal Sector to the Modern Sector...
Autonomous or dependent-subordinate?
Benign or exploitative?
5) Approach to Informal Sector Economic Policy...
Neo-liberal or Neo-Marxist?

Source: Adapted from Caroline O. N. Moser (1994). "The Informal Sector Debate. Part I: 1970-1983." p. 13

these research thrusts have also formed the basis for policy advocacy concerning the informal sector. The structuralist approach is a continuation of Hart's International Labour Office (ILO) analysis conducted in Ghana. The structuralists view the informal economy as an area of excess labor absorption especially evident during poor economic times and embedded in the nature developing of economies. However, the ILO approach does not "write-off" the informal sector as hopeless; on the contrary, structuralists promote the dynamic nature of the informal sector within the overall economy as "capable of generating jobs and profits for reinvestment" (House, 1984, 279). Summarily, the structuralist approach views the informal sector as endemic to developing economies—with the informal sector only needing a helping hand from government to change its refuge status to a status of economic dynamism.

The underground or neo-Marxist approach focuses on production processes, employment relationships and linkages with the larger national and global economies (Bienefeld, 1975). The neo-Marxist approach suggests that planned business linkages, such as subcontracting, with the informal sector assists capitalists in lowering overall business operating costs while passing on the cyclical risk of economic downturns upon informals through disguised employment relationships (Beneria, 1989). On the other hand, De Soto (1989) and his research foundation the *Instituto Libertad y Democracia* or ILD (Liberty and Democracy Institute) have defined the legalist approach in his widely circulated book, *El Otro Sendero* (The Other Path). In essence, De Soto (1989) argues that onerous governmental institutions and regulations have forced entrepreneurs into the

informal sector in order to establish and run their businesses in a timely and profitable manner. The ILD (1990, 137-138) argues that "the informal sector should be viewed as a dynamic and efficient economic response to the institutional costs and constraints imposed by a legal system that systematically excludes a large segment of the population from the normal protections afforded by property rights, contract enforcement, and torts." Rakowski (1994b, 40) has further characterized participants in De Soto's informal sector as "*forced* into extralegality (and poverty) because of discriminatory state regulations and costs that advantage powerful economic interest groups that compete unfairly against informals who have no property rights and no access to credit" (italics in the original).

Advocates of the microenterprise approach (such as Acción Internacional) have been primarily practitioners and activists in the development field rather than academic researchers. Hence, this approach relies less on theory and more on practice (Acción Internacional, 1988). Researchers have classified microenterprises as business entities with typically five or fewer employees, engaged in non-primary activities, and selling at least 50% of their output (Johnson, 1998, Mead & Liedholm, 1998). Micro is the key word in microenterprise, as Mead and Liedholm (1998) found that working proprietors (one-person shops) accounted for over half of all microenterprise employment in the developing world. When unpaid family members were included to the one-person shop, this arrangement accounted for 75% of workers in all microenterprise establishments (Mead & Liedholm, 1998).

The aim of the microenterprise approach is to enhance the competitive ability and

position of microenterprises (usually by definition outside the bounds of government control) in the informal sector as a means of poverty alleviation (Teltscher, 1996). Most often this approach promotes credit schemes and technical training programs directed at microenterprises because microenterprises are seen as informal economic juggernauts which only need a gentle helping hand to become growing, self-sustaining businesses while contributing significantly to the macroeconomy. Halvorson-Quevado (1992, 8) argue that microenterprises "provide employment and income to the poor and they effectively integrate marginal elements into society. They [microenterprises] constitute a huge reservoir of human initiative and ingenuity, and their [microenterprises] existence is central to the cultivation of a 'seedbed' of incipient entrepreneurs." Going beyond fulfilling individual firm-level needs of one micreoenterpirse at a time, recent research has advocated greater reliance on macroeconomic policy as a key ingredient to overall microenterprise growth (Pisani & Patrick, 1999, Grosh & Somolekae, 1996). Table 2.2 summarizes the recent study of the informal sector as outlined in the above four approaches.

The Informal Sector Literature: Latin America and Central America in Review

Latin America is a very diverse region with sharp economic contrasts that make generalizations difficult. However, within this diversity a common unifying economic theme arises—a large segment of the economically active population finds itself employed in the informal sector. Depending upon the country and definition of the informal sector, informals comprise somewhere between 20 and 90 percent of the economically active

Table 2.2: Comparison of Selected Aspects of the Four Major Approaches

	Structuralist Approach	Neo-Marxist Approach	Legalist Approach	Microenterprise Approach
Dimension				
Unit of Study	surveys, size and employment type	Subcontracting, conditions of work not regulated, not legal, status of labor form of management	Small firms, entrepreneurs	Entrepreneur group, community
Theoretical Models and Methods	segmentation, case studies, surveys	Production chains, firm-linkages	neo-liberal	Atheoretical or neo-liberal, case study
Origin of Sector	nature of development	nature of capitalism, informalization	Excessive legal cost, bureaucratization, poverty	Poverty
Nature of Sector	dualistic, marginal, hetereogeneous	Subordinate, heterogeneous	Rational, moral, dualistic	Rational
Function	survival strategy, absorb surplus labor	keep labor cost low, competitiveness high	Survival strategy, avoid costs	survival strategy
Focus	nature of linkages, industrilization, labor market change	nature of production economy	cost of regulation, firm organization	the poor
Role of Sector in Development	safety net for crisis, income for poor, capable of growth	Accumulate capital, impoverish workers, capable of growth	Create wealth, reduce costs, democratize	create jobs and income, supply goods and services
Agenda	social democratic reform, macroeconomic policy	academic theory, empirical knowledge	Policy, legalize	growth of firm and income, poverty alleviation, empower poor, massify programs
Role of State	stimulate macroeconomy, social welfare, support entrepreneurship	Applications of labor standards	Reform institutions, promote small firm	appropriate policy environment for massification, support NGO network

Source: Adapted from Cathy A. Rakowski, (1994b), "The Informal Sector Debate, Part I: 1984-1993," p. 34.

population (Portes & Schauffler, 1993, Castells & Portes, 1989). Castells and Portes (1989, 17) have suggested that the urban informal sector in Latin America accounts for roughly 60% of the economically active population while Tokman (1982, 127) has calculated the economically active population to be closer to 30%. More recently, the International Labour Office has suggested that the non-agricultural percentage of workers engaged in the informal sector is 57.4% in Latin America (International Labour Office, 2000a). Studies of four Latin American capitals, which are also classic primate cities, exhibit informal sector participation rates of 50 to 65%— Bogotá, Colombia at 50%, Lima, Peru at 53%; La Paz, Bolivia at 57%; and Managua, Nicaragua at 65% (see Gilbert, 1997, 1061, Yamada, 1996, 291, Buechler et. al., 1998, 86, Babb, 1997, 94, respectively).[6] Since it is difficult to know the exact size of the informal sector in Latin America due to the "hidden" nature of the informal sector and measurement differences, estimates in the 50% plus range seem the most realistic (Tletscher, 1996, Yamada, 1996, Tokman, 1993). Table 2.3 illustrates the variability of reports on the informal sector in Latin America using the measurement criteria of urban informality and enrollment in social security.

Funkhouser's seminal work (1996) on the informal sector in Central America has provided a benchmark in which to conduct further investigation in the region. Within

[6] The data for Bogotá, Lima, La Paz, and Managua are for the years 1994, 1985/1986, 1976, and 1989, respectively. Also, different data gathering methodologies were employed by these authors, which makes absolute comparisons somewhat problematic; however, these data are representative of the degrees of magnitude and the size of their respective capitol city informal sector. Lastly, the data for Managua is for women only.

Table 2.3: Selected Size Estimates of the Latin America Informal Sector

Country	Percent Employed in the Urban Informal Sector (various years)	Percent of Economically Active Population not Covered by Social Security (1995)~
Argentina	45 (1996)^	41
Bolivia	27 (1989)#	81
Brazil	59 (1996)^	20
Chile	37 (1996)^	13
Colombia	46 (1996)^	89
Costa Rica	42 (1995)^	15
Ecuador	53 (1980)*	81
El Salvador	50 (1992)+	86
Guatemala	53 (1989)+	84
Honduras	49 (1991)+	86
Mexico	48 (1995)^	51
Nicaragua	64 (1993)+	82
Panama	37 (1980)*	39
Paraguay	68 (1996)^	81
Peru	55 (1995)^	70
Uruguay	19 (1989)#	37
Venezuela	43 (1995)^	64

Sources:
~International Labour Office (2000c), "More than 140 Million Denied Access to Health Care in Latin America and the Caribbean ," p. 3.
^International Labour Office (2000b), "Cuadro 5: América Latina, Paises Seleccionadas: Incidencia del Empleo Informal Según Ramas de Actividad Económica. 1990-1996." p.1.
*Partice Franko (1999), The Puzzle of Latin American Economic Development, p. 337
#Alejandro Portes and Richard Schauffler (1993), "Competing Perspectives on the Latin American Informal Sector," p. 41.
+Edward Funkhouser (1996), "The Urban Informal Sector in Central America: Household Survey Evidence," p. 1739.

Central America, Funkhouser (1996) estimates that more than 1.7 million workers or 50% of urban workers are employed in the urban informal sector.[7] Adpated from Funkhouser (1996), Table 2.4 provides an overview of the size of the urban informal sector in Central America. In general, Funkhouser (1996) suggests that those engaged in the urban informal sector tend to be older, less educated, a household head, work longer hours and earn substantially less than their formal sector counterparts. Gender differences within theurban informal sector are most notable for women who generally have lower levels of education, higher marriage rates, greater incidence of being the household head, and who earn lower incomes than men. The work of Marcouiller, Ruiz de Castilla and Woodruff (1997) on El Salvador confirm the overall Central American profile as indicated by Funkhouser (1996) above.

Calculating the size of the informal sector, however, has received a greater consensus than the interpretations of the informal sector phenomena in Latin America. Five approaches to the informal sector in Latin America, similar to our earlier discussion of the global informal sector in part two of this chapter, have been identified. They are: 1) the International Labour Office (ILO) - Employment Program for Latin America and the Caribbean (PREALC) approach led by Victor Tokman; 2) the neo-Marxist approach (sometimes called the underground or disguised economy) led by Chris Birkbeck, Alejandro Portes, and John Walton; 3) the ILD or legalist approach led be Hernando De Soto; 4) the microenterprise approach led by Acción Internacional; and 5) the structural

[7] Funkhouser (1996, 1740) defines the informal sector as "workers in firms of four or fewer employees who are not professional, technical, or administrative workers and all self-employed workers."

Table 2.4: Overview of the Urban Informal Sector in Central America

	Males		Females		Totals	
Countries	Informal Sector	Formal Sector	Informal Sector	Formal Sector	Formal Sector	Informal Sector
Guatemala (1989)	309, 693 (46.8%)	351,462 (53.2%)	260,123 (63.0%)	152,868 (37.0%)	504,330 (47.0%)	569.816 (53.0%)
El Salvador (1992)	181,257 (38.7%)	287,092 (61.3%)	257,381 (62.0%)	157,582 (38.0%)	444,674 (50.3%)	438.638 (49.7%)
Honduras (1991)	166,867 (43.3%)	218,355 (56.7%)	149,736 (57.1%)	112,347 (42.9%)	330,702 (51.1%)	316.603 (48.9%)
Nicaragua (1993)	122,927 (60.4%)	80,738 (39.6%)	108,234 (68.3%)	50,312 (31.7%)	130,050 (36.2%)	231.161 (63.8%)
Costa Rica (1991)	91,705 (31.1%)	202,907 (68.9%)	70,130 (39.9%)	105,705 (60.1%)	308,612 (65.6%)	161.835 (34.4%)
Totals	872,449 (41.1%)	1,140,554 (58.9%)	845,604 (59.4%)	578,814 (40.6%)	1,719.368 (50.0%)	1,718.053 (50.0%)

Source: Adapted from Edward Funkhouser (1996). "The Urban Informal Sector in Central America Household Survey Evidence," p. 1739.

articulation approach led by Alejandro Portes[8] and Richard Schauffler.

In general, these approaches seek to delimit the "push" and "pull" factors of the informal sector. For example, pervasive structural unemployment may "push" those without work or a safety net toward the informal sector in order to survive. Conversely, the possibility of higher economic returns for some individuals within the informal sector especially for those engaged in self-employment activities may serve to "pull" individuals into the informal sector.

The ILO-PREALC approach has been termed the "structuralist approach" because adherents to this view see the presence of the informal sector as endemic (and obvious to observers) to Latin American economies. That is, the market "fails" to generate enough jobs within the formal sector which leads surplus labor into lesser productive arenas— the informal sector (Rosenbluth, 1994). Klein and Tokman (1996, 2) define informality through the usage of economic criteria— the "absence of modern technology or the lack of physical or human capital." As proxies for measuring technology and capital constraints, Klein and Tokman (1996) advocate the investigation of: 1) self-employed workers operating in firms with five or fewer employees; 2) education level; and 3) the number of unremunerated family workers operating in the very small business enterprise. Rakowski (1994b, 36) suggests that the ILO-PREALC approach seeks to assist informal sector businesses primarily through "macroeconomic policy that emphasizes expanding modern sector employment and incomes." Tokman (1989, 1075) adds "what is really being proposed is to improve the efficiency of government intervention— to rationalize it

[8] The work of Alejandro Portes spans both the neo-Marxist and the structural articulation approaches.

in some cases, to reduce or eliminate it in others, or to increase it in still others" and "intervention in the establishment of collateral mechanisms to facilitate access to credit for training purposes and to increase and focus social spending on the more deprived groups [informal sector]" where "ultimately the idea is neither to increase nor decrease the State's role, but to make it more effective."

Portes and Walton (1981) have defined the operation of the informal sector within the neo-Marxist perspective whereby informals work in structurally exploitative relationships that benefit the ownership class. Hence, the presence of the informal sector benefits capitalists at the expense of those participating as workers in the informal sector. Portes and Walton (1981, 85-86) argue "under these conditions, firms in the periphery generally seek to maintain the number of workers protected by labor contracts and legislation at a minimum. For temporary and unskilled tasks, they attempt to bypass formal hiring procedures reaching directly into the unorganized labor pool. Through this mechanism, surplus labor and surplus value extraction can be maximized, even while maintaining a formally 'privileged' segment of the labor force."

Additionally, Beneria (1989) and Buechler et. al. (1998), argue that informals are often dependent upon formals for work through subcontracting relationships. In La Paz, Bolivia, Buechler et. al. (1998, 87) found that "larger 'formal' and smaller 'informal' firms are often intricately interconnected through a network of dependent relationships, including work being contracted out by larger firms to smaller ones." Beneria (1989) similarly found empirical evidence for dependent subcontracting relations primarily

affecting women through a survey of seventy-six firms across ten different industries in Mexico City. Furthermore, sixty-nine percent of the subcontracting relationships were traced back to multinational corporations (Beneria, 1989, 176).

Birkbeck (1978) in his study of garbage pickers in Cali, Colombia suggested that these pickers are no more than self-employed proletarians. Birkbeck (1978, 1174) notes that the dependent and exploitative relationship between factories which control the "industrial market for recuperated materials" and "the garbage pickers [who] in effect work for the factories but are not employed by them. They [the garbage pickers] are little more than casual industrial outworkers, yet with the illusion of being self-employed." Bromley (1978b), through his study of street vendors in Cali, uncovered an important distribution link between consumers, domestic and foreign industrialists and importers, and street vendors. Fitting the neo-Marxist approach, Bromley's (1978b, 1165) study revealed that roughly 35% of street vendors worked in ultra-dependent work relationships as "commission sellers" (itinerant retailers who receive a fixed proportion of the mark-up as commission) or "dependent workers" (day workers who buy their wares in the morning on credit at a daily interest rate of 5-10% and who settle their debt at night).

The ILD or legalist approach follows and replicates the argument laid out by its founder Hernando De Soto based on his experiences in Peru (De Soto, 1989). De Soto investigated the economic inner workings of street vending, open-market or bazaar selling, transportation (bus) routes, and self-help settlements in the form of squatter settlements and concluded that Peruvian state institutions clearly impeded the fair functioning of the

marketplace especially for small firms (De Soto, 1979). Entrepreneurs succeeded, in spite of the regulatory efforts of the state. In this view, the state becomes public enemy number one for the informal self-employed worker, where "'informality' is the key to survival and success— ignoring or deliberately breaking unreasonable official rules and regulations in order to make a living and basic needs" (Bromely, 1990, 331).

Thus, the prescription to fix ailing Latin American economies only relies upon the unleashing of "free" markets to tap the dynamic energy of latent and constrained entrepreneurial talent through "de-bureaucratization, deregulation, the simplification of administrative procedures, privatization, the elimination of protectionism, subsidies and market segmentation policies and the opening up of national economies to foreign competition" (Bromely, 1990, 331). Detractors of the ILD approach suggest that formal firms face greater restrictions (costs of formal sector compliance) such as employee benefits and taxation whereas informal firms operate within an advantaged environment devoid of such external costs (Portes, 1991). Nonetheless, De Soto's (1989) legalist approach remains the darling of neo-liberal governments throughout contemporary Latin America. Marcouiller, Ruiz de Castilla and Woodruff (1997, 368) found a "wage premium" or above expected returns associated with work in the Mexican informal sector and suggest "the evidence we offer on wage differentials does challenge the widespread notion that informal-sector employment is, by its nature, the last resort of those who have no other choice."

The microenterprise approach emphasizes "doing;" hence this approach is

dominated by practitioners especially interested in action-oriented programs which promote microenterprise finance and technical assistance. In fact, an entire microfinance movement dubbed "microcredit" has revolutionized microenterprise development with the culmination of the Microcredit Summit held in Washington, D.C., in February of 1997. This summit was attended by over 2,900 people, representing 1,500 organizations from 137 countries all working towards the common goal of microenterprise development (Microcredit website, 2000a). The conference document, "The Micro Summit Declaration and Plan of Action," articulates well the fundamental beliefs in the efficacy of micro-lending (Microcredit website, 2000a): 1) Very poor people are a good credit risk, especially in the context of mutual responsibility systems; 2) Sustainability of programs in the developing world is achievable; 3) Microcredit models have exhibited a high degree of replicability; 4) Programs grow to serve large numbers of very poor people; 5) Microcredit programs help borrowers work their way out of poverty; 6) Microcredit programs stimulate savings and asset accumulation among poor people; and 7) Microcredit programs become vehicles for a variety of desirable social developments.

Respondents of a recent survey conducted by the MicroCredit Summit reported that over 900 "established microcredit practitioners had" reached over 22 million clients around the globe with 141 Latin American programs reaching 1,947,082 clients (Microcredit website, 2000b). This same survey reported 40% of the Latin American total was destined towards the poorest segments of society (Microcredit website, 2000b) The largest players in the Latin American microcredit arena in 1998 were: the Caribbean

Confederation of Credit Unions with 400,000 borrowers; the Microcredito Santa Fe de Guanajuato (Mexico) with 27,817 borrowers; and BancoSol (Bolivia) with 24,000 borrowers (Microcredit website, 2000b).

The microcredit summit pledged to combat extreme poverty such as that found in the informal sector in the developing world through microenterprise development. Although not all have joined the bandwagon of microcredit (Buckley, 1997), it seems that the pioneers (and practitioners) in the field, such as Acción Internacional, BancoSol and the Grameen Bank, have persuaded national policy-makers to enable microenterprise development programs to assist in the alleviation of poverty. It is only recently that academics have confirmed what microenterprise development specialists already knew—that microenterprise development is a catalyst for economic competitiveness, job creation, community rebuilding, and economic self-sufficiency for informal sector enterprises (Adams, 1992, Grosh & Somolekae, 1996, Klein, Keely & Carlisle, 1991, Liedholm, 1994, Mead & Liedholm, 1998).

Portes and Schauffler (1993) propose a synthesis of approaches towards interpreting the informal sector in advocating their structural articulation position. Portes and Schauffler (1993, 48) define the informal sector as a phenomenon of "income-earning activities unregulated by the state in a context where similar activities are so regulated" and suggest a deep set of networks and linkages bond informal and formal sector enterprises. Portes (1994) has further elaborated on the process in which informals work rather than on the products they sell. That is,

> The basic difference between formal and informal does not hinge on the character of the final product, but on the manner in which it is produced and/or exchanged. Thus, articles of clothing, restaurant food, or automobile parts— all perfectly licit goods— may have their origins in legally regulated production arrangements or in those that bypass established rules. By explicitly distinguishing between these three categories— formal, informal, and illegal activities— it is possible to explore their mutual relationships systematically, a task that becomes difficult when illegal and informal are confused (Portes, 1994, 428).

Furthermore, Portes (1994) captures the essence of these differences as depicted in Table 2.5. Following from the Portes definition, then, three examples serve to further illustrate this process. For instance, a street vendor selling vegetables would most likely fall into the informal sector (illicit process [street vending] ⇒ licit final product [vegetables]⇒ informal economic activity). Whereas a government postal worker would be considered within the formal sector (licit process [mail delivery] ⇒ licit final product [mail]⇒ formal economic activity). And lastly, a Counter-revolutionary soldier or "Contra" would fall under the criminal category (illicit process [a soldier working to topple the legal government] ⇒ illicit final product [coup d'etat]⇒ criminal economic activity). Although the literature on the Latin American informal sector is growing, only a trickle of work has been offered on Central America in general and Nicaragua in particular. The next section discusses the informal sector within the Nicaraguan context.

The Nicaraguan Informal Sector within the National Historical and Economic Context

It is difficult to discuss present-day Nicaragua without describing the astounding transformation that has taken place in the country over the past generation. In brief, these extraordinary events and changes include: 1) insurrection and popular revolution; 2)

Table 2.5: Definition of the Nature of the Formal/Informal Process

Licit/Illicit Process	Final Product	Economic Type
Licit	Licit	Formal
Illicit	Licit	Informal
Licit or Illicit	Illicit	Criminal

Source: Alejandro Portes (1994). "The Informal Economy and Its Paradoxes." p. 428

counter-revolution and low-intensity warfare (The Contra War); 3) 100,000 dead as a direct or indirect result of armed conflict (2.5% of the population) and a halving of national output; 4) a period of hyperinflation which reached an annualized 33,000% in 1988; 5) socialization of the economy; 6) privatization of the economy; 7) debt crisis including a 1990 per capita foreign debt figure of $2,867 where per capita GDP was $469 or a foreign debt to income ratio of 6.1 to 1; 8) six national leaders Anastasio Somoza Debayle (1967-1979), Urcuyo Maliño (July 16, 1979- July 19, 1979), The Government Junta of National Reconstruction (1979-1984), Daniel Ortega (1984-1990), Violeta Chamorro (1990-1997), Arnoldo Alemán (1997-present); and 9) three debilitating natural disasters- the omnipresent 1972 earthquake in Managua and two destructive hurricanes- Hurricane Mitch in 1998 and Hurricane Joan in 1988.

