

**DETERMINANTS OF NON-FARM SELF-EMPLOYMENT**

**IN**

**RURAL VIRGINIA**

by

**Bageshwari Sherchand**

thesis submitted to the Faculty of the

**Virginia Polytechnic Institute and State University**

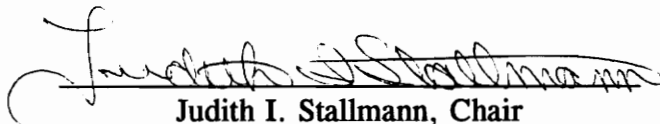
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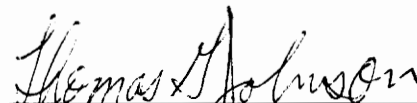
in

**Agricultural Economics**

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Committee Chair: Judith I. Stallmann  
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(ABSTRACT)

This research uses primary cross-sectional non-farm-household data collected from Virginia's non-metropolitan areas for the 1989 year. The primary objective of this research is to identify the factors that influence the probability of being self-employed. Using an effective sample of 851 household-heads, a model consisting of two dichotomous probit equations are specified and developed to determine the statistically significant factors that influence, first, the probability of labor force participation, and then the likelihood of being self-employed. The probit equations are estimated by the maximum likelihood estimation (MLE) procedure, using LIMDEP, an econometrics program. The Statistical Analysis Systems (SAS) is used for descriptive analysis and comparisons.

The empirical results reveal that human capital characteristics influence the likelihood of labor force participation. A gender disaggregated analysis illustrates that

*Abstract*

presence of pre-schoolers, and an employed spouse all decrease the probability of being in the labor force for women. For men, the variables have an increasing effect.

Overall, two key findings emerge from the analysis with respect to identifying the determinants of being self-employed: That human capital investments in the form of education and particularly, labor market experience, play an influential role in determining the probability of being self-employed; and that access to and availability of financial resources, for example unearned income, are important factors in determining an individual's likelihood of being self-employed.

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# CHAPTER 1

## 1.1 Introduction

During the two recessions of the early 1980s, rural areas lost jobs more rapidly than urban areas. During the recovery, many rural areas have not regained the jobs they once had (Freshwater, 1989; Henry et al., 1988). Solutions have stressed the need to focus on income and employment expansion. Employment expansion, however, has, to date, overwhelmingly focused on manufacturing and large-firm jobs. Although alternative approaches such as self-employment and small business have been considered as a strategy for employment and income expansion in rural areas, little research exists on rural small businesses or business-owners, that is, the self-employed individuals. Rural non-farm self-employment, as an employment and income source, has been insufficiently addressed. Equally serious is the lack of information on the characteristics of individuals that choose to be self-employed and establish small-businesses. Little is known about the factors that influence the likelihood that an individual would choose to be self-employed—who they are, what they do, why they choose to be self-employed.

## 1.2 Overview of Rural Economic Conditions

As reported by various studies, the lack of job opportunities remains the greatest single problem in rural America (Hoppe, 1989; Daft, 1982). Job losses during the early 1980's, and slow growth thereafter, limited economic opportunities and led to high unemployment rates, declining incomes, high poverty rates, and widespread population losses in many rural areas (Reid and Frederick, 1991). These problems are most severe in non-metropolitan counties dependent for employment and income on declining or cyclical industries—farming, forestry, mining, construction, and nondurable-goods manufacturing—which sustain nearly half of the rural population (Henry et al., 1987). The substantially slower employment growth in rural than in urban areas was mainly due to structural changes occurring in these non-metropolitan economies.

The nation's shift from manufacturing to services as the most rapidly growing sector, essentially left rural areas behind (Henry et al, 1987). The lack of a similar shift from its traditional extraction and manufacturing base to a service-oriented economy has hindered growth of rural areas leading to permanent job losses. According to Reid and Frederick (1991), the share of nonmetropolitan employment in the traditional rural industries has declined by nearly 50 percent since 1969.

During the recessions of the early 1980's, the service sector was the only sector that experienced rapid growth, while many other sectors lost jobs. From 1982 to 1986, the service sector registered an increase of 3.6 percent in employment

nationally (Majchrowicz and Ghelfi, 1988). This "phenomenon" was evident in non-metropolitan areas as well, even though the rate of growth was relatively slower: rural service jobs increased by 2.7 percent between 1982 and 1986 (Majchrowicz and Ghelfi, 1988). Job growth in the service sector is projected to continue for the nation as a whole. The Bureau of Labor (1990) has indicated that 90 percent of the 16 million new jobs between 1984 and 1995 will be in the service sector.