The contemporary context then begins with the insurrection and the triumph of the revolution: July 19, 1979. With the revolution, the Nicaraguan economic landscape changed drastically; the economy once dominated by the dictator Anastasio Somoza Debayle and his close associates now became controlled by the state. Over a short period of time, the Sandinista government confiscated the Somoza enterprises which totaled nearly 40% of the productive assets of the country and created a new economic paradigm based on the dependency development model (Booth, 1982).

The Sandinista economic plan sought to develop an economy which provided more benefits to the poor through wage increases and rent controls; enhanced educational training; full-employment, land reform creating agricultural cooperatives which by 1981

included abandoned and underutilized plots; and redistribution of Somoza family resources which was facilitated early on through the immediate confiscation of the enormous Somoza family holdings— 120 industries and 25% of the country's prime farmland held in some 1500 estates (Wynia, 1990, Berryman, 1985). Additionally, the new economy sought a reorientation from a dependent trade relationship with the US to a pluralistic trade relationship with the world; a mixed economy represented by a large government sector targeted at 40% of GDP and an even larger private sector where MNCs would remain active (White 1989, Austin & Ickis, 1986). Foreign donors became an important financial vehicle for the revolution. Business elites found themselves in a strongly regulated state-centered environment (Spalding, 1994).

The success of the economy under the Sandinistas faltered after 1984. For a myriad of reasons, the Contra War the most glaring, the economy slipped into disrepair and collapse by 1988. It has been estimated that the Contra War (1980-1990) reduced output in Nicaragua by about 20% per annum and upwards of 40% of GDP at the height of the conflict in 1986 (DiAddario, 1997). The informal sector became a haven of entrepreneurial talent as the state-centered formal sector stifled economic dynamism (Babb, 1997). In fact during this time period, informal sector income became more attractive (e.g., higher) than formal sector returns to income (Funkhouser, 1996). Inflation, the draft and the on-going war led to the demise of the economy, an abandonment of populist policies and the end of the Sandinista regime. The Higher Council on Private Enterprise (Consejo Superior de la Empresa Privada, or COSEP), the

national chamber for private business, became the standard bearer fighting against the economic policies of the Sandinista government (Norsworthy, 1990).

Indeed, the business elite helped sponsor U.S. involvement on behalf of the Contras who represented an anti-Sandinista position offered through armed rebellion. Leaders of COSEP were jailed in 1981 when they denounced the Sandinistas as Marxist-Leninist (Spalding, 1997, 251). Government policies were straight-forward: "traditional economic elites were displaced from the economic center, the state assumed direct responsibility for the transformation of the Nicaraguan social and economic order" (Spalding 1994, 95). With an economic free-fall in 1987, the Sandinista government sought to re-evaluate its position vis-á-vis the private sector and determined that the two would have to work together. The government decreased expropriations and put into place a fiscal plan reminiscent of an International Monetary Fund austerity program. However, for most of the private sector these reforms were not enough and the struggle for alternate representation was found with the 1990 election of Violeta Chamorro, friend and proponent of the private sector.

Free presidential elections in 1990 ended the Sandinista rule as well as the state-centered economic development policy. New president Violeta Chamorro (1990-1997), as well as her successor Arnoldo Alemán (1997-present), brought back an age of neo-liberal market reforms: state reduction in employment and businesses (privatization), an openness to the global trade and investment communities through trade liberalization, devaluation and debt reparations, and an end to runaway inflation (Close, 1999). The

government once again favored the large business and investor (bypassing the medium sized firms and the informal sector) to grow and develop the economy of the nation. This free-market orientation became institutionalized with the 1996 election of Arnoldo Alemán as president. In his short tenure, Alemán has privatized all remaining parastatals as well as moved ahead with the institutionalization of free trade— signing free trade agreements with Chile and Mexico (Devlin & Ffrench-Davis, 1999). Although the economy had finally showed signs of rebounding (1995-1998) from 20 years of political turmoil and economic upheaval, Hurricane Mitch stunted the progress attained— in an economy with an annual output of $2 billion, Mitch wrecked $1 billion of damage upon the nation.

It is within this backdrop the Nicaraguan informal sector operates. The literature is very sparse on the contemporary informal sector in Nicaragua. Although there are a couple of studies which look at the informal sector in Nicaragua from a social science perspective (Babb, 1997, Davis, 1997, Speer, 1997) only one academic study, Funkhouser (1996), describes the informal sector from an economic point of view using data collected from post-revolutionary Nicaragua (after 1990). Davis (1997) is primarily concerned with religious cleavages between Protestants and Catholics in the Managuan informal sector. Using the same data set collected from personal surveys of 480 informal sector workers in Managua in January 1991 as Davis (1997), Speer (1997) focuses on the political orientation of the informal sector with special consideration given to pre- and post-1990 election regimes.

Speer (1997, 265) suggests that the urban informal sector in Managua is "a broad

terrain for urban survival, yielding subsistence for some people and riches for a few." However, Speer (1997, 267) argues that the informal sector became a refuge especially with the onset of the economic crisis in 1988-1990 and the structural adjustment conflagration of the 1990s where new entrants into the informal sector were greeted with an already impoverished and "overcrowded informal economy.... Still the worst difficulty for the informal sector caused by structural adjustment was not overcrowding so much as it was the restriction of demand." Throughout the 1990s, official unemployment skyrocketed from a low of 7.6% in 1990 to a high of 17.8% in 1993 with an average of 14% for the decade. Unemployment was at its deepest levels during the Chamorro presidency where the official average unemployment hovered near 16% (Banco de Nicaragua Website, 2000a). Speer (1997, 269) concluded that "for the poorest informal sector workers, daily economic struggle got worse during the early 1990s, while the better-off stratum of the informal sector enjoyed a moderate level of relief."

Babb (1997) relies upon case studies and dated (1980s) research to describe the contemporary informal sector scene in Managua. Babb (1997, 95) argues that "a majority of workers in the informal sector are market sellers and these are predominantly women." Babb (1997) describes these women as struggling to earn marginal incomes while at the same time serving the needs of family. Furthermore in concert with the microenterprise approach, Babb (1997, 94) notes "that informal workers [in Managua] should be understood as productive contributors to the Nicaraguan economy" and not "as an unwanted vestige of the past."

For Nicaragua, Funkhouser (1996) found that employment in the formal sector in 1993 had plunged dramatically from 1985. In his study, Funkhouser (1996, 1739) portrayed the urban informal sector (UIS) in the following manner: for 1985, 61.5% of males worked in the urban formal sector (UBS) and conversely 38.5% of males worked in the UIS; 43.5% of females worked in the UBS and conversely 56.5% of females worked in the UIS; and overall participation was 54.1% formal and 45.9% informal. By 1993, these numbers flip-flopped: 39.6% of males worked in the UBS and conversely 60.4% of males worked in the UIS; 31.7% of females worked in the UBS and 68.3% of females worked in the UIS; and overall worker participation was 36.2% formal and 63.8% informal (Funkhouser, 1996, 1739). Thus, the gloomy and worsening economic picture of Nicaragua is confirmed.

Funkhouser (1996) explicated the characteristics and determinants of sector participation and concluded the following: 1) an inverse relationship exists between levels of education and informal sector employment, but the gap closed between 1985 and 1993; 2) females are more likely to be participants of the informal sector vis-a-vis men; 3) informals tend to be married at a higher rate than formals; 4) informal sector workers tend to be head of households at a higher rate than formal sector workers; 5) formal sector participants work more hours than informal sector participants; 6) the returns to human capital in the informal sector were higher in 1985 vis-á-vis the formal sector, however, by 1993 the gap had nearly closed for men and reversed dramatically for women; and lastly 7) women without children tend towards informal sector employment (see Table 2.6).

Table 2.6: Characteristics of the Nicaraguan Urban Informal Sector

	Formal Sector: Male		Formal Sector: Female		Informal Sector: Male		Informal Sector: Female	
Variable	**1985**	**1993**	**1985**	**1993**	**1985**	**1993**	**1985**	**1993**
Mean Age – Years	32.52	34.12	29.20	31.89	37.24	36.53	36.85	36.91
Mean Years of Education	7.10	7.76	8.81	7.87	4.35	7.33	3.66	6.42
Percent Married	70.4	68.1	48.3	50.2	72.4	80.6	52.5	63.3
Percent Head of Household	50.7	53.8	15.3	20.4	60.0	75.4	29.4	33.4
Mean Weekly Hours Worked	44.20	49.01	41.10	45.84	39.17	46.27	37.15	44.93
Sample Size	3,760	946	1,957	600	2,122	1,448	2,331	1,289

Source: Adapted from Edward Funkhouser (1996), "The Urban Informal Sector in Central America Household Survey Evidence," p. 1741.

Hence, Funkhouser (1996, 1746-1747) concluded that the informal sector was disproportionately filled by women, the old and the young, and the least educated while securing positive returns to human capital inputs.

Research Hypotheses

Contemporary Nicaragua provides a unique setting in which to test the informal/formal sector phenomenon. Specifically, a test as to sectoral choice, formal sector queuing and the evolution of the informal sector are offered in this section.

Selectivity Issues in the Informal and Formal Sectors

The informal sector literature is replete with examples, as cited in the previous sections of this chapter, as to the continuing debate on the nature of the informal sector as a wasteland of surplus labor or as a corps of dynamic entrepreneurship. More and better empirical evidence is necessary to help bring this debate to closure. Moving towards more and better research, Borjas and Bronars (1989) suggest that a model of self-selection may be employed to determine whether the best or worst individuals tend to flow into self-employment versus wage employment. That is, does self-employment attract the "best" as determined by reported income or the "worst" segments of society? For example, income distribution may be studied to reveal whether the opportunity cost of wage employment vis-á-vis self-employment for the highest (lowest) income earners is better (ill) served under wage or self-employment (Roy, 1951).

Borjas and Bronars (1989, 601) found in the United States that for ethnic groups, "The most able [white] persons enter self-employment and that the least skilled [white]

persons [are found] in the salaried sector." For Asian and Hispanic minority groups, Borjas and Bronars (1989, 601) found the opposite to be true; that "the most able persons remain in the salaried sector and the least skilled become self-employed."

Modified, this model can be used to determine whether the formal sector in Nicaragua attracts the most capable or the least capable of society vis-á-vis the informal sector in Nicaragua. This relationship is portrayed graphically in Figure 1. In reading Figure 2.1, assume that a normal distribution of worker skills exists in Nicaragua and that earnings are based upon individuals' skills. If the most skilled are drawn into the informal sector (Sp), then this reflects a positively selected labor flow. Conversely, if the least skilled are drawn into the informal sector (Sn), then a negatively selected labor flow mechanism is at work.[9] "In other words," as Asea states (1996, 164), if "the informal sector is dynamic and absorbs entrepreneurial talent," then "there is voluntary self-selection into the informal sector."

The dynamics of this selectivity process can be further explicated through graphical analysis. Adapting the work of Gisser and Dávila (1998), a theoretical comparison of worker selectivity between the informal and formal sectors within the Nicaraguan setting may be constructed (see Figure 2.2). Worker skills are depicted on the horizontal axis and the returns to worker skills, wages, are posted on the vertical axis. It has been argued (assumed) that the average formal sector wage level surpasses that of the informal sector as reflected by lines FF and II, respectively. The slope of the wage-skill lines (FF and II)

[9] This discussion has been adapted from Roy (1951) and Borjas (2000, 320-321).

Figure 2.1: The Distribution of Skills in Nicaragua and the Selectivity of Sectoral Labor Flows

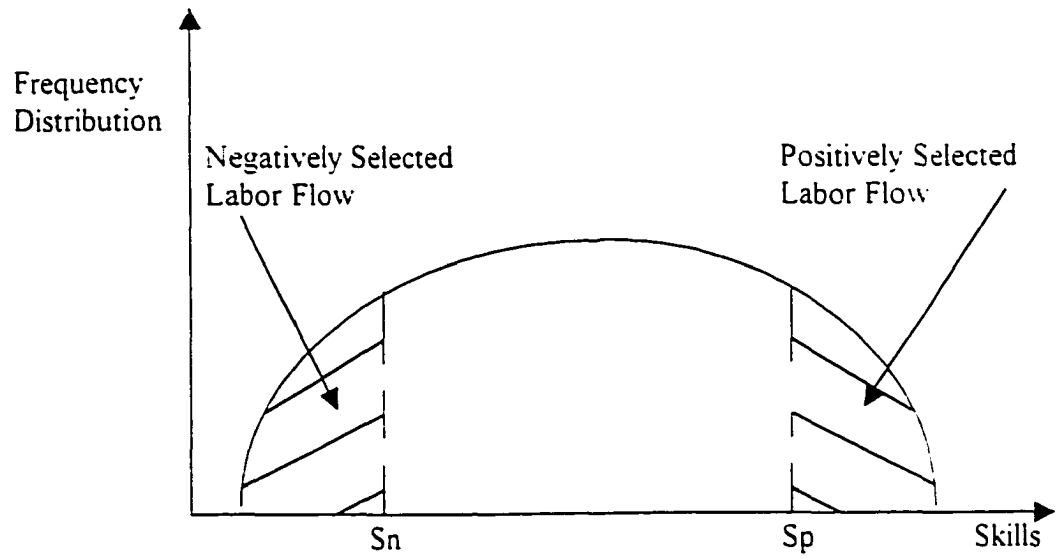
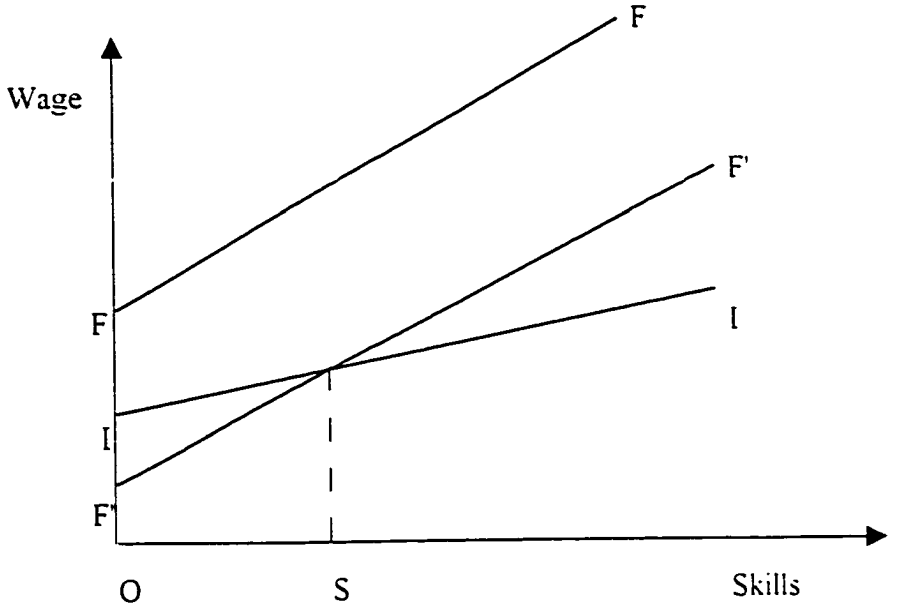


Figure 2.2: Self-Selection and Sectoral Choice



gives the wage payoff to an additional skill unit in each of these two sectors. The wage payoff to formal sector workers (FF) is steeper than informal sector workers because formal sector employment is assumed to require more skills and a greater differentiation of those skills vis-à-vis informal sector employment. The cost to informals moving from the informal to the formal sector is shown by F'F on the vertical axis. The final wage-line in the formal sector as seen from the perspective of the informal sector is represented by F'F'. The curve F'F' intersects with curve II at the skill level line OS. Thus, if workers select employment sectors rationally then it follows that informal sector workers with less than OS units of skills are relatively better off if they stay in the informal sector (e.g., negative selection) whereas informal sector workers with skills units surpassing OS find it more appealing to switch to formal sector employment (e.g., positive selection).

Additionally, Asea (1996) has called for just such research to determine whether self-selection into the informal sector is positive (confirming the neoclassical view of the optimal use of resources) or negative (confirming the backward and counterproductive view of the informal sector). Specifically, Asea (1996, 164) suggests the following process: "First, adopt one view (say, self-selection) as a 'null hypotheses.' Second, develop a simple model that stresses the null hypothesis and obtain empirically refutable predictions. Third, carry out empirical analysis which can speak to the causal relationship between the variables under consideration."

Hence, the following two hypotheses are suggested for testing:

H1: Nicaraguan men and Nicaraguan women are negatively selected into the informal sector.

H2: Nicaraguan men and Nicaraguan women are positively selected into the formal sector.

Queuing Issues in the Formal Sector

In his seminal paper on minimum wages and unemployment, Mincer (1976) described the "covered" and "uncovered" sectors within the context of above equilibrium minimum wage legislation. Mincer (1976, S88-S89) argued that an increase in the minimum wage impacted the uncovered sector not only by increasing the equilibrium wage in the uncovered sector, but also by creating an incentive for "a certain amount of 'waiting' for jobs" by uncovered workers "for jobs in the covered sector." Mincer (1976) notes that the labor flow may be bi-directional depending upon the context, specifically allowing for the flow of labor from the uncovered sector to the more desirable covered sector especially in the case of a developing economy. Additionally, he suggests that an above equilibrium minimum wage rate necessitates job rationing in the covered sector and argues that the "chances of success in the job search depend on the method of rationing" (Mincer 1976, S89). Lastly, he proposes that when vacancies do arise within the covered sector that these vacancies are filled nearly immediately from a pool of unemployed workers waiting for covered sector employment.

Mincer's observations of the covered and uncovered sectors may be applied to the discussion of formal sector queuing in the developing world and in the present case of Nicaragua. That is, wages in the formal sector (like Mincer's covered sector) are higher than in the informal sector. This higher wage in the formal sector may attract job entrants

from the informal sector at a rate greater than the availability of positions within the formal sector. This higher wage rate in the formal sector, then, may induce would be job entrants to "bide their time" until a formal sector position becomes available. Unlike developed countries which have a functional social safety net for unemployed persons to "wait" or queue for formal sector employment, Nicaragua has no social safety net; this compels potential formal sector job seekers to work in the informal sector (which acts as the de facto social safety net) while awaiting formal sector employment. That is, informal sector workers would ultimately maximize their utility by forming a queue in the formal sector and accepting a position within the informal sector.

Similarly, Asea (1996, 164) suggests for developing economies like Nicaragua that if the informal sector is indeed "the consequence of market imperfections inherent to developing countries," then a pool of surplus labor will form. That is, as Marcouiller, Ruiz de Castilla, Woodruff (1997, 368) succinctly state from their study of Mexico, El Salvador and Peru, "excess demand by workers for formal sector jobs" will prevail and "the image of workers queued for high-wage formal-sector jobs" will be observable. Hence, following Mincer's (1976) line of reasoning concerning job rationing, then, it is evident that a queue could potentially develop for formal sector employment from this labor surplus positioned in the informal sector.

Consequently, the issue of queuing may help shed light on the continuing informal sector debate: is the informal sector a drag on the economy or is the informal sector a catalyst for growth? Both individuals forming the job queue and employers who pull

potential employees from the queue are critical economic actors in this drama. Formal sector employers seek to minimize the costs associated with hiring and employing workers while informals in the job queue seek to make themselves attractive in order to be selected from the queue for formal sector employment. Thus, two decisions are at the crux of this analysis: 1) an informal's decision whether to join the formal sector queue; and 2) the formal sector employer's decision whether to select a particular informal from the queue (Marcouiller, Ruiz de Castilla, Woodruff, 1997).

In his study of the informal sector in Mexico, Maloney (1999, 288) suggests queuing should reflect the following three conditions: 1) low rates of formal sector turnover; 2) unidirectional flow of workers who graduate from the informal sector to the formal sector; and 3) that experience for informals increases their chances of being selected from the queue into formal sector employment. Although Maloney (1999) found some evidence of queuing in his study of the informal sector in Mexico specifically for unpaid workers moving into the informal salaried sector, his overall results suggest that sectoral queuing is the exception rather than the rule in Mexico. However, Maloney (1999) used the prosperous 1991-1992 time frame in Mexico as his data source a reality much in contrast to present-day Mexico not to mention most developing countries as well as Nicaragua— the focus of this study. Hence the following hypothesis is advanced:

H3: Nicaraguan men and women working in the informal sector queue for formal sector employment.

Evolution of the Informal and Formal Sectors in the 1990s

Nicaragua provides an interesting and relevant example of an economy in transition—from state-led development to market-led development— within the decade of the 1990s. Like most of contemporary Latin America, Nicaragua has undertaken a neoliberal economic approach to national development. Buechler et. al. (1998) suggest that the market-based approach in Bolivia swelled the ranks of the informal sector in the 1990s. Likewise, Franko (1999) argues that neoliberal reforms have impacted the welfare of Latin American women negatively. Chavez Metoyer (2000), in concert with Franko (1999), submits that neoliberalism in Nicaragua has further impoverished the majority of women relative to men.

In line with Funkhouser's (1996) results, the Central Bank of Nicaragua's estimate of the urban informal sector prepared for President Alemán calculated the urban informal sector rate at 59.2% for 1996, 53.4% for 1997 and 55.6% for 1998 (Banco de Nicaragua, 1999, 20). Throughout the 1990s, per capita income in Nicaragua has fallen from $469 in 1990 to $410 by 1998 (Arana, 1997, 83, World Bank, 1999). Concomitant with diminishing per capita income, another popular and broader index of well-being, the Human Development Index, (which takes into account life expectancy, literacy, schooling and income), declined in Nicaragua by about 25% from 1990 to 1996 (Close 1999, 121). The Human Development Index is measured on a scale from zero to one, where most developed (or First World) nations approach one; the raw Nicaragua score fell from .743 to .568 indicating worsening and widespread poverty (Close, 1999, 121).

The importance of the government sector was paramount in the economy at the beginning of the 1990s. Walker (1997, 9) suggests that roughly 40% of total output was directed by the government; whereas 20% of all employed persons (218,210) were employed directly by the government (Banco de Nicaragua, 2000a). In contrast, by the end of the 1990s the role of the government had diminished to 7.5% of national output and 5.1% of national employment (or 78,365 government sector employees) (Banco de Nicaragua, 2000a, Banco de Nicaragua, 2000c). Although the primary export sector has rebounded somewhat from the export disincentives of the Sandinista era, the current account remains in structural deficit running at about 40% of GDP (Banco de Nicaragua, 1999, i). This deficit has been financed primarily through foreign aid, a precarious situation indeed. And on top of this gloomy economic portrait, the destructive forces of Hurricane Mitch greatly exacerbated these economic challenges.

Clearly, however, not all the economic news is bad, inflation has been checked from 13,490% in 1990 to close to 10% at the end of the 1990s, official unemployment has declined to its lowest level in a decade to 10.7%, and the external (foreign) debt has been reduced significantly (approximately halved) to around $6 billion or about three times GDP (Banco de Nicaragua, 2000b). Of interest then is how has this sudden economic transition impacted sectoral employment patterns and returns. Hence, the last three hypotheses are proposed for testing as follows:

H4: The formal sector employment queue for Nicaraguan men and Nicaraguan women working in the informal sector is more pronounced in 1998 than in 1993.

H5: The sectoral returns to informal employment should have decreased from 1993 to 1998 for Nicaraguan men and Nicaraguan women.

H6: The sectoral returns to formal employment should have increased from 1993 to 1998 for Nicaraguan men and Nicaraguan women.

Chapter Summary

This chapter reviewed the multi-disciplinary informal sector literature. The literature reveals a large continuum of descriptions for the informal sector: from a refuge of surplus and dependent labor to a pool of dynamic entrepreneurial talent. The focus of the literature review was on Latin America generally and Central America more specifically. Five research approaches to the informal sector debate—the ILO, the neo-Marxist, the legalist, the microenterprise and structural articulation approaches—were presented within the Latin American context. The Nicaraguan informal sector was set in historical and contemporary economic context and six research hypotheses were advanced to test the nature and form of the informal/formal sector dichotomy. The research hypotheses centered on sectoral selectivity, queuing, evolution, and gender differences in Nicaragua within and between the informal/formal sectors for the period of the 1990s. Chapter three reports on the data, research design, and basic descriptive statistics in testing the six research hypotheses outlined in this chapter.

CHAPTER III

DATA, RESEARCH DESIGN, AND BASIC DESCRIPTIVE STATISTICS

Chapter three describes the Nicaraguan data employed to test the research hypotheses laid out in chapter two. Additionally, the research design and basic descriptive statistics for the Nicaraguan informal and formal sectors are offered.

Data[10]

In this dissertation, two Nicaraguan data sets are employed: 1) the 1993 Nicaragua *Encuesta de Medición de Nivel de Vida* (EMNV); and 2) the 1998 Nicaragua *Encuesta de Medición de Nivel de Vida* (EMNV).[11] These comprehensive and representative national surveys are modeled after the base Living Standards and Measurement Survey constructed by the World Bank which has been used in over a dozen developing countries around the world since 1985. In Nicaragua, these surveys were conducted by INEC, the National Statistics and Census Institute. Both the 1993 and 1998 surveys are similar— they contain, for the most part, individual level socio-economic information. For our purposes, the household questionnaire contains categorical and ratio data concerning the household roster, housing, education, and employment which enables us to examine informal sector phenomena.

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[10] Special thanks are accorded the Nicaraguan National Institute of Statistics and Census (INEC) and the Poverty and Human Resources Division (PHRD) of the World Bank in making available the 1993 and 1998 Nicaraguan LSMS with which the results of this research are based.

[11] The English equivalent of the EMNV is LSMS or Living Standards Measurement Survey.

The 1993 LSMS, conducted between February and June 1993, used a national random sampling design obtaining information from 4,454 households totaling 25,122 people across all seven regions and seventeen departments.[12] Of this total, 50.7% were female and 49.3% were male and 55.9% came from urban zones while 44.1% came from rural areas. The World Bank suggests that the condition of the 1993 data "is good" (The World Bank, n.d., 16). A further geographical breakdown of survey respondents is provided in Table 3.1.

Similar in structure to the 1993 LSMS, the 1998 LSMS was carried out between May and August 1998 and used a random sampling design. 23,521 people from 4,209 households were interviewed across the country including all seven regions and seventeen departments.[13] Of this total, 49.0% were male and 51.0% were female with 50.8% of all respondents hailing from urban areas. Table 3.2 depicts the geographical breakdown of the 1998 LSMS.

Research Design

When employing vast quantities of archival or secondary data, such as the

[12] The original sampling frame called for a national sample of 3,600 households with a starting total of 4,200 households as INEC estimated that 15% of households would decline to answer the questionnaire. However, only 6.62% of households declined to participate (hence a non-response bias should not be present in the data); thus, leaving more households in the sampling frame. Additionally, some households contacted contained more than one family which increased the final sample size.

[13] At the time the 1998 data set was acquired, January 2000, all final documentation had not yet been released (as it becomes available the author will be notified). The author was able to obtain advanced drafts or completed documentation modules for the entire 1998 LSMS survey however. Nonetheless, the World Bank had yet to make a ruling on the "quality" of the 1998 Nicaraguan LSMS at the time of this writing. Additionally, the original sampling frame called for a national sample of 4,656 households, with an urban/rural ratio of 52.3% to 47.7%, respectively (INEC, 1999). The final data collected closely resemble these goals. INEC also estimated that 10% of households would decline to answer the questionnaire, in fact the non-response rate was 9.6% (hence a non-response bias should not be present in the data).

Table 3.1: Geographical Breakdown of 1993 Nicaraguan LSMS Survey Respondents

Region	Departments	Respondent Characteristics			
		Total Respondents	% of Total Respondents	% Urban	% Rural
Segovias	Esteli, Madriz, Nueva Segovia	3,328	13.2	45.0	55.0
Western	León, Chinandega	3,226	12.8	58.8	41.2
Managua	Managua	6,047	24.1	84.8	15.2
Southern	Granada, Masaya, Carazo, Rivas	3,147	12.5	59.5	40.5
Central	Boaco, Chontales	3,396	13.5	38.2	61.8
Northern	Jinotega, Mataglapa	3,050	12.1	31.4	68.6
Atlantic	Rio San Juan, RAAN, RAAS	2,928	11.7	47.4	52.6
Totals	-----	25,122	99.9*	55.9	44.1

Source: The World Bank (n.d.) The 1993 Nicaraguan Living Standards Measurement Survey: Documentation, p. 12.

Notes:

(i) *Totals may not add up to 100 due to rounding.

Table 3.2: Geographical Breakdown of 1998 Nicaraguan LSMS Survey Respondents

Region	Departments	Respondent Characteristics			
		Total Respondents	% of Total Respondents	% Urban	% Rural
Segovias	Esteli, Madriz, Nueva Segovia	3,195	13.6	49.0	51.0
Western	León, Chinandega	3,474	14.8	57.5	42.5
Managua	Managua	2,713	11.5	87.5	12.5
Southern	Granada, Masaya, Carazo, Rivas	4,793	20.4	52.3	47.7
Central	Boaco, Chontales	1,964	8.3	38.9	61.1
Northern	Jinotega, Mataglapa	3,090	13.1	26.3	73.7
Atlantic	Rio San Juan, RAAN, RAAS	4,292	18.2	45.0	55.0
Totals	-----	23,521	99.9*	50.8	49.2

Source: author's compilation from 1998 Nicaraguan LSMS.

Note:

(i) *Totals may not add up to 100 due to rounding.

Nicaraguan national census data used in this dissertation, the nonexperimental research design is the most expedient (Buckley, Buckley & Chiang, 1976). That is, according to Buckley, Buckely and Chiang (1976, 40), "the research advantage [of archival data] lies in the ability to access and manipulate a vast quantity of hard, and very often factual, information." Thus, the study of the informal sector using the 1993 Nicaraguan LSMS and 1998 Nicaraguan LSMS is best "handled" using the nonexperimental research approach. The exact models, specifications, and variables are the subject of chapter four.

Basic Descriptive Statistics

The 1998 Nicaraguan Living Standards and Measurement Survey (LSMS) forms the basis for a comprehensive overview and description of the informal and formal sectors of contemporary Nicaragua. As discussed in chapter four, the 1998 Nicaraguan LSMS serves as the reference point for the first three hypotheses as well as the benchmark for comparison for hypotheses four through six; thus a general sectoral survey of the informal and formal employment using the 1998 Nicaraguan LSMS is warranted.

The primary challenge facing the researcher in delimiting a data set between the formal and informal sectors is definitional. That is, how should the sectoral division be constructed? Fortunately, the literature provides four basic alternatives in segregating the formal from the informal sector— 1) by social security coverage (Portes & Schauffler, 1993); 2) by firm size (Tokman, 1992); 3) by labor contract coverage (Beneria, 1989); and 4) by firm registration (Pagán & Tijerina-Guajardo, 2000, Roubaud, 1995). Each of the four alternatives is defined below.

Social security delimits the sectors through those belonging to social security (formal sector) and those not belonging to social security (informal sector). Tokman (1992) and other structuralists argue that firm size (measured by the number of employees in the firm) should be employed to separate the informal from the formal sector. Specifically, they advocate using "smallness" to conclude informality (e.g., five employees or less) and "largeness" to conclude formality (e.g., six employees or more). Beneria (1989) and Roberts (1989) suggest that contracts can measure the degree of formality— a labor contract signifies formality while the absence of a labor contract signifies informality. Lastly, Pagán and Tijerina-Guajardo (2000) and Roubaud (1995) in their studies of the Mexican urban informal sector use firm registration with the government as the delimiter between informality (firm is not registered) and formality (firm is registered). The 1998 Nicaraguan data allows the use of the first three approaches; unfortunately the survey did not inquire as to the nature of firm registration.

The basic descriptive statistics of the informal and formal sectors as determined by enrollment (or absence of) in social security appear in Table 3.3. The table lists aggregate data for each sector as well as disaggregated data based on gender. Based on 7,781 individuals aged twelve and older, the formal sector makes up 13.3% of the working population while 86.7% of workers are employed in the informal sector. Also, formal sector employees are older, have substantially higher levels of education, are much more likely to be married, have less experience, earn considerably more and work more than their informal sector counterparts. Gender similarities across sectors suggest that men are

Table 3.3: 1998 LSMS - Basic Descriptive Statistics for Informal/Formal Sectors Based on Social Security

	Enrolled in Social Security?					
Variable	**Yes: Formal Sector**			**No: Informal Sector**		
Total Number = 7,781 (% of total)	1,037 (13.3%)			6,744 (86.7%)		
	Male	Female	Total	Male	Female	Total
Total Number (%)	598 (59.7%)	439 (42.3%)	1,037 (100.0%)	4,672 (69.3%)	2,072 (30.7%)	6,744 (100.0%)
Mean Age - Years (Std. Dev.)	36.02 (11.52)	33.67 (9.24)	35.02 (10.67)	32.80 (16.15)	34.38 (14.46)	33.29 (15.66)
Mean Education - Years (Std. Dev.)	8.66 (4.30)	9.88 (3.76)	9.18 (4.12)	4.09 (3.64)	5.21 (3.86)	4.43 (3.75)
Married (%)	464 (77.6%)	231 (52.6%)	695 (67.0%)	2,637 (56.4%)	970 (46.8%)	3,607 (53.5%)
Mean Experience - Years (Std. Dev.)	21.36 (12.82)	17.78 (10.12)	19.85 (11.88)	22.60 (17.11)	23.09 (15.89)	22.75 (16.74)
Mean Experience squared (Std. Dev.)	621.27 (684.71)	418.47 (489.65)	535.45 (617.74)	805.03 (1092.84)	789.71 (960.47)	800.35 (1053.97)
Weekly Mean Income in Cordobas (Std. Dev.)	505.69 (764.02)	329.55 (402.95)	430.86 (641.86)	266.79 (614.70)	194.86 (285.50)	243.06 (530.27)
Mean Daily Hours Worked (Std. Dev.)	10.01 (4.06)	8.03 (2.29)	9.17 (3.56)	8.12 (2.59)	7.94 (3.33)	8.07 (2.83)

Source: Author's calculations derived from the 1998 Nicaraguan LSMS.

married at a higher rate, posses higher levels of experience and income, and work longer hours than women; on the other hand women are better educated than men. Gender dissimilarities show that women tend to be older in the informal sector relative to men and vice-versa in the formal sector. Also formal sector men tend to be more experienced than formal sector women. And informal sector women are more experienced than informal sector men.

The basic descriptive statistics of the informal and formal sectors as organized by firm size appear in Table 3.4. The table shows aggregate data for each sector as well as disaggregated data based on gender. Based on 8,071 individuals aged twelve and older, the formal sector makes up 29.7% of the working population while 70.3% of workers are employed in the informal sector. Informals tend to be older, significantly less educated, and more experienced than formals. Formal sector employees are remunerated at a superior rate and work longer hours than informal sector employees. Across sectors, women tend to be more educated, married at a lower rate, and work fewer hours than men. Mixed comparisons are found for age and experience– where informal sector women are more experienced then informal sector men while formal sector men are more experienced than formal sector women. And formal sector men are slightly older than formal sector women and informal sector women are older than informal sector men.

The basic descriptive statistics of the informal and formal sectors as demarked by employment contract appear in Table 3.5. The table illustrates aggregate data for each sector as well as disaggregated data based on gender. Based on 3,777 individuals aged

Table 3.4: 1998 LSMS - Basic Descriptive Statistics for the Informal and Formal Sectors Based on Firm Size

	Firm Size in Number of Employees					
Variable	**6 or more employees: Formal Sector**			**5 or less employees: Informal Sector**		
Total Number = 8,071 (% of total)	2,401 (29.7%)			5,670 (70.3%)		
	Male	Female	Total	Male	Female	Total
Total Number (%)	1,680 (70.0%)	721 (30.0%)	2,401 (100.0)	3,821 (67.4%)	1,849 (32.6%)	5,670 (100.0%)
Mean Age - Years (Std. Dev.)	32.06 (13.57)	32.01 (10.82)	32.04 (12.80)	33.64 (16.56)	35.20 (14.58)	34.16 (19.95)
Mean Education - Years (Std. Dev.)	6.29 (4.38)	8.39 (4.30)	6.93 (4.46)	4.00 (3.59)	5.18 (3.83)	4.39 (3.71)
Married (%)	1,014 (60.4%)	328 (45.5%)	1,342 (55.9%)	2,099 (54.9%)	877 (47.4%)	2,976 (52.5%)
Mean Experience - Years (Std. Dev.)	19.77 (14.30)	17.61 (11.73)	19.12 (13.31)	23.64 (17.49)	24.02 (15.99)	23.77 (17.00)
Mean Experience squared (Std. Dev.)	596.37 (822.29)	448.14 (571.14)	551.54 (758.14)	866.69 (1134.42)	837.31 (989.45)	856.98 (1088.66)
Weekly Mean Income in Cordobas (Std. Dev.)	360.90 (672.20)	268.19 (348.86)	332.68 (594.20)	263.41 (620.47)	200.67 (299.50)	240.29 (526.33)
Mean Daily Hours Worked (Std. Dev.)	9.13 (3.37)	7.93 (2.66)	8.77 (3.22)	7.98 (2.50)	7.97 (3.35)	7.98 (2.81)

Source: Author's calculations derived from the 1998 Nicaraguan LSMS.

Table 3.5: 1998 LSMS - Basic Descriptive Statistics for the Informal and Formal Sectors Based on Employment Contract

	Have an Employment Contract?					
Variable	**Yes: Formal Sector**			**No: Informal Sector**		
Total Number = 3,777 (% of total)	875 (23.2%)			2902 (76.8%)		
	Male	Female	Total	Male	Female	Total
Total Number (%)	557 (63.7%)	318 (36.6%)	875 (100.0%)	1,927 (66.4%)	975 (33.6%)	2,902 (100.0%)
Mean Age - Years (Std. Dev.)	33.75 (11.79)	32.80 (9.23)	33.40 (10.93)	31.22 (14.06)	31.12 (11.66)	31.18 (13.30)
Mean Education - Years (Std. Dev.)	8.13 (4.39)	10.13 (3.99)	8.86 (4.35)	4.98 (3.82)	6.19 (3.90)	5.39 (3.89)
Married (%)	390 (70.0%)	162 (50.9%)	552 (63.1%)	1,085 (56.3%)	405 (41.5%)	1,490 (51.3%)
Mean Experience - Years (Std. Dev.)	19.62 (12.87)	16.67 (9.89)	18.54 (11.95)	20.25 (15.00)	18.92 (12.87)	19.80 (14.34)
Mean Experience squared (Std. Dev.)	548.91 (701.78)	373.40 (429.55)	485.13 (622.33)	636.78 (896.53)	521.55 (670.00)	597.95 (828.84)
Weekly Mean Income in Cordobas (Std. Dev.)	422.35 (495.61)	356.86 (450.05)	398.48 (480.28)	224.73 (392.99)	158.13 (181.70)	202.78 (338.35)
Mean Daily Hours Worked (Std. Dev.)	9.75 (3.64)	8.11 (2.26)	9.15 (3.30)	8.83 (2.96)	8.66 (2.81)	8.77 (2.91)

Source: Author's calculations derived from the 1998 Nicaraguan LSMS.

twelve and older, the formal sector makes up 23.2% of the working population while 76.8% of workers are employed in the informal sector. Formal sector employees have higher levels of education, a greater propensity to be married, receive higher incomes, work longer hours, and have less experience than their informal sector counterparts. Regardless of sector, women tend be more highly educated, younger, work less hours, have less experienced, receive less income and are married at a lower rate than men.

All three tables (Tables 3.3-3.5) indicate that the informal sector in Nicaragua at the end of the 1990s is very large (over 70% of the working population), especially in comparison to the Latin American informal sector as a whole (see chapter two).[14] As expected, higher education levels are found in the formal sector and more experience accrues to the informal sector. Also, formal sector workers put in longer hours on the job than informal sector workers. Another important observation concerns earnings, in all cases, formal sector workers earn far more than their informal sector counterparts These unadjusted earnings data are certainly consistent with our selectivity hypotheses (hypotheses one and two) as well as our queuing hypotheses (hypotheses three and four); the remaining hypotheses study the economic transition in Nicaragua within the 1990s.

Chapter Summary

This chapter introduced and described the two individual level socio-economic

[14] It is important to note that the basic descriptive statistics from the 1998 survey employed in this dissertation show a higher level of informal sector participation than Funkhouser's (1996) findings This may be due to the following reasons: 1) measurement— my firm size cut-off point is five or fewer workers (which is in line with the mainstream literature) versus Funkhouser's (1996) four or fewer workers; 2) time—the 1998 data is considerably more recent than Funkhouser's (1996) and it may better reflect the harsh realities of the neo-liberal transition of the 1990s within Nicaragua; and 3) sample— Funkhouser (1996) only employed data from the urban centers whereas I have tried to incorporate both rural and urban data for a more complete national

Nicaraguan national surveys undertaken by the Nicaraguan National Institute of Statistics and Census (INEC) in 1993 and 1998 used to empirically address the research hypotheses offered in this dissertation. Basic descriptive statistics (mean age, mean education level, percentage married, mean experience, mean experience squared, mean income and mean hours worked) for both the formal and the informal sectors for 1998 were delineated based on three different measuring techniques for gauging the informal sector—firm size, social security enrollment, and coverage by labor contract. The descriptive statistics for 1998 indicate that the informal sector is quite large, employing seven in ten economically active individuals, and with informals on average earning 49%-28% below their formal sector counterparts. The next chapter focuses on the empirical methodology (econometric testing) of the aforementioned hypotheses.

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view of the informal sector in a society where nearly 40% of inhabitants still reside in the countryside.

CHAPTER IV

EMPIRICAL METHODOLOGY

This chapter seeks to identify and explain the empirical methodology employed to answer the aforementioned research questions concerning the informal and formal sectors in Nicaragua. Specifically, statistical tests are delimited in conjunction with the appropriate research hypothesis(es) investigated. Thus, three statistical analyses have been constructed to test the issues of individual sectoral selection, formal sector queuing, and sectoral evolution of labor within Nicaragua over the decade of the 1990s.

Selectivity Issues in the Formal and Informal Sectors

Roy's (1951) seminal essay on earnings distributions between two sectors forms the theoretical foundation for the dichotomous self-selection model between the formal and informal sectors.[15] Recall that the first two research hypotheses seek to shed light on the selectivity issue— are individuals negatively or positively selected into their respective sector of employment. For the Nicaraguan case study the hypotheses again are:

> **H1: Nicaraguan men and Nicaraguan women are negatively selected into the informal sector.**
>
> **H2: Nicaraguan men and Nicaraguan women are positively selected into the formal sector.**

[15] Interestingly, in his essay Roy compares the occupations of rabbit hunting and trout fishing to illustrate positive and negative occupational selection.

To test these hypotheses, a formal econometric model is developed. Assume that individuals choose the sector which maximizes their utility taking into consideration their human capital, the sectoral-specific labor market value of human capital, unobserved (and unmeasured) ability, and the explicit and implicit costs involved in the formal sector employment decision. The sectoral earnings and the formal sector employment choice can be estimated using a three-equation switching regression model:

employment decision. The sectoral earnings and the formal sector employment choice can

(1) $\ln Y_{FL} = X\beta_{FL} + u_{FL}$,

(2) $\ln Y_{IL} = X\beta_{IL} + u_{IL}$,

(3) $I^* = Z\gamma + \varepsilon$.

Where $\ln Y_{FL}$ and $\ln Y_{IL}$ are the log of weekly earnings of the formal and informal workers, X captures the determinants of earnings, Z captures the determinants of formal sector employment and β_{FL} and β_{IL} are vectors of coefficients. I^* represents an unobservable latent variable that measures the likelihood of being employed in the formal sector. If I^* is positive, then the individual is observed to be employed in the formal sector ($I = 1$); and if I^* is negative, then the worker is employed in the informal sector ($I = 0$). Assuming that $\sigma_i = 1$, the (1)-(3) system of equations can be estimated jointly using maximum likelihood (see Amemiya, 1985, Maddala, 1983).[16]

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[16] The log-likelihood function is given by

$$L(\beta_{FL}, \beta_{IL}, \gamma, \sigma_{FL}^2, \sigma_{IL}^2) = \sum_{i=1}^{N} \log[\theta_i f_{FL}(\ln Y_{FL_i}) + (1-\theta_i) f_{IL}(\ln Y_{IL_i})], \text{ where}$$

$$f_i(\ln Y_{ji}) = \frac{1}{\sqrt{2\pi\sigma_j^2}} \exp[-\frac{1}{2\sigma_j^2}(\ln Y_{ji} - X_{ij}'\beta_j)^2] \text{ and } \theta_i = F_i(0) = \phi(-Z_i'\gamma).$$

The correlation coefficients between ε, u_{FL}, and u_{IL} ($\rho_{\varepsilon u}^{FL}$ *and* $\rho_{\varepsilon u}^{IL}$) capture the ceteris paribus direction and the degree of selectivity in each sector (Borjas & Bonnars, 1989, 598, Maddala, 1983). If $\rho_{\varepsilon u}^{FL}$ is positive, then there is evidence of positive self-selection into the formal sector– that is, high ability individuals will choose formal sector employment. Conversely, if the correlation coefficient is negative then low ability individuals will choose formal sector employment. For the informal sector, if $\rho_{\varepsilon u}^{IL}$ is negative, then there is evidence of positive self-selection into the informal sector, and conversely if the correlation coefficient is positive, then negative self-selection exists in the informal sector.