The increase in service sector employment experienced by the service sector, however, was insufficient to offset the jobs lost in other sectors in rural areas. Furthermore, many of the service jobs in rural areas were primarily in low-wage subsectors of the service sector and susceptible to the vagaries of the business cycle, which has raised some concern about the "quality" of these jobs. Although the service sector offers more jobs, the compensation may be lower than that offered by manufacturing jobs and may not be sufficient to lift families out of poverty.

As a result of rural job losses during the eighties, many non-metropolitan counties lost population. Between 1980 and 1988, 64 percent (1565 counties) of all non-metropolitan counties lost a net of 1.97 million people due to out-migration, mostly to metropolitan areas and to those non-metropolitan counties that were faring better economically (Beale and Fuguitt, 1990). Despite the high rate of out-migration, unemployment in non-metropolitan counties during the early and mid-1980's remained higher than in the nation's metropolitan areas (Table 1.1).

**Table 1.1: Unemployment Rates in Metropolitan and Non-Metropolitan Counties: 1979 - 1989**

Year	Metropolitan	Non-Metropolitan
1979	5.8	5.7
1980	7.0	7.3
1981	7.5	7.9
1982	9.5	10.1
1983	9.4	10.1
1984	7.3	8.1
1985	6.9	8.4
1986	6.6	8.3
1987	5.9	7.2
1988	5.3	6.2
1989	5.2	5.7

Source: U.S.D.A. Economic Research Service. Rural Conditions and Trends. Vol.1 (2). Washington,D.C., Summer 1990.

In addition, as a result of rural economic stagnation, real per capita income levels in rural areas dropped from 76.5 percent of metropolitan per capita income in 1979, to 72.2 percent in 1988 (Table 1.2). Poverty levels for nonmetropolitan areas were equally troubling. Despite a nationwide economic revival during the mid 1980's, poverty rates in 1988 for nonmetropolitan areas remained higher than in metropolitan areas (by 3.8%) (Table 1.3).

**Table 1.2: Real Per Capita Personal Income in  
Metropolitan and Non-Metropolitan Areas: 1979 - 1989**

Year	National (Current Dollars)		Non-Metropolitan
	Metropolitan	Non-Metropolitan	% of Metropolitan
1979	9,522	7,222	75.8 %
1980	10,547	7,782	73.8 %
1981	11,661	8,675	74.4 %
1982	12,289	9,054	73.7 %
1983	12,995	9,443	72.7 %
1984	14,147	10,378	73.4 %
1985	15,036	10,924	72.7 %
1986	15,829	11,476	72.5 %
1987	16,605	11,998	72.2 %
1988	17,668	12,615	71.4 %
1989	18,783	13,526	72.0 %

Source: U.S. Dept. of Commerce. Bureau of Economic Analysis "Local Area Personal Income". U.S.G.P.O., Washington, D.C., May, 1993.

**Table 1.3: Poverty Rates in Metropolitan and Non-Metropolitan Areas  
1979 - 1989**

Year	Total	Metropolitan	Non-Metropolitan
1979	11.7	10.7	13.8
1980	13.0	11.9	15.4
1981	14.0	12.6	17.0
1982	15.0	13.7	17.8
1983	15.2	13.8	18.3
1984	14.4	NP	NP
1985	14.0	12.7	18.3
1986	13.6	12.3	18.1
1987	13.5	12.5	16.9
1988	13.1	12.2	16.0
1989	12.8	12.0	15.7

NP = not published.

Source: U.S. Department of Commerce, Bureau of the Census, "Money, Income and Poverty Status in the U.S." Current Population Reports. U.S.G.P.O., Washington, D.C., 1974-1990.

Persistently high unemployment rates illustrate the inability of non-metropolitan areas to put to use the supply of labor. Furthermore, traditional manufacturing is not expected to absorb this surplus labor in the non-metropolitan counties (Freshwater, 1989). The traditional strategy for employment-growth in rural areas of wooing big manufacturing plants with generous tax abatements and breaks and other similar benefit packages, has turned out to be costly for local governments. Such strategies have resulted, most often, in attracting businesses in the mature phase of the production cycle. Industries in the "mature" stage seek cost-cutting strategies, rather than investing in "newer" technology. As a result, they locate in areas offering low-wages, tax-breaks, cheap land, etc. This may perpetuate the areas' low wages, low incomes and weak tax-bases. In many cases, the employment generated by these big plants, did not increase the real per capita income, nor provide sufficient jobs for the local people as hoped (Larson and White, 1986; Malecki, 1988).