In the selectivity study, the following variables are included in X (the determinants of earnings): education, experience, experienced squared, marital status, regional residence, urban residence, agricultural employment, number of children in the household, the number of adults in the household, number of rooms in the household, home ownership and log of other household income. By convention, education, experience, experienced squared, and marital status are included in the earnings model. Indicators of wealth (number of rooms in the household, home ownership, and the log of other household income), geographic location (urban and regional residence), familial obligations (marriage, the number of children and adults in the household) and occupation (agricultural employment) may also influence earnings. Additionally, the following variables comprise Z (the determinants of formal sector employment): education, experience, experience squared, marital status, regional residence, and occupation. Again, education, experience, experienced squared, and marital status are included by convention

in the employment decision; however regional and urban residence, and occupation are also included to capture regional, urban, and occupational variations.

Queuing Issues in the Formal Sector

Using the queuing framework, we can examine whether an excess demand for formal sector employment exists vis-a-vis informal sector workers. That is, "the image of [informal sector] workers queued for high-wage formal-sector jobs," if present, will be observable (Marcouiller, Ruiz de Castilla, Woodruff, 1997, 368). The third hypothesis, which focuses upon this queuing phenomena, is given again by

H3: Nicaraguan men and women working in the informal sector queue for formal sector employment.

Adapting the work of Abowd and Farber (1982) and Defreitas (1993) in the area of unions and worker queues for union employment, an econometric model, using indirect measures of determining the likelihood of an individual's participation in the formal sector, may be applied to test for the possibility of sectoral employment queues. The model allows for the investigation of two independent and critical decisions within the formal sector: 1) an informal's decision whether to join the formal sector queue; and 2) the formal sector employer's decision whether to select a particular informal from the queue (Marcouiller, Ruiz de Castilla, Woodruff, 1997).

The model makes the assumption that an individual's desire to work in the formal sector is based on a comparison between the benefits and costs of being employed in the

formal sector vis-á-vis all other alternatives (e.g., employment in the informal sector). The queuing propensity function of this individual-level decision follows:

(4) $Q_i^* = X_i\beta + \varepsilon_i,$

Where Q_i^* represents a queuing propensity index function for individual i, X_i is a vector of variables determining queuing, β is the related vector of coefficients, and ε_i is the error term. The probability that the ith individual joins the formal sector employment queue is given by:

(5) $P(Queue = 1) = P(Q_i^* > 0) = P(\varepsilon_i > -X_i\beta).$

From the formal sector employer's perspective, the typical formal sector firm will select competent workers that are more likely to minimize labor costs per unit of output. The appropriate selection of workers, then, is directly related to the skills and experience of the worker. The cost per unit of output index function, C_i^*, can then be written as:

(6) $C_i^* = Z_i\gamma + v_i,$

where Z_i is a vector of individual characteristics related to employment cost, γ is the vector of coefficients, and v_i is the error term. Thus, the probability that the ith individual is selected by the formal sector from the employment queue is given by:

(7) $P(Hired = 1 | Queue = 1) = P(C_i^* > 0) = P(v_i > -Z_i\gamma).$

By multiplying Equations (5) and (7), the probability of obtaining a formal sector job can then be written as:

(8) $P(FormalSector = 1) = P(Queue = 1)P(Hired = 1|Queue = 1) = P(\varepsilon_i > -X_i\beta)P(v_i > -Z_i\gamma)$.

If we assume that ε_i and v_i have standard normal distributions and that the queuing and hiring decisions are sequential and independent, then the bivariate probit model with partial observability proposed by Abowd and Farber (1982) can be used to estimate the model parameters. These are estimated by maximum likelihood (Poirier, 1980).

The queuing propensity function includes as regressors those factors which conventionally constitute an equation of labor force participation: education, experience, experienced squared, marital status, household composition (the number of children and adults at home), household income (the log of individual income and the log of other household income), household assets (home ownership and number of rooms in the household), occupation, and geographical residence (urban and regional domiciles) The employer expected cost per unit of output function should only include factors observable by the employer. Hence, the specification should include education, experience, experienced squared, marital status, geographical residence and occupation (and, thus, this function excludes household composition, household income and assets).

Excluding these variables from the cost per unit of output function is not only theoretically justified but it is also necessary in order to identify the parameters of the model due to partial observability. That is, we are only able to observe whether individuals are employed or not employed in the formal sector. For informal sector workers, we do not observe whether they had joined the formal sector job queue in the

first place and were not selected, or whether they had not joined the job queue altogether (Poirier, 1980).

To empirically assess whether or not queuing exists and to what degree queuing may exist in the formal sector, a likelihood ratio test comparing the bivariate probit queuing model with a single probit non-queuing model can then be constructed (segmented by gender). Rejecting the null hypothesis would imply that the bivariate probit model explains the data well and, thus, null rejection would be statistical evidence in favor of queuing in the formal sector.

Evolution of the Formal and Informal Sectors in the 1990s

The economic transition undertaken by Nicaraguan economic decision-makers in the 1990s radically altered the national economic landscape. At the beginning of the 1990s, the economy was predominately state-centered and in trouble. However, by the end of the decade, the economy was primarily privatized and directed by dynamic market forces although the fruits of this dynamism (the economic turnaround) were enjoyed by few (Walker, 1997). Recall that hypothesis four suggested that the informal sector queue has expanded (or has become more pronounced) over the 1990s. Hypothesis four read as follows:

H4: The formal sector employment queue for Nicaraguan men and Nicaraguan women working in the informal sector is more pronounced in 1998 than in 1993.

The econometric framework developed in equations (4)-(8) to test for formal sector employment queuing can be utilized to estimate separate partial observability

bivariate probit models for 1993 and 1998. The models would be estimated for men and women separately. A Wald test of structural differences with unequal variances can then be used to test whether there have been any structural changes in formal sector employment queuing between 1993 and 1998 (Greene, 2000, 293).

More formally, assume that are the two vectors of coefficients for 1993 and 1998 from the bivariate probit models, $\theta_{93} = [\beta_{93}, \gamma_{93}]$ and $\theta_{98} = [\beta_{98}, \gamma_{98}]$, and that the estimated variance-covariance matrices are given by $V_{93} + V_{98}$. The null hypothesis would be that the two estimators have the same expected value; that is, $\theta_{98} - \theta_{93}$ has a mean equal to a vector of zeros and variance $V_{93} + V_{98}$. The Wald statistic is then given by $(\theta_{98} - \theta_{93})'(V_{98} + V_{93})^{-1}(\theta_{98} - \theta_{93})$, which follows a chi-squared distribution with degrees of freedom equal to the number of parameters in the two equations that comprise the partial observability bivariate probit model [equation (8)] Rejecting the null hypothesis would then imply that the queuing structure in 1998 statistically differs from that in 1993 and, consequently, that the formal sector employment queue is more pronounced in 1998 than in 1993.

Related to this 1993-1998 queuing structural change there ought to be a readily observable expanding wage gap between lower-income earning informal sector workers and higher-income earning formal sector workers. Accordingly, if the economic reforms instituted in the 1990s have furthered skewed the distribution of income in favor of those "best" equipped in a global economy (e.g., formal sector jobholders) as suggested by Walker (1997) and Chavez Metoyer (2000), then the size of this gap must have more likely expanded. Recall that H5 and H6 were stated as:

H5: The sectoral returns to informal employment should have decreased from 1993 to 1998 for Nicaraguan men and Nicaraguan women.

H6: The sectoral returns to formal employment should have increased from 1993 to 1998 for Nicaraguan men and Nicaraguan women.

The Wellington (1993) earnings decomposition method is proposed here to empirically test whether sectoral-specific returns changed from 1993 to 1998. It is noteworthy that from 1993 to 1998 the earnings differential between the formal and the informal sector increased from 30.04% to 60.96% for men and 16.76% to 51.29% for women. First, formal and informal sector log earnings functions are estimated for 1993 and 1998 separately. The human capital wage equations take the form:

$$(9) \qquad W_{it}^{s} = X_{it}^{s'}\beta_{t}^{s} + \varepsilon_{it}^{s},$$

where W_{it}^{s} is the natural logarithm of wages for worker i in year t and sector s, X_{it}^{s} is a vector of factors related to earnings (education, labor market experience, marital status, occupation, residence, household composition, and household income and assets), β_{t}^{s} is the vector of related coefficients, and ε_{it}^{s} is the stochastic error term with mean zero and constant variance.

The Wellington (1993) method can be used to decompose 1993-1998 changes in the differences in earnings between the formal and informal sectors. There are essentially two sources of inter-temporal change: changes in the mean individual characteristics related to human capital and changes in the labor market prices of these characteristics:

$$(10) \qquad (\overline{W}_{98}^{f} - \overline{W}_{98}^{i}) - (\overline{W}_{93}^{f} - \overline{W}_{93}^{i}) = [\hat{\beta}_{98}^{f\prime}(\overline{X}_{98}^{f} - \overline{X}_{93}^{f}) - \hat{\beta}_{98}^{i\prime}(\overline{X}_{98}^{i} - \overline{X}_{93}^{i}) + [\overline{X}_{93}^{f\prime}(\hat{\beta}_{98}^{f} - \hat{\beta}_{93}^{f}) - \overline{X}_{93}^{i\prime}(\hat{\beta}_{98}^{i} - \hat{\beta}_{93}^{i})],$$

where the β's are the vectors of estimated coefficients for the formal and informal sector equations in 1993 and 1998, and the $\overline{X}$'s are the vectors of the means of the factors related to earnings for either the formal or informal sector samples.

Equation (10) basically states that the change in the wage gap from 1993 to 1998 can be decomposed into two parts: the first one explains the role of inter-sectoral human capital changes from 1993 to 1998 and the second component explains the role of changes in the labor market prices of these characteristics during the same period. The two components can be further subdivided into each variable included in the regressions to see the contribution of each component to the total change in the formal-informal sector wage gap (see, Brown, Pagán & Rodriguez-Oreggia, 1999, Kidd & Meng, 1997, for related applications of this model). (See Table 4.1 for a listing and description of all the variables cited in this chapter.)

Chapter Summary

In order to test the six research hypotheses, three empirical (econometric) models were put forth and described. These tests include: 1) the three equation switching regression model which allows insight into the issues of selectivity (hypotheses one and two); 2) a two equation queuing model which measures the extent of informals queuing for employment in the formal sector; and 3) the Wellington earnings decomposition model which allows for the comparison of the 1998 and 1993 data along gender and sectoral lines. The results and discussion of these procedures comprise chapter five.

Table 4.1: Variable List

Variable Name	Description	Scale
Ed	Years of Education	Ratio
Age	Age in Years	Ratio
Exper	Experience (age minus education minus six)	Ratio
Exper2	Experienced squared/100	Ratio
Female	Gender	Categorical: Male=1; Female=0
Married	Civil Status	Categorical Married=1; Not Married=0
Children	Number of Children under 12 in the Household	Ratio
Adults	Number of Adults 12 Years or older in the Household	Ratio
Hseliv	Number of People Living in the Household	Ratio
Income	Income (in Córdobas)	Ratio
Otherinc	Other Household Income (in Córdobas)	Ratio
Numrooms	Number of Rooms in the Home (exclusive of the garage, kitchen, bathrooms, and hallways)	Ratio
Ownhome	Home Ownership	Categorical: Own Home=1; Do Not Own Home=0
Selfempl	Self-Employed	Categorical: Self-Employed=1; Not Self-Employed=0
Segovias Western Southern Central Northern Atlantic Managua	Geographical Region	Categorical: Segovias=1; Otherwise=0 Western=1; Otherwise=0 Southern=1; Otherwise=0 Central=1; Otherwise=0 Northern=1; Otherwise=0 Atlantic=1; Otherwise=0 Managua=1; Otherwise=0
Infsize	Informal/Formal Sectors Segmented by Firm Size	Categorical: Formal=1 (6 or more employees) Informal=0 (5 employees or less)

Table 4.1: Variable List (Continued)

Infss	Informal/Formal Sectors Segmented by Enrollment in Social Security	Categorical: Formal=1 (enrolled in social security) Informal=0 (not enrolled in social security)
Urban	Urban/Rural Residence	Categorical: Urban=1; Rural =0
Weight	Sample Weights	Ratio
Prof Service Ag Craft Laborers	Occupation	Categorical. Professional Workers=1; Otherwise=0 Service Workers (including clerks)=1; Otherwise=0 Agricultural Workers=1; Otherwise=0 Craft Workers=1; Otherwise=0 Laborers=1; Otherwise=0

Notes:

(i) The geographical regions includes the following departments:
Segovias = Esteli, Madriz, Nueva Segovia
Western = León, Chinandega
Southern = Granada, Masaya, Carazo, Rivas
Central = Boaco, Chontales
Northern = Jinotega, Matagalpa
Atlantic = Rio San Juan, RAAN, RAAS
Managua = Managua

(ii) Occupation was classified by ISCO (International Standard Classification of Occupations - ILO).

(iii) Only those individuals with positive incomes and who are 12 years of age or older are included in the data set.

CHAPTER V

RESULTS AND DISCUSSION

The results of the empirical tests expounded upon in the previous chapter are reported and discussed in this chapter. These findings are grouped by the respective hypothesis and empirical technique. A discussion of the results follows. The chapter concludes with a summary.

H1 and H2 Results

Hypotheses one and two explore the nature of selectivity into the formal and informal sectors for both men and women in Nicaragua.[17] It was posited that informals were negatively selected and formals were positively selected into their respective sectors, inclusive of gender. In concert with the informal sector literature, the formal and informal sectors were segregated by firm size and social security enrollment. The break point for firm size was five, where firms with five employees or less were considered to be a part of the informal sector and firms with six or more employees were considered to be a part of the formal sector. For the distinction between formal and informal using social security, individuals enrolled in social security were considered part of the formal sector and those individuals not enrolled in social security were counted as part of the informal sector.

[17] In this chapter, only those persons who reported positive earnings and who were twelve years of age or older are included in the earnings analyses. The 1993 income variables were inflated by 64.77% using the Nicaraguan Central Bank price indexes for 1993-1998 for comparison purposes with the 1998 data.

Additional tests were estimated to determine the nature of selectivity between the wage and salaried and the self-employed.

Descriptive Statistics for the Formal and Informal Sectors by Firm Size

Exploring the descriptive statistics for hypotheses one and two delimited by firm size reveals important insights into the nature of the Nicaraguan formal and informal sectors for the 1990s (see Table 5.1). In general, the formal sector is characterized as urban with over one-third of the observations coming from Managua, and by a high degree of wealth as partially measured by home ownership. Men are more likely to be employed in the formal sector than women and this trend has increased from 1993 to 1998.[18]

Overall, men and women in the informal sector also exhibit a high degree of home ownership (see Table 5.2). Women in the informal sector tend to be more urban, better educated and come from households with more children and rooms than their informal sector male counterparts. Men, on the other hand, tend to be married and employed in agriculture at higher rates as compared to women in the informal sector Of note, women are more likely to be employed in the informal sector than men and this trend has increased from 1993 to 1998.[19]

Comparisons between the sectors are particularly striking. In general, formal sector participants are better educated, more urban including a higher incidence of residence in Managua, and are able to access a higher degree of household income either through principal earnings or other sources of household income than their informal sector counterparts. On the other hand, informals possess greater experience and are

[18] In 1993, women were employed in the formal sector at a rate of 84.5% of men. This number decreased to 81.4% in 1998.
[19] In 1993, men were employed in the informal sector at a rate of 95.2% of women. This number decreased to 89.5% in 1998.

Table 5.1 – Formal Sector Descriptive Statistics for H1 & H2 Delimited by Firm Size

	Formal Sector Participation Rate (%)		Log Weekly Earnings	
	1998	1993	1998	1993
Men	38.7	24.5	5.350	5.654
Women	31.5	20.7	5.236	5.476

	Males		Females	
Variable	**1998**	**1993**	**1998**	**1993**
Years of Education	6.752	6.853	8.703	8.692
Potential Experience	20.389	23.217	17.778	18.956
Potential Experience Squared/100	6.233	7.462	4.534	4.883
Work in Agricultural Occupation	.260	.227	.141	.059
Resident of an Urban Area	.620	.704	.763	.837
Resident of Managua	.356	.368	.391	.394
Resident of Western Nicaragua	.178	.123	.136	.142
Resident of Southern Nicaragua	.147	.123	.116	.096
Resident of Atlantic Nicaragua	.056	.091	.071	.137
Married	.640	.793	.460	.531
Number of Children in Household	1.513	2.37	1.471	1.938
Number of Adults in Household	5.053	4.152	4.761	3.995
Home Ownership	.830	.781	.853	.842
Number of Rooms in Household	2.482	3.162	2.695	3.464
Log of Other Household Income	1.281	-1.257	2.820	1.860
N	1447	794	620	386

Table 5.2 – Informal Sector Descriptive Statistics for H1 & H2 Delimited by Firm Size

	Informal Sector Participation Rate (%)		Log Weekly Earnings	
	1998	1993	1998	1993
Men	61.3	75.5	4.875	5.361
Women	68.5	79.3	4.822	5.321

	Males		Females	
Variable	**1998**	**1993**	**1998**	**1993**
Years of Education	4.698	4.218	5.492	4.760
Potential Experience	26.673	23.908	25.413	25.922
Potential Experience Squared/100	10.734	7.957	8.773	8.932
Work in Agricultural Occupation	.461	.372	.023	.028
Resident of an Urban Area	.486	.577	.700	.739
Resident of Managua	.213	.249	.299	.342
Resident of Western Nicaragua	.161	.111	.172	.158
Resident of Southern Nicaragua	.151	.132	.203	.149
Resident of Atlantic Nicaragua	.113	.111	.060	.068
Married	.674	.746	.508	.555
Number of Children in Household	1.441	2.183	1.443	2.200
Number of Adults in Household	4.783	4.291	4.920	4.384
Home Ownership	.795	.812	.836	.829
Number of Rooms in Household	2.170	4.230	2.288	4.817
Log of Other Household Income	-1.390	-2.236	1.666	-.416
N	2293	2449	1351	1478

more numerous than formals. When gender is considered, formal sector men and women tend to be more educated, less experienced, more urban (including a higher incidence of residence in Managua), and more likely to have greater sources of other household income than men and women in the informal sector. Also, men in the formal sector are less likely to be employed in agriculture than informal sector men. And formal sector women tend to have lower rates of marriage, are likely to have fewer adults living in their household, and are more likely to be a homeowner than informal sector women.

Also evident is the structural and widening wage gap between the formal and informal sectors. The wage gap between the formal and informal sectors for men increased from 34.04% in 1993 to 60.96% in 1998. For women, the wage gap grew even more dramatically, from 16.76% in 1993 to 51.29% in 1998.[20] Even though the overall wage gap grew between sectors, intra-sectoral wages declined for both men and women between 1993 and 1998– wages for women declined 27.13% in the formal sector and 64.17% in the informal sector; for men, wages declined 35.53% in the formal sector and 62.58% in the informal sector. As expected men earn more than women in each sector over both time periods— the formal gender wage gap was 19.48% in 1993 and 12.08% in 1998 whereas the informal gender wage gap was 4.08% in 1993 and 5.44% in 1998. The male/female wage gap is in concert with other wage studies of Central America (Dávila & Pagán, 1999, Funkhouser, 1997, Psacharopoulus & Tzannatos, 1993).

The descriptive statistics for demarcating the formal and informal sectors through

[20] The percentage wage gaps were calculated using $[\exp(\beta)-1]100$. See Kennedy (1981)

firm size and enrollment in social security are similar. The purpose of running a complementary definition of the formal and informal sectors by enrollment in social security is to serve as an additional test as to the robustness of the empirical results (see Appendix A for a discussion and tabular presentation of the descriptive statistics for enrollment in social security).[21] They both show that the formal sector is urban with a Managuan residential base (see Appendix A, Table 1). Men tend to be more experienced and more likely to be married than women. Women on the other hand tend to be more educated than men. In the informal sector, men are more likely to be married and engaged in agricultural employment than women (see Appendix A, Table 2), whereas informal women tend to be more educated, urban, and living in a household with more rooms and other sources of income than informal men.

Also in common is the large number of informals as compared to formals, at the very least roughly two-thirds of the labor market belongs to the informal sector and one-third to the formal sector. Formals are better educated, earn higher incomes, reside in urban areas and have greater access to other income sources than their more experienced informal counterparts. Importantly, both definitions find a large and growing wage gap between the formal and informal sectors and between men and women as well as indicating a decline in overall sectoral earnings. However, the two sectoral definitions most widely diverge on the deepening or opening of the formal sector— the enrollment in

[21] The 1983 and 1993 LSMS only support the measuring of the formal and informal sectors through firm size and enrollment in social security. The other two accepted means of delimiting the formal and informal sectors—labor contract and firm registration with the government—are not present in both data sets. Specifically, the 1993 LSMS contains labor union measures from the workplace, but the 1998 LSMS does not; the 1998 contains information on labor contract measurements, but the 1993 data does not (both the labor

social security definition indicates a rapidly shrinking formal sector (from 29.1% in 1993 to 17.0% in 1998) while the firm size approach suggests that the formal sector is growing in percentage employment (from 23.1% in 1993 to 36.2% in 1998). This difference may be related to the large downsizing of the government in the early 1990s, where former government employees who were previously enrolled in social security may have found new employment in firms, both small and large, uncovered by social security. Also perhaps, the cost of social security coverage coupled with the decline in union strength contributed to the lessening of those enrolled in social security which may not be evident in the formal/informal sector delineation along firm size.