### **1.3 Self-Employment and Small Business Development**

Declining employment and permanent job losses caused by structural changes in rural areas have prompted a serious search for alternative approaches to employment and income expansion in rural areas. An approach that has been widely considered as an alternative is self-employment.

Non-farm self-employment (ie. the owner operated business without employees in the non-farm sector) is the most common form of business in the U.S.

(Lichtenstein, 1990). According to the Census Bureau, the number of self-employed persons (as their primary occupation) increased from 5.6 million in 1976 to 8.5 million in 1988. If moonlighting self-employed individuals are added to the Census Bureau's number of self-employed (as the primary occupation), the number of persons with some self-employment increases to approximately 13.5 percent (Lichtenstein, 1990).

Self-employment (including farming) is nearly twice as widespread in rural as in urban areas (Bradshaw and Blakely, 1983; Shapira, 1983). Even when agricultural self-employment is excluded, non-farm self-employment is a "strong rural tradition" offering both primary and secondary sources of income to non-metropolitan residents (Block, 1983; Bryant, 1980). For many rural residents, where job opportunities are thin, self-employment serves as the best alternative to unemployment. In addition, smaller firms operated by the self-employed may be appropriately sized for the demand of smaller communities which cannot support larger firms.

The recent renewed interest in self-employment and specifically the small-businesses they operate, has been due to the recognition that a large number of jobs are created by small-businesses (SBA, 1988). The job-generation ability of small businesses was first brought to light by David Birch (1979). More recent scrutiny of the job generation ability of small firms, however, has shown that the number of jobs generated depends on definition used. In any case, the conclusive point made is that

small firms have contributed to employment generation and that they are responsible for a significant share of the new job creation in the United States (Fisher, 1989).

The growth in the number of small-businesses was partly spawned by technological changes and ensuing product and process innovations during and after the seventies. Such improvements made technologies more accessible to firms and individuals, making small firms more viable and competitive. In addition, changes in the industrial structure caused by deregulation, rising foreign competition, and the rapid pace of technological changes have created a need for specialized expertise leading to "out-sourcing" in bigger firms, as a cost-control measure. Such changes have lowered the barriers to entry and made it easier for small firms and individuals to take advantage of opportunities and niches and provide cost-effective services required by individual customers and by large firms as well (Blau, 1987; Becker, 1984).

Besides the job-generation ability, state and local officials have espoused small business development for several other reasons. The flexibility and "innovativeness" of small businesses have allowed them to respond promptly to prevailing market conditions and needs, and led to the generation of new products, processes, markets etc. In addition, the resourcefulness of small businesses owners is illustrated by their ability to find the needed capital from sources other than formal lending institutions, and to start businesses with very little capital. Forty-eight percent of small firms started business with less than \$20,000 (Table 1.4).

**Table 1.4: Capital Requirement for Small Business Start-ups**

Dollar Amount	Percent of Business
Under \$5,000	18
\$5,000 to \$10,000	14
\$10,000 to \$20,000	16
\$20,000 to \$50,000	25
\$50,000 to \$100,000	15
\$100,000 to \$250,000	8
\$250,000 to \$500,000	2
\$500,000 and over	1
No Response	1

Source: Hoke, Linda. "Creating an Entrepreneurial Culture: Microenterprises in the Southern Economy." SGPB Alert, April 1990. No.32. Research Park Triangle. North Carolina.

Small businesses also contribute to local communities. They are more likely to hire labor and buy inputs locally (Fisher, 1989). They tend to employ lower skilled and less-experienced workers, providing the needed training and experience for the labor force (Bednarzik, 1983), and offering stop-gap work for those seeking full-time work (Morrison, 1983). In addition, locally-owned small businesses serve as a role model for the residents in the community (Hoke, 1990).

Interest in small business is not limited to the United States. Many of the 17 country members of the Organization for Economic Cooperation and Development (OECD) regard self-employment and small business as an alternative way of generating jobs for the unemployed, and thus, have initiated programs to promote self-employment to solve their labor market problems (Rees and Shah, 1985). Japan, for example, has been supporting its small and medium sized enterprises since World

War II<sup>1</sup>. The small and medium sized enterprises exist in large numbers, (mainly as subcontractors to large firms) and are regarded as important players in the Japanese economy (Rothwell and Zegveld, 1982).