Switching Regressions for the Formal and Informal Sectors

Across years and gender, education is a primary determinant of formal sector participation (equation three of the switching regression, see pages 60-20). In 1993, education, experience, and log of other household income are the most important formal sector determinants (see Tables 5.3 and 5.4). In 1998, education, agricultural employment, residence in the Atlantic region (as compared to other regions in Nicaragua), and the number of children and rooms in the household made up the statistically significant determinants of the formal sector decision (see Tables 5.5 and 5.6). Clearly, education paves the way toward formal sector participation and this result is in concert with Funkhouser's (1996) work on Central America.

The statistically significant determinants of formal sector employment for men across years are education, number of children and rooms in the household, and the

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union and labor contract measures are defined differently) and neither data set contains data as to firm registry.

Table 5.3: Switching Regression Estimates for the Formal and Informal Sectors Delimited by Firm Size: Males 1993

	Switch (γ)	β_{Formal}	$\beta_{Informal}$
Constant	-1.285***	2.506***	4.405***
	(.135)	(.173)	(.078)
Years of Education	.102***	.122***	.085***
	(.007)	(.008)	(.007)
Potential Experience	.019***	.056***	.046***
	(.007)	(.007)	(.004)
Potential Experience Squared/100	-.0129	-.076***	-.057***
	(.010)	(.010)	(.006)
Work in Agricultural Occupation	-.120	-.251***	-.499***
	(.074)	(.083)	(.047)
Resident of an Urban Area	-.018	.284***	.301***
	(.069)	(.077)	(.047)
Resident of Managua	.071	.369***	.135***
	(.072)	(.084)	(.051)
Resident of Western Nicaragua	-.017	.179*	-.034
	(.089)	(.104)	(.061)
Resident of Southern Nicaragua	-.143	.006	.019
	(.088)	(.097)	(.057)
Resident of Atlantic Nicaragua	.041	.304***	.259***
	(.091)	(.101)	(.057)
Married	.018	.283***	.031
	(.070)	(.078)	(.044)
Number of Children in Household	.052***	---	---
	(.011)		
Number of Adults in Household	.001	---	---
	(.011)		
Home Ownership	-.076	---	---
	(.054)		
Number of Rooms in Household	-.097***	---	---
	(.014)		
Log of Other Household Income	.010***	---	---
	(.003)		
σ	---	.981***	.870***
		(.043)	(.019)
ρ	---	.890***	-.318***
		(.020)	(.112)
Log-Likelihood	-5,465.057		
N	3,243		

Notes:

(i) Standard errors in parentheses.

(ii) ***, ** and * imply statistical significance at the 1%, 5% and 10% level, respectively.

(iii) The reference region is the central mountainous zone, which includes the region of the Segovias, northern, and central Nicaragua.

(iv) The reference occupational group is comprised of professional, service, craft, and general labor workers.

Table 5.4: Switching Regression Estimates for the Formal and Informal Sectors Delimited by Firm Size: Females 1993

	Switch (γ)	β_{Formal}	$\beta_{Informal}$
Constant	-1.525***	2.845***	4.211***
	(.200)	(.310)	(.107)
Years of Education	.125***	.117***	.057***
	(.010)	(.013)	(.011)
Potential Experience	.020**	.038***	.034***
	(.009)	(.011)	(.005)
Potential Experience	-.042***	-.072***	-.050***
Squared/100	(.015)	(.022)	(.008)
Work in Agricultural Occupation	.930***	.369	-.324*
	(.194)	(.273)	(.177)
Resident of an Urban Area	.185	.345***	.264***
	(.115)	(.126)	(.058)
Resident of Managua	.062	.517***	.313***
	(.101)	(.114)	(.061)
Resident of Western Nicaragua	.002	.391***	.095
	(.126)	(.148)	(.072)
Resident of Southern Nicaragua	-.141	.382**	.151**
	(.137)	(.157)	(.073)
Resident of Atlantic Nicaragua	.592***	.433***	.035
	(.143)	(.153)	(.111)
Married	-.302***	-.223***	.122**
	(.082)	(.076)	(.049)
Number of Children in Household	-.004	---	---
	(.022)		
Number of Adults in Household	-.036**	---	---
	(.018)		
Home Ownership	.087	---	---
	(.088)		
Number of Rooms in Household	-.080***	---	---
	(.021)		
Log of Other Household Income	.025***	---	---
	(.005)		
σ	---	.804***	.865***
		(.055)	(.014)
ρ	---	.770***	-.072
		(.060)	(.245)
Log-Likelihood	-3,016.487		
N	1,864		

Notes:

(i) Standard errors in parentheses.

(ii) ***, ** and * imply statistical significance at the 1%, 5% and 10% level, respectively. (iii) The reference region is the central mountainous zone, which includes the region of the Segovias, northern, and central Nicaragua.

(iv) The reference occupational group is comprised of professional, service, craft, and general labor workers.

Table 5.5: Switching Regression Estimates for the Formal and Informal Sectors Delimited by Firm Size: Males 1998

	Switch (γ)	β_{Formal}	$\beta_{Informal}$
Constant	032	3.905***	4.910***
	(.107)	(.099)	(.117)
Years of Education	045***	094***	106***
	(.007)	(.006)	(.008)
Potential Experience	-.015***	026***	019***
	(.006)	(.005)	(.006)
Potential Experience	009	-.036***	-.026***
Squared/100	(.008)	(.008)	(.008)
Work in Agricultural Occupation	-.347***	-.474***	-.843***
	(.054)	(.063)	(.065)
Resident of an Urban Area	-.058	050	208***
	(.051)	(.058)	(.061)
Resident of Managua	309***	322***	450***
	(.074)	(.070)	(.098)
Resident of Western Nicaragua	207***	089	272***
	(.065)	(.069)	(.082)
Resident of Southern Nicaragua	062	034	015
	(.060)	(.059)	(.072)
Resident of Atlantic Nicaragua	-.241***	-.015	163**
	(.067)	(.070)	(.066)
Married	-.056	179***	148**
	(.054)	(.053)	(.063)
Number of Children in Household	026**	---	---
	(.012)		
Number of Adults in Household	014**	---	---
	(.006)		
Home Ownership	-.053	---	---
	(.044)		
Number of Rooms in Household	-.070***	---	---
	(.013)		
Log of Other Household Income	013***	---	---
	(.002)		
σ	---	845***	1.275***
		(.031)	(.023)
ρ	---	607***	-.849***
		(.061)	(.015)
Log-Likelihood	-7,177.742		
N	3,740		

Notes:

(i) Standard errors in parentheses.

(ii) ***, ** and * imply statistical significance at the 1%, 5% and 10% level, respectively

(iii) The reference region is the central mountainous zone, which includes the region of the Segovias, northern, and central Nicaragua.

(iv) The reference occupational group is comprised of professional, service, craft, and general labor workers.

Table 5.6: Switching Regression Estimates for the Formal and Informal Sectors Delimited by Firm Size: Females 1998

	Switch (γ)	β_{Formal}	$\beta_{Informal}$
Constant	-1.591***	3.182***	3.343***
	(.176)	(.200)	(.117)
Years of Education	.150***	.131***	.084***
	(.011)	(.012)	(.018)
Potential Experience	.004	.024***	.052***
	(.009)	(.007)	(.006)
Potential Experience	-.018	-.030**	-.063***
Squared/100	(.016)	(.014)	(.009)
Work in Agricultural Occupation	1.606***	.308**	-.488**
	(.141)	(.131)	(.214)
Resident of an Urban Area	.122	.179**	.145***
	(.085)	(.080)	(.056)
Resident of Managua	.094	.234***	.314***
	(.101)	(.082)	(.079)
Resident of Western Nicaragua	-.118	-.157*	.100
	(.105)	(.087)	(.079)
Resident of Southern Nicaragua	-.256***	-.162**	.274***
	(.092)	(.080)	(.066)
Resident of Atlantic Nicaragua	.209*	.134	.155*
	(.116)	(.098)	(.083)
Married	-.105	.065	.113**
	(.072)	(.057)	(.051)
Number of Children in Household	.057***	---	---
	(.021)		
Number of Adults in Household	.016	---	---
	(.010)		
Home Ownership	.006	---	---
	(.085)		
Number of Rooms in Household	-.069***	---	---
	(.024)		
Log of Other Household Income	.005	---	---
	(.005)		
σ	---	.708***	.844***
		(.041)	(.013)
ρ	---	.656***	-.042
		(.843)	(.305)
Log-Likelihood	-3,238.380		
N	1,971		

Notes:

(i) Standard errors in parentheses.

(ii) ***, ** and * imply statistical significance at the 1%, 5% and 10% level, respectively

(iii) The reference region is the central mountainous zone, which includes the region of the Segovias, northern, and central Nicaragua.

(iv) The reference occupational group is comprised of professional, service, craft, and general labor workers.

log of other household income. The determinants for men in 1998 also include agricultural employment, residence in Managua and the western regions, and the number of adults living in the household.

With the economic free fall just coming to an end in Nicaragua in 1993 (Arana, 1997), it seems that those with additional household assets were able to maintain their formal sector participation. By 1998, the Nicaraguan economy had recovered particularly in the capital and the agricultural-export sector or western region presumably generated greater formal sector employment opportunities (Close, 1999).

The determinants for formal sector women across both time periods includes education, employment in agriculture, and Atlantic residence. The determinants for formal sector women in 1993 also include experience, marriage, and the number of adults living in the household. In 1998, additional determinants include the number of children and rooms in the household and residence in the Southern region.

As noted earlier, educational attainment is the primary vehicle toward gaining formal sector employment. In the sparsely populated Atlantic region it is difficult to find qualified workers; hence it may be that well-educated women find greater opportunities and less competition for formal sector employment in the tropical lowlands of Caribbean Nicaragua. Although agricultural fieldwork is the province of men in Nicaragua, on the business side, especially in entry-level positions such as clerks and bookkeepers, formal sector women often find work as employees (Chavez Metoyer, 2000). Like formal sector men in 1993, formal sector women required additional household assets in order to

acquire their education and experience to maintain their formal sector participation. In 1998, household assets were still important in the formal sector decision.

Sectoral earnings functions are also exhibited in Tables 5.3-5.6. For men and women in 1993 and 1998, the coefficients of education, experience, and residence in Managua were statistically significant and positive. For all sectoral pairs except men in 1998, the returns to education were higher in the formal sector than the informal sector. And for all sectoral pairs except women in 1998, the returns to experience were higher in the formal sector than the informal sector. Aside from the two exceptions cited above, these results are as expected. For 1993, the pay differential for those residing in Managua was much higher for formals than informals, whereas by 1998 the opposite in part was true—the returns for residence in Managua was slightly higher for informals. These results seems to mirror the overall economy as a whole; that is, the 1993 economy performed at a much lower rate than in 1998 making employment difficult in 1993 and, thus, supporting the relative gains for those employed in the formal sector. By 1998, however, the economy, at least in the urban areas, was in full recovery allowing some earnings growth, particularly in the informal sector.

For men in 1998, the return for marriage was positive earnings and particularly high for those employed in the formal sector. For males in 1998 and 1993, the returns for agricultural employment were negative, even more so for informals. Agriculture in general has yet to rebound from its state-subsidized apogee under the Sandinista administration (Jonakin, 1997). For men in 1993, positive returns were associated with

urban residence in general and residence in Managua for both formals and informals, an expected result where Nicaraguan urbanites are generally economically better off than their rural counterparts. Lastly, men residing in the Atlantic zone in 1993 had higher earnings than those in other areas.

For women, sectoral earnings for urban residence and residence in southern Nicaragua were both significant. Urban residence led to higher relative earnings, more so for formals, as expected. For women in 1993, southern residence permitted a positive return on income while in 1998 southern residence had a negative effect on formal women and a positive impact on informal women. This turn of events from 1993 to 1998 may reflect the greater earnings potential in Managua as well as urban zones offered by the recovering economy. Women in 1998 were significantly impacted by agricultural employment. Positive returns accrued for formal women employed in agriculture while informal women saw agricultural employment negatively impact their earnings. This seems to match the essence of agricultural employment in Nicaragua, field hands or small farmers saw their business diminish over the 1990s while agricultural-exporters employing formal employees saw their markets grow. Finally for women in 1993, marriage induced a return penalty for formals and positive returns for informals.

The switching regression model was also estimated by enrollment in social security for the formal and informal sectors (see Appendix A, Tables 3-6). The results were similar to those explicated above. Briefly, comparison of the two models reveals the importance of education and experience as key determinants of formal sector choice. For a more

complete discussion of the results of this model, see Appendix A.

Selectivity is revealed by the ρ coefficient value and significance level at the bottom of the switching regressions tables (see tables 5.3-5.6). For 1993 and 1998 and for men and women, the nature of selectivity is statistically significant and positive for all groups except for informal sector women whose ρ coefficient signs are positive but insignificant. These findings also closely match those estimated under enrollment in social security for the same model. Of the eight selectivity results, only one was different— the one for 1993 informal sector males (see Table 5.7).

Recall hypotheses one and two:

H1: Nicaraguan men and Nicaraguan women are negatively selected into the informal sector.

H2: Nicaraguan men and Nicaraguan women are positively selected into the formal sector.

Thus, hypothesis one is rejected and hypothesis two is accepted. It stands to reason, that the sector with the highest returns—the formal sector—would exhibit positive selectivity because the rational choice for the most able would be that sector with highest returns. However, in an economy as fragile as that in Nicaragua, employment choice remains a life and death decision. Thus, each sector is populated by individuals who maximize their returns in their respective sector, given their human capital endowments. In essence, the informal sector selection may be one that results in employment income over dire poverty. However, as we shall see with the results for hypotheses three and four, informals do aspire to formal sector positions as evidenced by queuing. Next,

Table 5.7: Summary of Formal and Informal Sector Selectivity by Firm Size and Enrollment in Social Security for 1998 and 1993

	By Firm Size				By Enrollment in SS			
	Formal Sector		Informal Sector		Formal Sector		Informal Sector	
Year - 1998	Male	Female	Male	Female	Male	Female	Male	Female
Positive Selection	X	X	X	(NS)	X	X	X	X
Negative Selection								
Year - 1993								
Positive Selection	X	X	X	(NS)	X	X		(NS)
Negative Selection							X	

Notes:
(i) X= significant at the 1% level.
(ii) NS = not significant.

however, is a discussion of self-employment in Nicaragua followed by the results of hypotheses three and four.

Nicaraguan Self-Employment

The self-employed have received increasing attention in the literature concerning their contribution to the push versus pull syndrome of the self-employed sector in developing economies (Bornstein, 1997, Yamada, 1996, De Soto, 1989) and for minorities in developed economies (Clark & Drinkwater, 1998, Taylor, 1996, Borjas & Bronars, 1989). Oftentimes, the self-employed and informal sectors are lumped together within the Latin American environment (Yamada, 1996, Tokman, 1992, De Soto, 1989); thus, its scrutiny is of interest to our analysis of the formal and informal sectors. Hence, the selectivity model that was employed to analyze hypotheses one and two above was also used to analyze the self-employment versus wage and salary decision within the Nicaraguan context.

In the 1990s in Nicaragua, about one-third of all income earners were self-employed with the remainder engaged in wage and salaried employment (see Table 5.8). The self-employed tend to be more experienced, are more likely to be married and own a home than wage and salaried workers. On the other hand, wage and salaried workers tend to be better educated, more urban and have more rooms in their household than the self-employed (see Table 5.9).

When comparing the self-employed and wage and salaried workers by gender, the following distinctions are also evident: wage and salaried women come from households

Table 5.8– Self-Employed Descriptive Statistics

	Self-Employed Participation Rate (%)		Log Weekly Earnings	
	1998	1993	1998	1993
Men	30.6	32.0	4.697	5.463
Women	37.0	37.6	4.939	5.492
	Males		Females	
Variable	**1998**	**1993**	**1998**	**1993**
Years of Education	4.490	4.272	5.089	4.620
Potential Experience	31.156	28.998	30.694	31.266
Potential Experience Squared/100	12.482	10.727	11.691	12.124
Work in Agricultural Occupation	.481	.427	.027	.031
Resident of an Urban Area	.491	.550	.731	.753
Resident of Managua	.224	.217	.319	.320
Resident of Western Nicaragua	.146	.100	.176	.181
Resident of Southern Nicaragua	.136	.134	.203	.166
Resident of Atlantic Nicaragua	.139	.154	.061	.079
Married	.771	.826	.581	.606
Number of Children in Household	1.527	2.125	1.430	2.167
Number of Adults in Household	4.612	3.959	4.626	4.214
Home Ownership	.863	.859	.864	.859
Number of Rooms in Household	2.045	3.967	2.310	3.956
Log of Other Household Income	-2.924	-3.826	1.283	1.581
N	1145	1037	730	700

Table 5.9 – Wage & Salaried Descriptive Statistics

	Wage & Salaried Participation Rate (%)		Log Weekly Earnings	
	1998	1993	1998	1993
Men	69.4	68.0	5.218	5.418
Women	63.0	62.4	4.960	5.269

	Males		Females	
Variable	**1998**	**1993**	**1998**	**1993**
Years of Education	5.990	5.141	7.387	6.149
Potential Experience	21.258	21.267	18.485	20.398
Potential Experience Squared/100	6.890	6.477	4.934	5.670
Work in Agricultural Occupation	.334	.294	.082	.036
Resident of an Urban Area	.563	.636	.716	.763
Resident of Managua	.293	.305	.336	.372
Resident of Western Nicaragua	.177	.120	.151	.138
Resident of Southern Nicaragua	.155	.128	.157	.121
Resident of Atlantic Nicaragua	.069	.084	.065	.084
Married	.617	.725	.442	.516
Number of Children in Household	1.451	2.229	1.466	2.132
Number of Adults in Household	5.007	4.397	5.002	4.357
Home Ownership	.790	.779	.829	.815
Number of Rooms in Household	2.401	3.969	2.487	4.887
Log of Other Household Income	.770	-1.137	2.480	.439
N	2595	2206	1241	1164

with more adults than self-employed women and wage and salaried women find themselves engaged in an agricultural occupation at a lesser rate then self-employed men. Additionally, wage and salaried males live in households with more adults and other sources of income than self-employed males. Interestingly, wage and salaried workers earned less than self-employed workers in 1993 while the reverse occurred in 1998. The self-employed/wage and salaried wage gap in 1993 was 4.60% for men and 24.98% for women, whereas the wage and salaried/self-employed wage gap in 1998 was 68.37% for men and 2.12% for women.

Looking solely at wage and salary earners, men have a higher participation rate than women[22] and men tend to be more experienced, are more likely to be married and work in agriculture than women wage and salary workers. On the other hand, female wage and salaried workers tend to be more educated, more urban including residence in Managua, and have access to greater amounts of capital (e.g., larger amounts of other income, more rooms in the household and a greater likelihood of homeownership) than male wage and salary workers. As expected wage and salaried men earned more than wage and salaried women in the 1990s— the male/female wage gap was 16.07% in 1993 and 29.43% in 1998.

Within the self-employed, women are, on a percentage basis, more likely to be self-employed than men.[23] Self-employed women are less likely to be married than self-employed men. And self-employed women tend to be better educated, more urban

[22] In 1993, women were employed as wage and salaried workers at a rate of 91.8% of men. This number decreased to 90.8% in 1998.
[23] In 1993, men were self-employed at a rate of 85.1% of men. This number decreased to 82.7% in 1998.

including residence in Managua, and have greater access to other income than self-employed men. Surprisingly, self-employed women earned more than self-employed men—the female/male wage gap was 2.94% in 1993 and increased to 27.40% in 1998.

Switching Regressions for the Self-Employed and Wage and Salaried Workers

Experience is the primary determinant of self-employment across years and gender in Nicaragua (see equation three of the switching region on pages 56-58, replacing formal with self-employed and informal with wage and salaried). That is, a very important component of self-employment choice is the ability to rely upon experience as a guide toward building a business (see Tables 5.10-5.13). For men, experience is augmented by agricultural employment, marriage, home ownership, the log of other household income, and Atlantic residence as determinants of self-employment. Additional self-employment determinants for men in 1993 include the number of children and adults living in the household. In 1998, self-employed men also saw the number of rooms in their household, and residence in the western and southern regions important variables in choosing self-employment. For men, then, the picture of self-employment choice becomes even more focused where experience, access to capital, and stability in the home foster self-employment.

For women, experience, marriage and residence in the southern region are critical elements (determinants) of the self-employment choice. In 1993, the number of children and adults were important factors for women selecting self-employment. Self-employed women in 1998 found education, agricultural employment, home ownership, the

Table 5.10: Switching Regression Estimates for Self-Employed and Wage and Salaried Workers: Males 1993

	Switch (γ)	$\beta_{\text{Self-Employed}}$	$\beta_{\text{Wage \& Salaried}}$
Constant	-1.489***	4.093***	4.209***
	(.132)	(.507)	(.061)
Years of Education	.009	.087***	.065***
	(.007)	(.011)	(.004)
Potential Experience	.042***	.041***	.040***
	(.006)	(.012)	(.004)
Potential Experience	-.035***	-.047***	-.061***
Squared/100	(.009)	(.014)	(.005)
Work in Agricultural Occupation	.281***	-.610***	-.334***
	(.067)	(.099)	(.045)
Resident of an Urban Area	-.013	.409***	.274***
	(.065)	(.086)	(.040)
Resident of Managua	-.087	.108	.216***
	(.068)	(.104)	(.041)
Resident of Western Nicaragua	-.083	-.060	.079
	(.084)	(.121)	(.050)
Resident of Southern Nicaragua	.103	.088	.019
	(.079)	(.107)	(.048)
Resident of Atlantic Nicaragua	.242***	.329***	.248***
	(.083)	(.110)	(.053)
Married	.132**	.000	.080**
	(.063)	(.096)	(.034)
Number of Children in Household	-.028**	---	---
	(.014)		
Number of Adults in Household	-.036***	---	---
	(.013)		
Home Ownership	.262***	---	---
	(.062)		
Number of Rooms in Household	.004	---	---
	(.003)		
Log of Other Household Income	-.010***	---	---
	(.003)		
σ	---	1.052***	.701***
		(.045)	(.017)
ρ	---	.241	.535***
		(.238)	(.072)
Log-Likelihood	-5,545.793		
N	3,243		

Notes:

(i) Standard errors in parentheses.

(ii) ***, ** and * imply statistical significance at the 1%, 5% and 10% level, respectively

(iii) The reference region is the central mountainous zone, which includes the region of the Segovias, northern, and central Nicaragua.

(iv) The reference occupational group is comprised of professional, service, craft, and general labor workers

Table 5.11: Switching Regression Estimates for Self-Employed and Wage and Salaried Workers: Females 1993

	Switch (γ)	$\beta_{\text{Self-Employed}}$	$\beta_{\text{Wage \& Salaried}}$
Constant	-1.698***	3.482***	4.108***
	(.181)	(.410)	(.090)
Years of Education	.007	.0477***	.059***
	(.009)	(.013)	(.005)
Potential Experience	.051***	.038***	.042***
	(.008)	(.013)	(.006)
Potential Experience	-.021*	-.043***	-.056***
Squared/100	(.012)	(.015)	(.010)
Work in Agricultural Occupation	-.063	-.653***	-.187
	(.168)	(.248)	(.177)
Resident of an Urban Area	.055	.230**	.265***
	(.086)	(.108)	(.054)
Resident of Managua	-.055	.268**	.369***
	(.086)	(.114)	(.056)
Resident of Western Nicaragua	.107	.175	.137*
	(.103)	(.134)	(.071)
Resident of Southern Nicaragua	.209**	.272*	.183***
	(.103)	(.145)	(.066)
Resident of Atlantic Nicaragua	.044	-.051	.096
	(.129)	(.170)	(.096)
Married	.387***	.235**	.068
	(.067)	(.096)	(.443)
Number of Children in Household	.052***	---	---
	(.018)		
Number of Adults in Household	-.060***	---	---
	(.015)		
Home Ownership	.099	---	---
	(.079)		
Number of Rooms in Household	-.002	---	---
	(.003)		
Log of Other Household Income	-.002	---	---
	(.004)		
σ	---	1.161***	.707***
		(.081)	(.025)
ρ	---	.646***	-.446***
		(.106)	(.120)
Log-Likelihood	-3,249.297		
N	1,864		

Notes:
(i) Standard errors in parentheses.
(ii) ***, ** and * imply statistical significance at the 1%, 5% and 10% level, respectively.
(iii) The reference region is the central mountainous zone, which includes the region of the Segovias, northern, and central Nicaragua.
(iv) The reference occupational group is comprised of professional, service, craft, and general labor workers.

Table 5.12: Switching Regression Estimates for Self-Employed and Wage and Salaried Workers: Males 1998

	Switch (γ)	$\beta_{\text{Self-Employed}}$	$\beta_{\text{Wage \& Salaried}}$
Constant	-1.881***	3.566***	4.229***
	(.128)	(.398)	(.062)
Years of Education	.014	.096***	.081***
	(.008)	(.012)	(.004)
Potential Experience	.046***	.036***	.036***
	(.006)	(.011)	(.004)
Potential Experience	-.038***	-.033**	-.043***
Squared/100	(.078)	(.013)	(.005)
Work in Agricultural Occupation	.301***	-1.005***	-.340***
	(.062)	(.108)	(.040)
Resident of an Urban Area	-.030	.167*	.111***
	(.060)	(.094)	(.036)
Resident of Managua	-.182**	.404**	.174***
	(.083)	(.178)	(.053)
Resident of Western Nicaragua	-.173**	.299**	-.042
	(.074)	(.136)	(.047)
Resident of Southern Nicaragua	-.153**	-.041	-.043
	(.068)	(.109)	(.043)
Resident of Atlantic Nicaragua	.318***	.422***	.227***
	(.070)	(.095)	(.046)
Married	.154***	.248**	.224***
	(.058)	(.103)	(.038)
Number of Children in Household	.0167	---	---
	(.017)		
Number of Adults in Household	-.003	---	---
	(.009)		
Home Ownership	.493***	---	---
	(.062)		
Number of Rooms in Household	-.091***	---	---
	(.020)		
Log of Other Household Income	-.027***	---	---
	(.003)		
σ	---	1.184***	.743***
		(.028)	(.009)
ρ	---	.158	-.139
		(.158)	(.116)
Log-Likelihood	-6,655.573		
N	3,740		

Notes:

(i) Standard errors in parentheses.

(ii) ***, ** and * imply statistical significance at the 1%, 5% and 10% level, respectively.

(iii) The reference region is the central mountainous zone, which includes the region of the Segovias, northern, and central Nicaragua.

(iv) The reference occupational group is comprised of professional, service, craft, and general labor workers.

Table 5.13: Switching Regression Estimates for Self-Employed and Wage and Salaried Workers: Females 1998

	Switch (γ)	$\beta_{\text{Self-Employed}}$	$\beta_{\text{Wage \& Salaried}}$
Constant	-1.483***	5.139***	3.342***
	(.188)	(.270)	(.082)
Years of Education	-.056***	.070***	.119***
	(.010)	(.014)	(.006)
Potential Experience	.046***	-.002	.043***
	(.009)	(.011)	(.005)
Potential Experience	-.026*	-.016	-.062***
Squared/100	(.014)	(.015)	(.009)
Work in Agricultural Occupation	-.707***	-.460***	.142*
	(.149)	(.168)	(.081)
Resident of an Urban Area	.007	.327***	.042
	(.079)	(.094)	(.051)
Resident of Managua	.038	.419***	.235***
	(.100)	(.122)	(.062)
Resident of Western Nicaragua	.150	.205	-.100
	(.102)	(.126)	(.069)
Resident of Southern Nicaragua	.152*	.267**	.064
	(.087)	(.105)	(.541)
Resident of Atlantic Nicaragua	-.058	.220	.105
	(.112)	(.135)	(.066)
Married	.391***	-.112	.067
	(.067)	(.088)	(.046)
Number of Children in Household	-.033	---	---
	(.021)		
Number of Adults in Household	-.010	---	---
	(.011)		
Home Ownership	.282***	---	---
	(.080)		
Number of Rooms in Household	.095***	---	---
	(.021)		
Log of Other Household Income	-.018***	---	---
	(.004)		
σ	---	1.098***	.705***
		(.052)	(.024)
ρ	---	-.697***	.451***
		(.071)	(.131)
Log-Likelihood	-3.299.854		
N	1.971		

Notes:

(i) Standard errors in parentheses.

(ii) ***, ** and * imply statistical significance at the 1%, 5% and 10% level, respectively.

(iii) The reference region is the central mountainous zone, which includes the region of the Segovias, northern, and central Nicaragua.

(iv) The reference occupational group is comprised of professional, service, craft, and general labor workers.

number of rooms in the home, and the log of other household income to be determinants of the self-employment choice. Thus, a clearer portrait of self-employed women emerges (which is similar to self-employed men), one that shows the importance of experience, access to capital, and stability in the home in the creation of self-employed women-directed enterprises.

Interestingly, education is not important in the self-employment choice nor are the returns to education for the most part significant. This indicates a heightened reliance upon experience and access to capital in the formation of self-employed enterprises. Conversely, education becomes critical for wage and salaried work as well as formal sector employment as we have already discussed.

Sectoral earnings functions for the self-employed and wage and salaried workers are reported in Tables 5.10-5.13. In all comparable and significant cases except agricultural employment, the returns to earnings are positive. For example, the returns to education favor the self-employed for men and the wage and salaried for women. This may reflect the greater educational achievement of women who find higher educational levels a key variable to formal sector employment. As expected, experience garners higher returns for self-employed men. However, experience netted higher returns for wage and salaried women than self–employed women in 1993 possibly signifying a much tighter labor market during the economic crisis of the early 1990s (Arana, 1997).

Residence in Managua and urban areas in general, improve the returns for both the self-employed and wage and salaried. In 1993, wage and salaried female urbanites and

Managuan residents achieved higher returns than self-employed female urbanites and Managuans, most likely due to the poor economic situation cited above. Yet self-employed men in 1993 found that urban zones yielded higher returns than rural areas suggesting more economic vitality in the city than the countryside, even during the economic downturn of the early 1990s. By 1998, the economy had recovered allowing self-employed Managuans and urban males higher returns in the self-employed sector. Also residence in the Atlantic zone for men in 1993 and 1998 and residence for southern region females in 1993 proved to significantly increase earnings.

The returns to agricultural employment are negative for all self-employed males and for self-employed females in 1998. This finding matches the general decline of agriculture, especially staple agriculture in the 1990s (Jonakin, 1997). Only in 1998 for wage and salaried females are returns to agriculture positive, possibly illustrating the formal sector role of women engaged in office or office-related work in agriculture.

Although hypotheses were not constructed as to selectivity for the self-employed and wage and salaried dichotomy, the issue of positive and negative selection is nevertheless and important one which may shed light on the push versus pull phenomenon discussed by Clark and Drinkwater (1998). Assessing the ρ value at the bottom of Tables 5.7-5.10, the following picture emerges: 1) self-employed men have the sign of positive selection, though the coefficient is not significant; 2) self-employed women are positively selected in 1993 and negatively selected in 1998; 3) wage and salaried women are positively selected; and 4) wage and salaried men in 1993 are positively selected and

although not significant in 1998, wage and salaried men show the sign of positive selection (see Table 5.14).

The positive selection mirrors that of selection in the formal sector which the wage and salaried sector is most akin to as previously discussed. Thus, the wage and salaried sector (and the closely allied formal sector) pull the most able individuals toward wage and salaried employment. The mixed findings for the self-employed may suggest that the self-employed, depending upon current economic conditions, may alternate back and forth between the sector with the highest returns (see Roberts, 1989, for a similar discussion of the footwear industry in Guadalajara, Mexico). This was the case for self-employed women who were positively selected in 1993 when self-employed earnings were greater than wage and salaried earnings and self-employed women were negatively selected in 1998 when self-employed earnings were less than wage and salaried earnings. This finding may showcase both a push and pull dynamic for the self-employed depending upon the exigency of the national economy. That is, in good economic times, the wage and salaried sector may be preferred and in bad economic times the self-employed sector may be preferred based upon the possibility of earnings maximization.

H3 Results

Hypothesis three focuses on the nature of queuing within the Nicaraguan formal sector. It was predicted that informal sector workers queue for formal sector employment. And provided that evidence of queuing was uncovered, then the queue was expected to become more pronounced over time during (e.g., from 1993 to 1998,

Table 5.14 – Summary of Self-Employed and Wage and Salaried Worker Selectivity for 1998 and 1993

	1998				1993			
	SE		W/S		SE		W/S	
	Male	Female	Male	Female	Male	Female	Male	Female
Positive Selection	(NS)		(NS)	X	(NS)	X	X	X
Negative Selection		X						

Notes:
(i) X = significant at the 1% level.
(ii) NS = Not Significant.
(iii) SE = Self-employed.
(iv) W/S = Wage and Salaried.

hypothesis four). Using the queuing model discussed in chapter four (see pages 62-65), the results elaborated upon below suggest queuing is present in the Nicaraguan formal sector.

Queuing in the Nicaraguan Formal Sector

The queuing model was estimated under both conditions segregating the formal and informal sectors previously established—the formal and informal sectors were delimited by firm size and enrollment in social security. Specifically, the queuing model is comprised of a bivariate probit with partial observability which estimates: 1) the likelihood of informal sector workers to queue for formal sector employment (Pr(Q=1)); and 2) the likelihood of informal sector workers to be chosen from the queue to work in the formal sector (Pr(H=1 | Q=1)) (see Tables 5.15-5.18).[24] Finally, the likelihood ratio queuing tests between a simple formal/informal sector probit and bivariate probit models are reported as the likelihood ratio statistic which reveals whether or not queuing is present.

The results of the probit formal sector employment model identifies those significant explanatory variables which tend to lead toward formal sector employment. The results closely match the determinants of formal sector employment discussed in the previous section.[25]

More germane to answering hypothesis three are the results of the partially observable bivariate probit model. The first term in the bivariate probit model provides insight into the key variables that comprise the likelihood of informal sector

[24] The definition default of the formal/informal sector dichotomy is firm size. The results of the model estimated under social security are highlighted in Appendix C.

[25] This was the case for both probit estimates— i.e., those based on firm size and enrollment in social security

Table 5.15 – Queuing Model Results by Firm Size: Males 1993

	Probit Model			Partial Obsverability Bivariate Probit model					
	Pr(F=1)			Pr(Q=1)			Pr(H=1|Q=1)		
Variables	Coeff.	S.E.		Coeff.	S.E.		Coeff.	S.E.	
Constant	-1.312	.141	***	-1.464	.238	***	2.379	1.145	**
Years of Education	.096	.007	***	.144	.019	***	-.023	.024	
Potential Experience	.019	.006	***	.018	.021		-.089	.040	**
Potential Experience Squared /100	-.014	.009		.085	.048	*	.061	.039	
Work in Agricultural Occupation	-.122	.073	*	-.072	.127		-.133	.162	
Resident of an Urban Area	-.046	.069		-.174	.120		.184	.163	
Resident of Managua	.094	.070		.160	.113		-.036	.169	
Resident of Western Nicaragua	.007	.088		.044	.145		-.048	.231	
Resident of Southern Nicaragua	-.150	.086	*	.031	.156		-.327	.190	*
Resident of Atlantic Nicaragua	.006	.090		.289	.188		-.443	.206	**
Married	.026	.067		-.155	.098		---	---	
Number of Children in Household	.060	.015	***	.080	.024	***	---	---	
Number of Adults in Household	-.015	.014		-.039	.019	**	---	---	
Home Ownership	-.166	.064	***	-.197	.086	**	---	---	
Number of Rooms in Household	-.037	.014	***	-.039	.023	*	---	---	
Log of Other Household Income	.009	.003	***	.014	.005	***	---	---	
N	3,243			3,243					
Chi Squared	309.421			351.995					

Notes:

(i) Coeff. = Coefficient; and S.E. = Standard Error

(ii) ***, ** and * imply statistical significance at the 1%, 5% and 10% level, respectively

(iii) The reference region is the central mountainous zone, which includes the region of the Segovias, northern, and central Nicaragua.

(iv) The reference occupational group is comprised of professional, service, craft, and general labor workers.

(v) F = Formal Sector; Q = Queue; H = Hired; and Pr = Probability

Table 5.16 – Queuing Model Results by Firm Size: Females 1993

	Probit Model			Partial Observability Bivariate Probit model					
	Pr(F=1)			Pr(Q=1)			Pr(H=1|Q=1)		
Variables	Coeff.	S.E.		Coeff.	S.E.		Coeff.	S.E.	
Constant	-1.531	.215	***	-1.457	.350	***	2.397	1.709	
Years of Education	.119	.011	***	.154	.019	***	.022	.032	
Potential Experience	.020	.010	**	-.015	.035		-.141	.061	**
Potential Experience Squared /100	-.045	.017	***	.196	.094	**	.102	.058	*
Work in Agricultural Occupation	.992	.187	***	.873	.292	***	.951	.360	***
Resident of an Urban Area	.197	.106	*	.083	.180		.301	.258	
Resident of Managua	.039	.097		-.164	.168		.378	.229	*
Resident of Western Nicaragua	.024	.122		-.029	.209		.129	.272	
Resident of Southern Nicaragua	-.124	.131		-.225	.222		.079	.332	
Resident of Atlantic Nicaragua	.616	.136	***	.654	.223	***	.338	.331	
Married	-.312	.079	***	-.407	.116	***	---	---	
Number of Children in Household	-.025	.023		-.034	.031		---	---	
Number of Adults in Household	-.044	.020	**	-.056	.026	**	---	---	
Home Ownership	.132	.102		.173	.127		---	---	
Number of Rooms in Household	-.056	.024	**	-.063	.031	**	---	---	
Log of Other Household Income	.029	.005	***	.041	.087	***	---	---	
N	1.864			1.864					
Chi Squared	351.070			370.918					

Notes

(i) Coeff. = Coefficient, and S.E. = Standard Error

(ii) ***, ** and * imply statistical significance at the 1%, 5% and 10% level, respectively

(iii) The reference region is the central mountainous zone, which includes the region of the Segovias, northern, and central Nicaragua.

(iv) The reference occupational group is comprised of professional, service, craft, and general labor workers.

(v) F = Formal Sector; Q = Queue; H = Hired; and Pr = Probability

Table 5.17 – Queuing Model Results by Firm Size: Males 1998

	Probit Model			Partial Observability Bivariate Probit model					
	Pr(F=1)			Pr(Q=1)			Pr(H=1|Q=1)		
Variables	Coeff.	S.E.		Coeff.	S.E.		Coeff.	S.E.	
Constant	-.427	.114	***	-.604	.137	***	4.363	5.012	
Years of Education	.034	.007	***	.511	.009	***	-.071	.027	***
Potential Experience	-.008	.005		-.001	.006		-.044	.014	***
Potential Experience Squared/100	-.004	.008		-.010	.001		.036	.022	*
Work in Agricultural Occupation	-.270	.057	***	.429	.221	*	-3.495	4.945	
Resident of an Urban Area	-.070	.053		-.265	.070	***	.810	.248	***
Resident of Managua	.262	.062	***	.331	.073	***	-.203	.218	
Resident of Western Nicaragua	.195	.664	***	.169	.084	**	.364	.180	**
Resident of Southern Nicaragua	.068	.061		-.065	.085		.784	.299	***
Resident of Atlantic Nicaragua	-.241	.087	***	.044	.135		-.874	.219	***
Married	.068	.053		.102	.060	*	---	---	
Number of Children in Household	.020	.051		.017	.018		---	---	
Number of Adults in Household	.017	.008	**	.017	.009	*	---	---	
Home Ownership	.095	.056	*	.153	.063	**	---	---	
Number of Rooms in Household	.028	.017	*	.034	.019	*	---	---	
Log of Other Household Income	.016	.003	***	.015	.003	***	---	---	
N	3,740			3,740					
Chi Squared	298.009			376.287					

Notes:

(i) Coeff. = Coefficient; and S.E. = Standard Error.

(ii) ***, ** and * imply statistical significance at the 1%, 5% and 10% level, respectively

(iii) The reference region is the central mountainous zone, which includes the region of the Segovias, northern, and central Nicaragua.

(iv) The reference occupational group is comprised of professional, service, craft, and general labor workers.

(v) F = Formal Sector; Q = Queue; H = Hired; and Pr = Probability

Table 5.18 – Queuing Model Results by Firm Size: Females 1998

	Probit Model			Partial Observability Bivariate Probit model					
	Pr(F=1)			Pr(Q=1)			Pr(H=1|Q=1)		
Variables	Coeff.	S.E.		Coeff.	S.E.		Coeff.	S.E.	
Constant	-1.517	.183	***	6.451	2.545	**	-1.584	.149	***
Years of Education	.131	.011	***	.009	.063		.142	.010	***
Potential Experience	.003	.008		-.037	.072		-.010	.009	
Potential Experience Squared /100	-.022	.015		-.138	.120		.017	.019	
Work in Agricultural Occupation	1.913	.148	***	-2.817	1.236	**	2.364	.201	***
Resident of an Urban Area	.138	.084		-.285	.608		.150	.088	*
Resident of Managua	.100	.087		-3.341	1.263	***	.222	.097	**
Resident of Western Nicaragua	-.065	.107		-.844	1.218		-.028	.110	
Resident of Southern Nicaragua	-.204	.105	*	3.464	4.542		-.217	.102	**
Resident of Atlantic Nicaragua	.231	.141		-2.174	.870	**	.356	.162	**
Married	-.178	.070	**	-1.162	.590	**	—	—	
Number of Children in Household	.017	.023		.776	.296	***	—	—	
Number of Adults in Household	-.007	.020		.121	.082		—	—	
Home Ownership	.090	.091		1.484	.605	**	—	—	
Number of Rooms in Household	-.006	.024		-.383	.208	*	—	—	
Log of Other Household Income	.013	.005	***	.122	.047	**	—	—	
N	1,971			1,971					
Chi Squared	452.770			486.78 8					

Notes:

(i) Coeff. = Coefficient; and S.E. = Standard Error

(ii) ***, ** and * imply statistical significance at the 1%, 5% and 10% level, respectively

(iii) The reference region is the central mountainous zone, which includes the region of the Segovias, northern, and central Nicaragua.

(iv) The reference occupational group is comprised of professional, service, craft, and general labor workers.

(v) F = Formal Sector; Q = Queue; H = Hired; and Pr = Probability

workers queuing for formal sector employment. Thus, those who tend to make up the queue were those informals with relatively higher education levels, access to other household income and generally live in households with fewer rooms. Also for men in 1998 and 1993, the additional variables of home ownership and the number of adults living in the household were important in the queuing decision. Males in 1998 who were married, worked in agriculture and lived in the regions of Managua and western Nicaragua tended to fall into the queue which was mitigated by urban residency. Additionally, for males in 1993 the number of children had a positive influence on the likelihood to queue.

Informal sector women who tend to form the formal sector queue, like men, have higher education levels, access to other household income and generally live in households with fewer rooms. For informal women, marriage discourages queue formation, with agricultural employment and Atlantic residence providing significant but mixed findings for joining the formal sector queue. For informal women in 1998, home ownership and children in the household were positive indicators of joining the formal sector queue only lessened by residence in Managua. Informal sector women in 1993 were less likely to join the formal sector queue when adults were present in the household.

The likelihood of informal sector workers being selected from the queue by formal sector employers was gender based. For men, employers seem to be most concerned with the following observable traits: experience, residence and education (in 1998 only). For women, employers looked for previous employment in agriculture and residence in Managua. Employers also negatively considered experience for women in 1993 and in

1998 employers were also concerned with education, and residence in urban, southern and Atlantic Nicaragua.

Although residence in Managua plays a major role, it is education that is the primary variable that links informals with formals through formal sector queue formation. Formal sector employers, on the other hand, seek qualified employees by gender that enhance business results at the lowest marginal cost. Essentially, then, according to the results reported above, the formal sector is an urban phenomena in Nicaragua, and those qualified informal workers who join the queue have the best chances of being selected from the queue if they base themselves in an urban area, preferably in Managua (inducing rural to urban migration).

Lastly, the likelihood queuing tests for both definitions of the formal/informal sector dichotomy suggests strong support for informal sector queuing in the formal sector in all cases (see Table 5.19).[26] Hence, hypothesis three is supported with further evidence of the queue becoming more pronounced from 1993 to 1998. The next section evaluates hypothesis four—the nature of the informal sector job queue in the 1990s.

H4 Results

Hypothesis four posited that the informal sector queue for formal sector work in Nicaragua became more pronounced over the decade of the 1990s. Using the vector coefficients from the bivariate probit models and the estimated variance-covariance matrices employed in the queuing model under hypothesis three, a Wald test of structural

[26] The null hypothesis of no queuing is rejected at the 1% significance level for all cases except for females in 1993 by firm size where the significance level is .030.