Because most small businesses start with self employment, it is vital that communities have an accurate understanding of who becomes self-employed and what goes into creating small businesses for policy formulation on employment and income-generating activities in rural areas.

#### **1.4 Problem Statement**

Policy-makers have been seeking alternatives for expanding employment and income in non-metropolitan areas. One strategy that has been suggested is self-employment promotion and small business development. Thus far, policy makers have implicitly assumed that what works in metropolitan areas will work in rural areas as well. Such perceptions about rural economies may be erroneous since rural areas are not "less-populated" urban areas (Buss and Lin, 1990). Rural areas are different, and therefore may require "customized" approaches and solutions to solve their unique problems. In order to understand the potential role and realities of self-employment and small business in rural areas, local-area specific research is imperative (Gladwin, 1985).

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<sup>1</sup> Small and Medium Sized Enterprises (SME) is a generic term used by the Europeans to define those enterprises employing less than 500 employees.

The research that exists on self-employment and small businesses primarily concentrates on national and metropolitan environments. Relatively little research exists on rural non-farm self-employment as an employment and income source. In addition, research to date on self-employment and small business has focused overwhelmingly on the "business entity" and not on the "business-person" or the self-employed individual. Fundamental information on the characteristics of individuals that choose to be self-employed and establish small-businesses—who they are, why they choose to be self-employed, and what factors influence their choice—is lacking. There is very little information on gender differences among the self-employed. More men are self-employed than women, yet women are entering self-employment at a faster rate (SBA, 1988). Many studies concentrate only on men (Fuchs, 1982; Borjas, 1986). Information on these basic issues is crucial for the formulation of an effective policy for rural job generation.

## **1.5 Objectives**

In this study, self-employment will be used to refer to those business-owners who operate their own enterprises for a profit or a fee, whether they have employees or not, and whether or not they are incorporated.

The primary objective of this research is to identify the determinants of the probability that an individual in rural Virginia would be self-employed as opposed to not-self-employed. The secondary objectives are (1) to develop an econometric model

that estimates labor force participation probabilities for individuals, and then determines the factors that influence the likelihood of being self-employed for individuals in rural Virginia; (2) to evaluate the effect a change in these factors has on the probability that an individual will be self-employed; (3) to analyze the model from a gender perspective and to determine if different factors influence the probability that males and females are self-employed; and (4) to compare the demographic characteristics of self-employed individuals and others who are not self-employed.

## **1.6 Data and Technique**

This research uses primary cross-sectional non-farm-household data collected from Virginia's non-metropolitan areas in June 1990 for the 1989 year. Six-hundred households containing 994 household-heads responded. Data were collected by telephone surveys using a random digit dialing procedure.

Descriptive statistics and a model, consisting of two bivariate probit equations, are utilized to determine the statistically significant factors that influence, first, the probability of labor force participation, and then the probability of being self-employed. The two bivariate probit equations, which are linked by a sample selection factor as a correction for possible selection bias, are estimated by the maximum likelihood procedure.

## **1.7 Thesis Organization**

This thesis is divided into 6 chapters. Chapter 2 discusses the basic theoretical framework, which guides the development of the empirical model. This chapter also presents the hypotheses to be tested. Chapter 3 provides the empirical model and introduces the variables used for the research. Chapter 4 discusses data collection and provides a descriptive analysis of individuals participating in the labor market, particularly self-employed individuals, in non-metropolitan Virginia. Chapter 5 presents an analysis of the empirical model, and Chapter 6 presents the conclusions and policy implications of the research.

## **Chapter 2**

### **Theoretical Framework for Labor Force Participation**

This chapter presents a theoretical framework for the analysis of labor allocation decision of individuals. This research applies the framework to identify and analyze the factors that influence the decision to participate in non-farm self-employment. The chapter concludes with the specification of labor force participation models.

#### **2.1 Theoretical Framework**

Economists use the concept of utility to understand consumers' resource allocation processes. Utility is a measure of the subjective satisfaction obtained from purchased consumption goods and services, and leisure. Individuals, households, and firms are assumed to always prefer more utility to less, and have numerous choice-sets determined by individual tastes and preferences. As optimizing entities they make preference/selection decisions to maximize their utility.

Utility maximization assumes that an individual will prefer that combination, or consumption bundle of goods, services, and leisure that offers the highest level of satisfaction. But the individual decision problem is that of constrained maximization

since the behavior of the utility maximizing consumer is restricted by limited resources: income and time.

The total availability of time constrains the amount of labor to be allocated to income-earning and non-income earning activities (leisure, housework and other non-market work) since time cannot exceed 24 hours a day. The restriction imposed by limited money income between attainable and unobtainable utility is determined by prices and tastes. Tastes or preferences are assumed to be fixed in the short run, and prices are assumed to be unaffected by individuals (because individuals are price-takers). Income is generated from employment at the prevailing market wage and from unearned income sources such as interest, dividends, transfer payments, and rent. Depending on these constraints, individuals will choose to allocate their resources, time and income, to the consumption of goods and services and leisure that maximizes utility.

Individuals can "sell" their labor and earn income either through self-employment (earning a proprietor's profit) or through wage-employment (earning a wage or salary) or through a combination of both. As an employee, the wage-rate offered represents the market clearing price of labor; a price determined by the interaction of the labor demanded and supplied. The demand for an individual's labor or wage-offer function is determined by the personal characteristics, including human capital stock of the individual, and the labor market characteristics such as unemployment rate, employment growth-rate, employment opportunities, and in-

dustrial/occupation composition. The amount of labor supplied is influenced by the offered wage which is a function of human capital, household characteristics, and household earnings and non-labor income. Labor supply is found by solving for optimal time allocation in constrained utility maximization.

A formal constrained utility maximization model, which is subject to a budget and a time constraint, can be defined as:

$$\text{Utility } U_{\text{MAX}} = U ( X_i, L ) \quad (1)$$

- L = Total hours of Leisure (non-market time);
- X<sub>i</sub> = Total amount of Consumed Goods and Services; i= 1,..m.

The budget constraint is defined by income earned from wage employment, profits from operating an enterprise(s), and non-labor income, I, (interests, dividends, transfer payments). The amount of wage-employment income (wW) is dependent on the number of hours worked (W) as a wage-employee, and the market wage-rate (w) where the wage is determined by:

$$w = w(M, C) \quad (2)$$

- where: M = human capital stock; i=1..m and
- C = labor market characteristics indicating job opportunities.

Profit ( $\pi$ ) from operating an enterprise(s) is subject to the amount of output produced and sold. The amount of output produced (Q) is dependent on the

production function of the enterprise, which is assumed to exhibit diminishing marginal returns to all inputs, including labor. The production function is given by:

$$Q = Q(S,N;K,M,P) \quad (3)$$

where:      Q = Total amount of output produced;  
              S = Total own labor input;  
              N = Quantity of variable inputs including hired labor;  
              K = Capital invested in the enterprise, considered fixed in the short run;  
              M = Individual's human capital stock, considered fixed in the short term; and  
              P = Production technology, considered fixed in the short run.

A firm maximizes its profit ( $\pi$ ), subject to its production function. Firm profit ( $\pi$ ) is also determined by such factors as the demand function (which determines the price) in the product market, the supply functions in the factor markets including the labor market and wage-rate, and market shares. Factors such as production technology and human capital/personal characteristics of the owner/operator/manager are assumed to be fixed.

The amount of profit ( $\pi$ ) or net firm-income earned from operating an enterprise is then determined by the amount of output produced (Q) and the price of the product (q).

$$\pi = qQ - nN \quad (4)$$

where:      qQ = total revenue; and  
              nN = total cost of inputs.

The budget or income constraint to utility maximization is then given by:

$$xX_i \leq wW + I + qQ(S,N;K,M,P) - nN \quad (5)$$

where:  $X_i$  = total amount of consumed goods and services, where  $i=1,..n$ ;  
 $x$  = cost of  $X$ ;  
 $W$  = number of hours worked as wage-employee;  
 $w$  = wage rate received;  
 $Q$  = total amount of output produced from the enterprise;  
 $q$  = price of output 'Q';  
 $I$  = unearned income (interests, dividends, transfer payments etc.);  
 $N$  = quantity of variable inputs including hired labor; and  
 $n$  = cost of variable production inputs  $N$ .

The Time Constraint is given by:

$$T = 24 \text{ hours} = L + S + W \quad (6)$$

where:

$S \geq 0$  and defined as 'Total hours supplied in self-employment';  
 $W \geq 0$  and defined as 'Total hours worked as wage employee;' and  
 $L \geq 0$  and defined as 'Total hours consumed as leisure.'