Table 5.19: Likelihood Ratio Queuing Tests by Firm Size and Enrollment in Social Security: 1993 and 1998

Year	Firm Size		Enrollment in Social Security	
1993	**LR Statistic**	**p-value**	**LR Statistic**	**p-value**
Males	42.574	.000	33.638	.000
Females	19.848	.030	41.540	.000
1998	**LR Statistic**	**p-value**	**LR Statistic**	**p-value**
Males	78.278	.000	45.088	.000
Females	34.018	.000	43.251	.000

Note:
(1) LR Statistic = Likelihood Ratio Statistic

differences was employed to determine by gender if the queues were dissimilar and more pronounced in 1998 than in 1993 (see page 66 for a more complete explanation of the estimation). The estimated results for both working definitions (firm size and enrollment in social security) of the formal/informal sector dichotomy very strongly indicate that the queues were distinct between groups and more pronounced in 1998 (see Table 5.20). The p-values below 1% suggests a rejection of the null and the acceptance of hypotheses four; thus hypothesis four is accepted.

This finding supports the economic reality observed in Nicaragua throughout the 1990s—economic re-structuring and hardship has made the formal sector a more desirable sector to work vis-à-vis the informal sector. Hypotheses five and six examine the differences between the sectors with special consideration given to wage differentials and changes in inter-sectoral human capital endowments.

H5 & H6 Results

The Wellington (1993) earnings decomposition model allows for the exposition of earnings differentials between the formal and informal sectors by gender (see pages 67-68) as called for in hypotheses five and six. Specifically, wage, labor market, and human capital endowment differentials in Nicaragua are detailed. The model was estimated for both definitions of informality—firm size and enrollment in social security. When heteroskedasticity was found, the standard errors were calculated using White's (1980) consistent estimator of the variance-covariance matrix.

Overall, the wage gap between formal sector men and informal sector men from 1993 to 1998 increased substantially, at least .1806 log points if calculated by firm size

Table 5.20: Wald Test of Structural Differences by Firm Size and Enrollment in Social Security

	Firm Size		Enrollment in Social Security	
	Males	Females	Males	Females
Chi-square	290.818	101.086	195.816	146.735
p-value	.000	.000	.000	.000

and .3101 log points using enrollment in social security as the measuring delimiter (see Table 5.21). For women, the wage gap increased more dramatically, from .2593 log points, as measured by firm size, to .3371 log points, as measured by enrollment in social security (see Table 5.22). Hence, formal men and women in 1998 were better off than they were in 1993 relative to the informal sector.

For the model run under firm size, the increase in the wage gap between the formal and informal sectors for both men and women can be mostly explained by changes in labor market conditions and not changes in human capital endowments. For formal sector men, the wage gap widened as a result of changes in the price of skills and changes in labor market conditions. These changes occurred in the areas of education, experience and employment in agriculture vis-à-vis informal sector men. Conversely for formal sector men, the wage gap lessened as a result of worsening labor market conditions for those who were married, urban, and residents of Managua, western, southern, and Atlantic Nicaragua as compared to their informal sector male counterparts. Overall, 1993-1998 changes in the labor market structure for men accounted for a widening of the wage gap of .2347 log points.

On the other hand, informal sector men partially closed the wage gap by .0540 log points based upon increases in human capital endowments vis-à-vis formal sector men. Informal men saw their earnings improve in the areas of education, experience, marriage, and residence in western and Atlantic Nicaragua when compared against formal sector men. Yet informal sector men who were engaged in agriculture, were urban, and who were residents of Managua and southern Nicaragua saw the wage gap expand versus

Table 5.21: The Wellington Model Sectoral Earnings Differential Decomposition by Firm Size and Enrollment in Social Security for Men

	1993-1998	
Variables	**Firm Size**	**Enrollment in Social Security**
Due to Coefficients		
Constant	.4045	-.0031
Years of Education	.0688	.2481
Potential Experience	.0670	.2327
Potential Experience Squared/100	.0197	-.0790
Work in Agricultural Occupation	.0483	.1002
Resident of an Urban Area	-.1411	-.0303
Resident of Managua	-.0676	-.1553
Resident of Western Nicaragua	-.0374	-.0769
Resident of Southern Nicaragua	-.0065	-.0625
Resident of Atlantic Nicaragua	-.0281	-.0306
Married	-.0928	.0318
Subtotal	.2347	.1752
Due to Mean Values		
Years of Education	-.0454	.0892
Potential Experience	-.1758	-.0175
Potential Experience Squared/100	.1156	.0255
Work in Agricultural Occupation	.0839	.0570
Resident of an Urban Area	.0185	.0024
Resident of Managua	.0007	.0006
Resident of Western Nicaragua	-.0037	-.0141
Resident of Southern Nicaragua	.0013	-.0064
Resident of Atlantic Nicaragua	-.0250	-.0192
Married	-.0241	.0174
Subtotal	-.0540	.1348
Total Differential	0.1806	.3101

Notes:

(i) The reference region is the central mountainous zone, which includes the region of the Segovias, northern, and central Nicaragua.

(ii) The reference occupational group is comprised of professional, service, craft, and general labor workers.

Table 5.22: The Wellington Model Sectoral Earnings Differential Decomposition by Firm Size and Enrollment in Social Security for Women

	1993-1998	
Variables	**Firm Size**	**Enrollment in Social Security**
Due to Coefficients		
Constant	.7022	.0675
Years of Education	.0907	.2553
Potential Experience	-.6232	-.4447
Potential Experience Squared/100	.2907	.3133
Work in Agricultural Occupation	.0046	-.0007
Resident of an Urban Area	.0095	.0586
Resident of Managua	-.1174	-.0530
Resident of Western Nicaragua	-.0718	-.0462
Resident of Southern Nicaragua	-.0691	-.0493
Resident of Atlantic Nicaragua	-.0217	.0020
Married	.1609	.1074
Subtotal	.3552	.2103
Due to Mean Values		
Years of Education	-.0514	.1301
Potential Experience	.0232	.0621
Potential Experience Squared/100	.0195	-.0523
Work in Agricultural Occupation	-.0104	.0018
Resident of an Urban Area	-.0039	.0021
Resident of Managua	.0249	.0148
Resident of Western Nicaragua	-.0017	.0012
Resident of Southern Nicaragua	-.0417	-.0251
Resident of Atlantic Nicaragua	-.0069	-.0008
Married	-.0011	-.0067
Subtotal	-.0959	.1272
Total Differential	.2593	.3371

Notes:

(i) The reference region is the central mountainous zone, which includes the region of the Segovias, northern, and central Nicaragua.

(ii) The reference occupational group is comprised of professional, service, craft, and general labor workers.

formal sector men.

For formal sector women, the wage gap widened as a result of improved labor market conditions in the areas of education, employment in agriculture, urban residence and marriage vis-à-vis informal sector women. Conversely for formal sector women, the wage gap lessened as a result of worsening labor market conditions for those who were experienced and who were residents of Managua, western, southern and Atlantic Nicaragua as compared to their informal sector female counterparts. Overall, the labor market structure for women accounted for a 1993-1998 widening of the wage gap of .3552 log points.

On the other hand, informal sector women partially closed the wage gap by .0959 log points based upon increases in human capital endowments vis-à-vis formal sector women. Informal women saw their earnings improve in the areas of education, agricultural employment, marriage, urban residence and residence in western, southern and Atlantic Nicaragua when compared against formal sector women. Yet informal sector women who were experienced and who were residents of Managua saw the wage gap expand versus formal sector women.

The labor market as expected, then, from 1993 to 1998 rewarded those formal sector workers who possessed more education and worked less in agriculture relative to informal sector workers.[27] However, informal sector workers were able to make some gains in education and the incidence of marriage to slightly reduce the burgeoning wage

[27] Interestingly, similar increases in the value of education in the formal sector were found by Pagán and Tijerina-Guajardo (2000) for Mexico during the early 1990s.

gap with formal sector workers.

The earnings decomposition model estimated by enrollment in social security paints a similar if not more severe picture of the formal-informal sector wage gap (see Tables 5.18-5.19). For men and women, the primary difference between the two informality definitions lay in the nature of the contribution of human capital endowments to the wage gap. That is, informality as defined by enrollment in social security, secures a higher reward for the educational gains for formal sector workers vis-a-vis their informal sector counterparts than does informality defined through firm size (which views this gap as closing rather than widening). Thus, the findings of the second model of informality estimated under enrollment in social security supports those estimated under firm size.

Chapter Summary

In this chapter, we have empirically tested the six hypotheses posited in chapter two. Our findings suggest that both formal and informal sector workers were positively selected into their respective sectors (supporting hypothesis two and rejecting hypothesis one) indicating not only a critical decision in employment choice, but also perhaps a decision which resonates between mere subsistence and income security. Of note, selectivity tests based on switching regressions were also estimated on the self-employed/wage and salaried decision indicating that workers in the wage and salaried sector are positively selected (in line with our formal sector results) with the results mixed for the self-employed, perhaps as a result of the fact that selectivity into self-employment depends on macroeconomic conditions. Additionally, informal sector workers were found to queue for formal sector jobs and the informal sector queue for

formal sector work became more pronounced over time (supporting hypotheses three and four). Lastly, earnings decompositions suggest that the wage gap between the formal and informal sectors widened throughout the 1990s, with changes in the structure of the labor market primarily through education explaining most of the increasing intersectoral wage gap (supporting hypotheses five and six).

Chapter six concludes the dissertation with a discussion of this investigation's contribution to the informal sector literature as well as a discussion of policy implications for public officials and practitioners working in the informal sector, most notably the Nicaraguan informal sector.

CHAPTER VI

CONCLUSION

This final chapter summarizes the key findings and contributions of the dissertation, discusses policy implications and limitations of the research results, and presents an agenda for future research.

Key Findings and Contributions

The informal sector literature is replete with hyperbole vilifying or propounding the merits of the informal economy. I employed the term informality as "income-earning activities unregulated by the state in a context where similar activities are so regulated" (Portes & Schauffler, 1993, 48). As such, roughly three-quarters of the economically active Nicaraguan population work in the informal sector—a very significant amount even by hemispheric standards.[28] Yet, this present research suggests that the informal sector is a sector of choice for those Nicaraguans so disposed to work in the informal sector.[29] That is, the informal sector has become an important domain of financial and household survival in Nicaragua. Be that as it may, though, the informal sector may not be *the* rising star of the economy; however, the informal sector is not *the*

[28] Of note, although confident of my analysis, my figure of approximately 75% of the economically active population engaged in informal sector pursuits differs from the figures promulgated by the Nicaraguan national government through the offices of the Nicaraguan Central Bank. The Nicaraguan Central Bank figures indicate an urban informal sector of less than 60% of the economically active population (Banco de Nicaragua, 1999, 20). The difference may lie, most likely, in the national scope of my present analysis from the urban only estimate used by the Nicaraguan Central Bank.

scourge of the economy either. More generally, within developing economies as Asea (1996) asserts, the informal sector may be the domain of a voluntary and positive self-selection process, the same process that we have uncovered in Nicaragua.

Thus, the empirical results indicate that the Nicaraguan informal sector contributes positively to the overall economy by attracting those individuals best suited toward informal sector employment. This finding is in concert with Hart (1973, 1970), of the International Labour Office or structuralist approach, whose pioneering work in Ghana suggested that the informal sector could be entrepreneurial and productive. Indeed, the microenterprise approach, led by Acción Internacional and BancoSol in Latin America, have come to the same conclusion, albeit without rigorous empirical study to support their views.

This positive informal sector selection finding is in contrast to the market failure hypothesis described by Harris and Todaro (1970) in their study of Kenya. They emphasized the informal sector simply as a source of surplus labor idling their time away in unproductive pursuits until such a time as a formal sector position came open. Although it is true that Nicaraguan informals queue for formal sector employment, informals while employed informally still exhibit positive selection. Furthermore, the findings presented here are counter to those of Speer (1997) who suggested that the Managuan informal sector of 1991 was characterized as a refuge for surplus labor. This difference, however, may be most likely due to the variance in data coverage and time as well as Speer's

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[29] From the perspective of neoclassical economics, then, informals, maximizing their income utility, act rationally through self-selection into the informal sector.

(1997) non-empirical support (personal observation) for his surplus labor argument. However, my findings do support Speer's (1997) general observation that the informal sector earnings declined in the 1990s and that the formal-informal sector wage gap grew larger. Not surprisingly, however, education level acts as the primary wedge between formal and informal sector employment.

Yet, many informal sector workers prefer to work in the formal sector, where the returns are higher (even more so since 1993), as evidenced by informal sector queuing for formal sector employment.[30] Of note for a nation where over 40% of the total working population finds employment in agriculture, agricultural work acted as a double-edged sword for those eventually entering formal sector employment through the informal sector job queue. For women, an agricultural background assisted in the transition from informal to formal sector employment; on the other hand for men, agricultural employment history likely meant informal sector employment now and in the future. Importantly, however, the evidence of queuing supports the notion of the interdependence and, at times, integration of the Nicaraguan informal and formal sectors.

In the 1990s, the Nicaraguan economy was transformed from a predominantly state-centered and state-directed economy to an economy where market mechanisms free of government intervention prevailed. The rigors of the adjustment to a free market and free trade environment were revealed in the

[30] This finding contrasts with that of Maloney (1999) in Mexico where informal sector queuing was not detected in the formal sector. However, unlike Maloney (1999), my analysis spanned two distinct points in time, was national in scope, and was more rigorous in conception (using the Wellington earnings decomposition model to better understand changes in human capital endowments and changes in the structure of the labor market) which allowed greater insight into the queuing phenomena.

widening wage gap between formal and informal sector workers (which was mostly explained by changes in the structure of the labor market) and in the free-fall in wages throughout the 1990s. This increased income inequality during the economic transition compares favorably to the Kuznets curve (Kuznets, 1955), where income inequality persists as an economy develops until such time as sufficient economic development secures gains in income equality. These findings from Nicaragua may provide a blueprint in which to study and contrast a similar economic transition presently underway in Eastern Europe.

An emerging dialogue concerning entrepreneurship and the role of the self-employed within the Latin American economic landscape has focused more attention upon this often overlooked group in the literature.[31] My results from Nicaragua indicate that the self-employed respond positively to downturns in the economy, enrolling themselves as entrepreneurs by choice. Conversely, when the economy improves, the self-employed sector becomes a refuge for workers with few alternative income earning options. Within this dynamic entrepreneurial panorama, self-employed women earn more than their male counterparts debunking the myth of the Nicaraguan male-female gender earnings gap as structural and static (see Babb, 1997).

In summary, my findings through the study of Nicaragua add to the informal sector literature in a number of important ways. A large number of select Nicaraguans are pulled toward informal sector employment where the informal sector comprises a preponderance of the economically active population.

With positive selection into the informal sector, the contribution of the informal sector to the overall economy is not a drain, but rather a catalyst for economic growth. However, the market-based macroeconomic adjustments of the 1990s exacerbated the earnings gap between the formal and informal sectors ever larger. Perhaps the worsening earnings inequality, primarily the result of changes in the structure of the Nicaraguan labor market as exhibited in the Wellington earnings decomposition analyses within this period of market-based economic reforms, lends credence to the existence of the inverted Kuznets curve hypothesis— where Nicaragua currently is positioned in the early stages of economic development and income inequality will persist until the economic infrastructure permits the gains of the market reforms to be dispersed more evenly. Additionally within the 1990s, the wage gap has contributed to informal sector workers queuing for formal sector employment. Seemingly, the self-employed are ahead of the Kuznets curve having already transformed their ranks from positive selection during the worst of economic times (1993) to negative selection during modest economic recovery (1998).

Policy Implications

Scarce public resources in Nicaragua should be devoted to facilitating and developing the informal sector as a policy tool for alleviating poverty and sustaining national economic growth. I have shown that the informal sector (as well as the formal sector) contributes positively to the overall economy. Hence, policy makers should move beyond the myopic view of the informal sector as a

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[31] David Blau (1985, 361) offers an interesting, though dated, exception with findings from Malaysia where "self-employed earnings [were] less than wage employees in rural areas, and more

safety net or valve for labor toward a new view where the informal sector is seen as a source of economic productivity, growth and potential capital formation. Since informals choose informality, the state can maximize informals' returns through benign macroeconomic policy and active microenterprise development support. That is, a growing economy facilitates wages upward (reducing poverty) and small business support such as micro-credit lending and technical assistance provide small firms that added edge toward enhanced productivity and long term profitability. Additionally, in the near term, the state can legalize the informal sector through nominal firm registration fees and identifications to relieve the negative stigma associated with informal sector work. In essence this supports a two-tier economy—one falling under the fiscal management and regulatory environment of the government and the other falling outside the boundaries of governmental fiscal management and regulation, but conditioned by market forces.

In practice, this segmentation may be best implemented on the basis of firm size. For example, those businesses with six or more employees would be subject to taxation and employment protection laws while those firms with five or fewer employees would be exempt from such governmental purview. However the pursuit of such a segmentation strategy would impinge upon the central government's ability to effectively engage in the use of fiscal policy, especially tax planning. That is, the informal sector mitigates the nation's ability to enact effective tax policy and hence manipulate aggregate demand in the face of the

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than wage employees in urban areas."

informal sector's ability to avoid taxes. Yet it can be argued that effective fiscal policy is currently unattainable within an economy where nearly three-quarters of the active workforce is employed out of the effective reach of the government in the informal sector. Additionally, weak public institutions call into question the efficacy of fiscal policy tools, most notably the problems surrounding tax collection (evasion) and fiscal corruption.

The greatest public policy tool available toward easing the earnings gap between the formal and informal sectors centers upon education. As the results have shown, education is the most important determinant of formal sector employment and higher earnings. A long term national effort focused upon basic education (e.g., effective compulsory schooling from kindergarten through high school) for all Nicaraguans will raise the standard of living through enhanced human capital endowments in a domestic labor market which provides higher returns to greater levels of educational attainment.

As for policy considerations for the self-employed, in times of macroeconomic instability, self-employed workers become centers of entrepreneurship and dynamism. Thus, at the depths of the business cycle and/or a national austerity program promulgated from without, the findings suggest that the Nicaraguan self-employed should receive preferential policy incentives in order to help "kick-start" the economic recovery. In times of economic growth, then, public funds may be redirected from the self-employed to other groups (e.g., the formal and informal sectors) where the returns to scarce public resources would be higher.

Study Limitations

There are two notable limitations to the findings in this study. First, proxy measures of the formal/informal sector dichotomy (by firm size and enrollment in social security) were employed seeking to capture the essence of "informality." The additional generally accepted measurement proxies of firm registration and union enrollment were unavailable in the data employed. In any case, no proxy measure can totally capture all those employed in one sector or the other or those that cross between sectors. Nonetheless, the major approaches toward informality in Latin America—the ILO, the neo-Marxist, the legalist, the microenterprise and structural articulation approaches—were primarily captured under firm size (ILO and microenterprise), enrollment in social security (neo-Marxist and structural articulation) and self-employment (microenterprise) measures. And secondly, this study would be aided by ethnographic research of the informal sector phenomena in order to triangulate the robustness of the present findings (see Pisani & Celtek, 1999, for an example of ethnographic work in the rural Nicaraguan informal sector).

Future Research

The informal/formal sector research discussed here may serve as the groundwork for further inquiry in comparative economics, small business analysis, ethnographic and survey investigation, and study of the self-employed. For example, our present study may be widened to include a regional analysis of the whole of Central America or compared against the economic transition currently underway in Eastern Europe. Ethnographic and survey research may

enhance our current findings through the intensive investigation of the survival strategies of the unemployed (which may include out-migration and/or remittances from abroad). Additionally ethnographic and survey research may allow the in-depth look at one public facet of informality, such as street vendors, or the impact Hurricane Mitch wreaked upon the Nicaraguan formal and informal sectors. The use of alternate research methodologies not only enables the investigator different avenues of asking the research question, but also more confidence in the research results (provided convergence in study findings).

Lastly, the field of investigation for entrepreneurship in the developing world, especially Latin America, is very young and open to new contributions. For example, Yuengert (1995) found some support in his study of U.S. self-employed immigrants of the tax avoidance hypothesis. The tax avoidance hypothesis suggests individuals enter into self-employment to decrease their tax burden, particularly apropos in a high tax environment (either through legal or illegal opportunities associated with business ownership), and maximize their earnings. Although Nicaragua is a weak tax collection state, this line of investigation—the tax avoidance hypothesis— may prove fruitful in the future as the government stresses better tax collection and enforcement in its pursuit of lasting market based reforms.

A broader look at the informal/formal sector may also view sectoral choice within a framework associated with four employment entry choices—wage and salaried work in the formal sector, self-employment in the formal sector, wage and salaried wok in the informal sector and self-employment in the

informal sector. As econometric techniques improve to allow for the multivariate estimation of choice models, the sectoral decision and the wage and salaried versus self-employment decision may be tested using a multinominal logit framework.

Also, our present analysis may be expanded to better understand the Nicaraguan self-employed phenomena from the rural/urban perspective as well as from the self-employed/formal sector standpoint. New research questions may be formulated and investigated to explore the potential existence of an earnings gap between the urban and rural self-employed or the propensity of the self-employed to queue for formal sector work. The self-employed should also be examined using available comparative, ethnographic, and survey techniques.

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APPENDIX A:
H1 AND H2 RESULTS BY ENROLLMENT IN SOCIAL SECURITY

Both men and women in the formal sector tend to be very urban (over 75%) with a primary regional base in Managua (over 40%) and employed in a non-agricultural occupation (see Appendix A, Table 1). Additionally, the formal sector shrinks acutely throughout the 1990s. Females tend to be more educated and have greater access to capital (e.g., possessing more rooms and other income in their households) as compared to males. Men, on the other hand, tend possess more experience, have more children and adults living in the household, and are more likely to be married than formal sector women.

Converse to the formal sector, the informal sector grows rapidly throughout the 1990s. Men are more likely to be married and have employment in an agricultural pursuit as compared to women (see Appendix A, Table 2). Women, however, tend to be more educated, more urban (including a greater propensity to be a resident of Managua), have more children and adults living in the household, and tend to possess greater access to capital than men.

When the formal and informal sectors are juxtaposed, it is evident that informals are more experienced and are engaged in greater numbers in agricultural employment then formals. Also informals tend to earn less income, possess less education, live in a rural region, reside in households with less rooms, have less access to other income earners

Appendix A, Table 1 – Formal Sector Descriptive Statistics for H1 & H2 Delimited by Enrollment in Social Security

	Formal Sector Participation Rate (%)		Log Weekly Earnings	
	1993	1993	1998	1993
Men	15.0	26.6	5.789	5.835
Women	20.7	33.4	5.480	5.571
		Males		**Females**
Variable	**1998**	**1993**	**1998**	**1993**
Years of Education	8.563	7.294	9.881	7.605
Potential Experience	21.884	21.578	17.768	19.733
Potential Experience Squared/100	6.516	6.340	4.188	5.124
Work in Agricultural Occupation	.051	.101	.027	.014
Resident of an Urban Area	.775	.827	.836	.859
Resident of Managua	.482	.478	.457	.410
Resident of Western Nicaragua	.179	.144	.133	.162
Resident of Southern Nicaragua	.123	.126	.104	.109
Resident of Atlantic Nicaragua	.057	.070	.069	.088
Married	.773	.758	.548	.584
Number of Children in Household	1.556	2.022	1.431	1.905
Number of Adults in Household	4.592	4.296	4.475	4.129
Home Ownership	.873	.766	.870	.818
Number of Rooms in Household	2.728	4.601	2.880	5.047
Log of Other Household Income	.949	-1.339	2.505	.682
N	561	862	408	622

Appendix A, Table 2 – Informal Sector Descriptive Statistics for H1 & H2 Delimited by Enrollment in Social Security

	Informal Sector Participation Rate (%)		Log Weekly Earnings	
	1998	1993	1998	1993
Men	85.0	73.4	4.930	5.287
Women	79.3	66.6	4.814	5.243

	Males		Females	
Variable	**1998**	**1993**	**1998**	**1993**
Years of Education	4.921	3.983	5.620	4.558
Potential Experience	24.448	24.521	24.319	26.856
Potential Experience Squared/100	8.852	8.377	8.263	9.580
Work in Agricultural Occupation	.446	.422	.072	.044
Resident of an Urban Area	.492	.529	.689	.709
Resident of Managua	.229	.204	.294	.324
Resident of Western Nicaragua	.166	.103	.168	.151
Resident of Southern Nicaragua	.156	.131	.194	.152
Resident of Atlantic Nicaragua	.096	.120	.062	.079
Married	.635	.757	.476	.533
Number of Children in Household	1.453	2.259	1.459	2.266
Number of Adults in Household	4.966	4.243	4.979	4.391
Home Ownership	.796	.819	.834	.838
Number of Rooms in Household	2.210	3.740	2.294	4.282
Log of Other Household Income	-.511	-2.235	1.921	-.285
N	3179	2381	1563	1242

living in the household, and tend to be married at a lower rate than formals. The general pattern differentiating formals and informals parallels that for the differences between men and women in the formal and informal sectors. The only notable gender difference shows that women tend to be employed at a higher rate in the formal sector than men and vice-versa.

Also evident is the structural and widening wage gap between the formal and informal sectors. The wage gap between the formal and informal sectors for men increased from 72.98% in 1993 to 136.08% in 1998. For women, the wage gap grew even more dramatically, from 38.82% in 1993 to 94.64% in 1998. Nonetheless, intra-sectoral wages declined for both men and women between 1993 and 1998B wages for women declined 9.53% in the formal sector and 53.57% in the informal sector; for men, wages declined 4.71% in the formal sector and 42.90% in the informal sector. As expected men earn more than women in each sector over both time periods— the formal wage gap was 30.21% in 1993 and 36.21% in 1998 whereas the informal wage gap was 4.50% in 1993 and 12.30% in 1998.

Switching Regressions for the Formal and Informal Sectors by Enrollment in Social Security

Across years and gender, as expected both education and experience are the major determinants of formal sector participation when evaluated by enrollment in social security (equation three of the switching regression, see page 55). Additional determinants for formal sector men include employment in an agricultural occupation and residence in Managua and the western region (see Appendix A, Tables 3-6).

Appendix A, Table 3:
Switching Regression Estimates for the Formal and Informal Sectors Delimited by Social Security Enrollment: Males 1993

	Switch (γ)	β_{Formal}	$\beta_{Informal}$
Constant	-1.577***	2.840***	4.277***
	(.138)	(.153)	(.080)
Years of Education	078***	093***	060***
	(.007)	(.006)	(.006)
Potential Experience	029***	060***	040***
	(.007)	(.007)	(.005)
Potential Experience	-.043***	-.089***	-.051***
Squared/100	(.010)	(.012)	(.007)
Work in Agricultural Occupation	-.467***	-.604***	-.388***
	(.077)	(.084)	(.048)
Resident of an Urban Area	207***	403***	286***
	(.070)	(.075)	(.048)
Resident of Managua	565***	716***	-.057
	(.069)	(.074)	(.056)
Resident of Western Nicaragua	422***	520***	-.153**
	(.088)	(.091)	(.066)
Resident of Southern Nicaragua	158*	461***	-.081
	(.084)	(.089)	(.059)
Resident of Atlantic Nicaragua	083	358***	256***
	(.099)	(.108)	(.058)
Married	-.051	-.003	089*
	(.065)	(.066)	(.046)
Number of Children in Household	-.005	---	---
	(.014)		
Number of Adults in Household	016	---	---
	(.012)		
Home Ownership	-.161***	---	---
	(.057)		
Number of Rooms in Household	-.002	---	---
	(.002)		
Log of Other Household Income	.001	---	---
	(.003)		
σ	---	.919***	.895***
		(.031)	(.018)
ρ	---	.863***	.510***
		(.020)	(.082)
Log-Likelihood	-5,373.434		
N	3,243		

Notes:
(i) Standard errors in parentheses.
(ii) ***, ** and * imply statistical significance at the 1%, 5% and 10% level, respectively.
(iii) The reference region is the central mountainous zone, which includes the region of the Segovias, northern, and central Nicaragua.
(iv) The reference occupational group is comprised of professional, service, craft, and general labor workers.

Appendix A, Table 4:
Switching Regression Estimates for the Formal and Informal Sectors Delimited by Social Security Enrollment: Females 1993

	Switch (γ)	β_{Formal}	$\beta_{Informal}$
Constant	-1.032***	3.616***	4.091***
	(.185)	(.205)	(.138)
Years of Education	.065***	.070***	.067***
	(.008)	(.008)	(.014)
Potential Experience	.018*	.035***	.039***
	(.009)	(.009)	(.594)
Potential Experience	-.057***	-.083***	-.053***
Squared/100	(.015)	(.015)	(.009)
Work in Agricultural Occupation	-.252	-.639**	-.267*
	(.234)	(.265)	(.161)
Resident of an Urban Area	.230***	.268**	.295***
	(.087)	(.105)	(.071)
Resident of Managua	.186**	.414***	.338***
	(.086)	(.099)	(.074)
Resident of Western Nicaragua	.159	.239**	.130
	(.106)	(.120)	(.084)
Resident of Southern Nicaragua	.003	.280**	.142*
	(.112)	(.121)	(.084)
Resident of Atlantic Nicaragua	.126	.072	.055
	(.130)	(.173)	(.104)
Married	.012	.008	.098*
	(.066)	(.066)	(.053)
Number of Children in Household	-.036*	---	---
	(.019)		
Number of Adults in Household	-.021	---	---
	(.016)		
Home Ownership	.030	---	---
	(.077)		
Number of Rooms in Household	.015	---	---
	(.003)		
Log of Other Household Income	.005	---	---
	(.004)		
σ	---	.897***	.889***
		(.044)	(.031)
ρ	---	.806***	-.197
		(.036)	(.329)
Log-Likelihood	-3,292.451		
N	1,864		

Notes:
(i) Standard errors in parentheses.
(ii) ***, ** and * imply statistical significance at the 1%, 5% and 10% level, respectively.
(iii) The reference region is the central mountainous zone, which includes the region of the Segovias, northern, and central Nicaragua.
(iv) The reference occupational group is comprised of professional, service, craft, and general labor workers.

Appendix A, Table 5:
Switching Regression Estimates for the Formal and Informal Sectors Delimited by Social Security Enrollment: Males 1998

	Switch (γ)	β_{Formal}	$\beta_{Informal}$
Constant	-1.614***	2.726***	4.282***
	(.158)	(.224)	(.084)
Years of Education	.096***	.136***	.101***
	(.009)	(.010)	(.062)
Potential Experience	.016*	.042***	.030***
	(.081)	(.010)	(.004)
Potential Experience	-.022	-.059***	-.036***
Squared/100	(.014)	(.018)	(.006)
Work in Agricultural Occupation	-1.028***	-.905***	-.767***
	(.089)	(.168)	(.048)
Resident of an Urban Area	-.044	.117	.164***
	(.075)	(.097)	(.045)
Resident of Managua	.330***	.352***	.335***
	(.087)	(.107)	(.073)
Resident of Western Nicaragua	.353***	.157	.173***
	(.088)	(.110)	(.062)
Resident of Southern Nicaragua	.013	-.074	.008
	(.083)	(.102)	(.052)
Resident of Atlantic Nicaragua	-.027	-.209*	.245***
	(.102)	(.124)	(.048)
Married	.114	.208**	.191***
	(.073)	(.092)	(.047)
Number of Children in Household	.000	---	---
	(.018)		
Number of Adults in Household	-.006	---	---
	(.009)		
Home Ownership	.082	---	---
	(.056)		
Number of Rooms in Household	-.060***	---	---
	(.017)		
Log of Other Household Income	.008***	---	---
	(.003)		
σ	---	1.013***	1.029***
		(.060)	(.011)
ρ	---	.877***	-.696***
		(.027)	(.032)
Log-Likelihood	-6,162.517		
N	3,740		

Notes:
(i) Standard errors in parentheses.
(ii) ***, ** and * imply statistical significance at the 1%, 5% and 10% level, respectively.
(iii) The reference region is the central mountainous zone, which includes the region of the Segovias, northern, and central Nicaragua.
(iv) The reference occupational group is comprised of professional, service, craft, and general labor workers.

Appendix A, Table 6:
Switching Regression Estimates for the Formal and Informal Sectors Delimited by Social Security Enrollment: Females 1998

	Switch (γ)	β_{Formal}	$\beta_{Informal}$
Constant	-2.638***	2.388***	3.552***
	(.214)	(.246)	(.102)
Years of Education	.175***	.172***	.057***
	(.012)	(.031)	(.010)
Potential Experience	.039***	.035***	.041***
	(.011)	(.101)	(.005)
Potential Experience	-.074***	-.047***	-.051***
Squared/100	(.021)	(.018)	(.008)
Work in Agricultural Occupation	.032	-.153	-.152**
	(.181)	(.360)	(.077)
Resident of an Urban Area	.114	.052	.152***
	(.107)	(.112)	(.053)
Resident of Managua	.035	.259***	.286***
	(.104)	(.097)	(.070)
Resident of Western Nicaragua	-.079	-.164	.084
	(.118)	(.112)	(.072)
Resident of Southern Nicaragua	-.359***	-.190*	.262***
	(.107)	(.104)	(.060)
Resident of Atlantic Nicaragua	.162	.221*	.095
	(.134)	(.126)	(.073)
Married	.006	.124*	.082*
	(.081)	(.074)	(.047)
Number of Children in Household	.031	---	---
	(.021)		
Number of Adults in Household	.008	---	---
	(.011)		
Home Ownership	.038	---	---
	(.080)		
Number of Rooms in Household	.006	---	---
	(.025)		
Log of Other Household Income	.001	---	---
	(.005)		
σ	---	.856***	.851***
		(.051)	(.022)
ρ	---	.916***	.425***
		(.022)	(.129)
Log-Likelihood	-3,030.521		
N	1,971		

Notes:
(i) Standard errors in parentheses.
(ii) ***, ** and * imply statistical significance at the 1%, 5% and 10% level, respectively.
(iii) The reference region is the central mountainous zone, which includes the region of the Segovias, northern, and central Nicaragua.
(iv) The reference occupational group is comprised of professional, service, craft, and general labor workers.

For women, residence in the southern region is significant in 1998 while residence in Managua is significant in 1993. Additionally for women in 1993, urban residence and the number of children in the household are important determinants of formal sector participation. For men, access to capital is important in the form of home ownership for 1993 as well as in the form of number of rooms in the household and other sources of household income in 1998. Urban residence and residence in the southern region are also determinants of formal sector participation for men in 1993.

The sectoral earnings functions are also reported in Appendix B, Tables 3-6. Positive returns are exhibited for both education and experience for men and women in both 1993 and 1998. As expected, education returns are highest for formal sector workers. The highest returns for experience accrued to the formal sector for men and the informal sector for women. In 1998, marriage had a positive impact of the return to earnings for both men and women, even more so for formals. Agricultural employment returns were negative for men in both sectors over both reporting periods, more so for formal sector men. Negative returns also accompanied formal and informal women in 1993, with formal sector women most strongly impacted. These agricultural employment results reflect the demise of Nicaraguan agriculture in general in the 1990s (Jonakin, 1997).

As no surprise, Managua continued to be the region with the most significant influence on earnings in Nicaragua. Returns to earnings was positive for residents in Managua in 1998 for all groups and for women in 1993, although the results for sectoral performance were mixed. Formal sector men in 1998 and formal sector women in 1993

saw enhanced earnings than their informal sector counterparts. For women in 1998, informals accrued higher returns to residence in Managua than formals. Reinforcing these results were the positive returns to urban residence for all groups in 1993. Other regions which impacted earnings include Atlantic, southern, and western. However, the return to earnings picture was mixed for these regions boosting the positive importance of Managuan residency.

Lastly, the ρ coefficient value sheds light upon the selectivity issue. The ρ can be found at the bottom of Appendix A, Tables 3-5. As already reported in the main text, positive selection is exhibited for formal sector participants across years and gender. Also in 1998, informal sector participants are positively selected. Although not significant, informal sector women in 1993 show the sign of positive selection. Only informal sector males in 1993 are negatively selected; not enough to support hypothesis one; hence hypothesis one is rejected. Hypothesis two is overwhelmingly supported, indicating positive selection into the formal sector.

APPENDIX B:

H3 RESULTS BY ENROLLMENT IN SOCIAL SECURITY

The results of the queuing model delimited by social security are reported here as an additional empirical finding to assist in determining the robustness of the queuing model. Recall that the first term in the bivariate probit model provides insight into the key variables that comprise the likelihood of informal sector workers queuing for formal sector employment.

Thus, those who tend to make up the queue were those informals with higher education levels, access to other household income and those generally with higher experience levels (see Appendix B, Tables 1-4). Also for men in 1998 and 1993, the additional variables of home ownership and residence in Managua were positive and agricultural employment was mixed in determining the queuing decision. Males in 1998 with access to other household income tended to fall into the queue. Additionally, for males in 1993 the number of adults in the household had a positive influence on the likelihood to queue.

Informal sector women who tend to form the formal sector queue, like men, have higher education levels and more experience. For informal women in 1998, access to other household income discourages queue formation. In 1993, informal women with children were less likely to join the formal sector queue.

Appendix B. Table 1:
Queuing Model Results by Enrollment in Social Security: Males 1993

	Probit Model			Partial Obsverability Bivariate Probit model					
	Pr(F=1)			Pr(Q=1)			Pr(H=1|Q=1)		
Variables	**Coeff.**	**S.E.**		**Coeff.**	**S.E.**		**Coeff.**	**S.E.**	
Constant	-1.458	.142	***	-2.037	.284	***	1.770	1.286	
Years of Education	.078	.007	***	.126	.020	***	-.012	.035	
Potential Experience	.026	.007	***	.067	.027	**	-.089	.038	**
Potential Experience Squared 100	-.037	.011	***	-.032	.052		.069	.350	**
Work in Agricultural Occupation	-.538	.076	***	-.480	.162	***	-.395	.196	**
Resident of an Urban Area	.219	.070	***	.045	.152		.365	.155	**
Resident of Managua	.440	.056	***	.403	.107	***	.352	.138	**
Married	-.074	.066		-.111	.090		---	---	
Number of Children in Household	.008	.016		-.008	.024		---	---	
Number of Adults in Household	.039	.014	***	.077	.026	***	---	---	
Home Ownership	-.249	.066	***	-.290	.107	***	---	---	
Number of Rooms in Household	-.003	.003		-.004	.004		---	---	
Log of Other Household Income	-.004	.004		-.005	.005		---	---	
N	3,243			3,243					
Chi Squared	618.188			651.827					

Notes:

(i) Coeff. = Coefficient; and S.E. = Standard Error.

(ii) ***, ** and * imply statistical significance at the 1%, 5% and 10% level, respectively.

(iii) The reference region is all of Nicaragua outside of Managua.

(iv) The reference occupational group is comprised of professional, service, craft, and labor workers.

(v) F = Formal Sector; Q = Queue; H = Hired; and Pr = Probability.

Appendix B, Table 2:
Queuing Model Results by Social Security: Females 1993

	Probit Model			Partial Obsverability Bivariate Probit model					
	Pr(F=1)			Pr(Q=1)			Pr(H=1|Q=1)		
Variables	**Coeff.**	**S.E.**		**Coeff.**	**S.E.**		**Coeff.**	**S.E.**	
Constant	-.957	.186	***	-2.724	.650	***	.228	.348	
Years of Education	.063	.008	***	.183	.041	***	.035	.012	***
Potential Experience	.018	.009	*	.251	.050	***	-.031	.018	***
Potential Experience Squared 100	-.057	.016	***	-.279	.094	***	-.030	.026	
Work in Agricultural Occupation	-.258	.213		-.686	.859		-.053	.356	
Resident of an Urban Area	.294	.086	***	-.320	.319		.378	.110	***
Resident of Managua	.078	.067		.144	.238		.077	.083	
Married	.032	.066		.306	.212		---	---	
Number of Children in Household	-.057	.020	***	-.244	.648	***	---	---	
Number of Adults in Household	-.005	.016		.061	.052		---	---	
Home Ownership	.032	.088 9		-.298	.273		---	---	
Number of Rooms in Household	-.000	.003		.072	.071		---	---	
Log of Other Household Income	.005	.004		.008	.015		---	---	
N	1,864			1,864					
Chi Squared	257.646			299.186					

Notes:

(i) Coeff. = Coefficient, and S.E. = Standard Error.

(ii) ***, ** and * imply statistical significance at the 1%, 5% and 10% level, respectively.

(iii) The reference region is all of Nicaragua outside of Managua.

(iv) The reference occupational group is comprised of professional, service, craft, and labor workers.

(v) F = Formal Sector; Q = Queue; H = Hired, and Pr = Probability.

Appendix B, Table 3:
Queuing Model Results by Social Security: Males 1998

	Probit Model			Partial Obsverability Bivariate Probit model					
	Pr(F=1)			Pr(Q=1)			Pr(H=1|Q=1)		
Variables	**Coeff.**	**S.E.**		**Coeff.**	**S.E.**		**Coeff.**	**S.E.**	
Constant	-2.152	.149	***	-2.618	.355	***	.080	.686	
Years of Education	.090	.009	***	.183	.026	***	-.002	.032	
Potential Experience	.030	.007	***	.096	.022		.018	.016	
Potential Experience Squared 100	-.042	.012	***	.085	.053		-.065	.026	
Work in Agricultural Occupation	-.931	.089	***	1.332	.714	*	-1.767	.272	
Resident of an Urban Area	-.040	.068		-.260	.189		.165	.155	**
Resident of Managua	.252	.059	***	.261	.150	*	.340	.146	***
Married	.291	.068	***	.527	.151	***	---	---	
Number of Children in Household	.005	.020		.000	.036		---	---	
Number of Adults in Household	-.000	.010		-.001	.017		---	---	
Home Ownership	.240	.076	***	.380	.137	***	---	---	
Number of Rooms in Household	-.001	.019		.033	.040		---	---	
Log of Other Household Income	.008	.004	**	.014	.007	*	---	---	
N	3,740			3,740					
Chi Squared	353.550			398.638					

Notes:

(i) Coeff. = Coefficient; and S.E. = Standard Error.

(ii) ***, ** and * imply statistical significance at the 1%, 5% and 10% level, respectively

(iii) The reference region is all of Nicaragua outside of Managua.

(iv) The reference occupational group is comprised of professional, service, craft, and labor workers

(v) F = Formal Sector; Q = Queue; H = Hired; and Pr = Probability

Appendix B, Table 4:
Queuing Model Results by Social Security: Females 1998

	Probit Model			Partial Obsverability Bivariate Probit model					
	Pr(F=1)			Pr(Q=1)			Pr(H=1|Q=1)		
Variables	**Coeff.**	**S.E.**		**Coeff.**	**S.E.**		**Coeff.**	**S.E.**	
Constant	-2.457	.205	***	-4.809	.921	***	-1.179	.378	***
Years of Education	.151	.012	***	.263	.075	***	.128	.013	***
Potential Experience	.032	.010	***	.344	.086	***	-.039	.023	
Potential Experience Squared/100	-.065	.020	***	-.496	.160	***	.041	.041	*
Work in Agricultural Occupation	.119	.179		-.540	.624		.411	.255	
Resident of an Urban Area	.153	.091	*	.188	.414		.141	.109	
Resident of Managua	.158	.075	**	.041	.405		.174	.086	**
Married	.088	.076		.416	.382		---	---	
Number of Children in Household	-.030	.025		.004	.111		---	---	
Number of Adults in Household	-.008	.013		-.029	.056		---	---	
Home Ownership	.139	.100		.483	.403		---	---	
Number of Rooms in Household	.001	.025		.124	.132		---	---	
Log of Other Household Income	.000	.005		-.070	.041	*	---	---	
N	1,971			1,971					
Chi Squared	324.727			367.978					

Notes:

(i) Coeff. = Coefficient; and S.E. = Standard Error.

(ii) ***, ** and * imply statistical significance at the 1%, 5% and 10% level, respectively.

(iii) The reference region is all of Nicaragua outside of Managua.

(iv) The reference occupational group is comprised of professional, service, craft, and labor workers.

(v) F = Formal Sector; Q = Queue; H = Hired; and Pr = Probability.

The likelihood of informal sector workers being selected from the queue by formal sector employers was gender based. For men, employers were most concerned with the following observable traits: urban residence or residence in Managua, experience and agricultural employment (the latter two for 1993 only). Only previous agricultural employment dissuaded formal sector firms from hiring informals from the queue. For women, employers looked positively upon education and negatively upon experience.

Although urban residence and experience play major roles, it is education that is the primary variable that links informals with formals through formal sector queue formation. Formal sector employers, on the other hand, seek qualified employees by gender that enhance business results at the lowest marginal cost. Essentially, then, according to the results reported above, the formal sector is an urban phenomena in Nicaragua, and those qualified informal workers who join the queue have the best chances of being selected from the queue if the base themselves in an urban area, preferably in Managua. These findings are in concert with those detailed for firm size.

As previously reported, the likelihood ratio statistic strongly signals that queuing is present for informal sector workers wishing to access formal sector employment (see Table 5.19).

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