## 2.2 Labor Supply

The quantity of labor supplied depends on the market wage-rate, the returns to labor in own-firm, and on the preference and willingness of the individual to supply labor. This preference and willingness depends on the individual's personal characteristics (eg. age, health), household characteristics (such as number of dependents), and unearned income stream, since these influence the individual's value of time (Sumner, 1982).

The individual's marginal value of time, and therefore her/his reservation wage—the wage at which the individual is indifferent to participating or not participating in the labor market—determines the decision whether or not to allocate some fraction of time to labor market activities. If at the margin, the reservation wage (opportunity cost of leisure and non-market activities), exceeds the market wage, then the person will choose not to participate in the labor force, resulting in zero hours of work (Pencavel, 1986). Working augments the individual's earnings and provides the opportunity to consume more of the elements that increase utility. A conceptual model describing labor supply, applicable to both women and men, is specified by (Lass, Findeis, and Hallberg, 1989):

$$\text{Labor Supply} = L(M, F, C, I) \quad (7)$$

where:

- M = The individual's human capital;
- F = Household characteristics;
- C = Local labor market characteristics; and
- I = Household earnings and non-labor income.

### 2.3 Selection of Employment-Type

Once an individual makes the decision to participate in the labor force, the type of employment/class-of-work in which the individual engages is determined by the marginal returns to labor supplied. The individual will choose the activity that offers the highest return per unit of labor input since this enables him/her to reach a

higher level of utility. Thus, given two income-earning possibilities (for example, self-employment and wage-employment), an individual will choose to be self-employed if the marginal revenue product of self-employment is higher than the marginal revenue product of wage-employment:  $MRP_{\text{SELF}} > MRP_{\text{WAGE}}$ .

When the marginal revenue products (MRP) from self-employment and wage employment are equal, the individual will participate in both (becoming a multiple job-holder) in order to maximize income. However, as the marginal revenue product from one source (eg. wage-employment) increases compared to the competing source (eg. self-employment) the allocation of time and labor shift away from self-employment toward wage-employment, consistent with the maximizing principle which assumes, both a budget and a time constraint (Lee, 1965).

In other words, for utility maximization, the optimal allocation of time among the two employment classes and leisure requires that allocation of labor in market and non-market-activities be such that it satisfies the first order conditions (FOC) (zero-slope conditions) of equation 1 (Chiang, 1984).

The FOC of equation 1 can be determined by maximizing utility subject to constraints faced by the maximizing individual. In this case, the budget and time constraints are expressed in equations 5 and 6. Given the maximization of utility function subject to constraints, the lagrangian function (a form which facilitates the

application of the FOC on the maximization problem) can be specified as follows:

$$\text{Max } U = U(L, X) + \lambda_1 (xX - wW - I - qQ(S, N; K, M, P) + nN) + \lambda_2 (T - L - S - W) \quad (8)$$

Where:  $\lambda_1$  and  $\lambda_2$  are the Lagrangian multipliers.

The First Order Conditions are obtained by setting the first partial derivatives of Max U (equation 8 with respect to the time variables to zero. Equations 9 through 11 represent marginal utility of leisure, marginal utility of wage-employment, and marginal utility of self-employment, respectively. Equations 12 and 13 are presented to ensure that the constraints are satisfied.

$$\frac{\partial U}{\partial L} = U'(L) - \lambda_2 = 0 \quad \text{or} \quad U'(L) = \lambda_2 \quad (9)$$

$$\frac{\partial U}{\partial W} = \lambda_1 w - \lambda_2 = 0 \quad \text{or} \quad \lambda_1 w = \lambda_2 \quad (10)$$

$$\frac{\partial U}{\partial S} = \lambda_1 qQ - \lambda_2 = 0 \quad \text{or} \quad \lambda_1 qQ = \lambda_2 \quad (11)$$

$$(xX - wW - I - qQ(S, N; K, M, P) + nN) = 0 \quad (12)$$

$$T - L - S - W = 0 \quad (13)$$

The lagrangian multipliers ( $\lambda_1$  &  $\lambda_2$ ) represent the marginal utility of income and time, respectively. They represent the rate at which the optimal value of the objective function (equation 8) changes in response to a per unit change in the constraints (income and time) (Henderson and Quandt, 1980).

The first three equations (9, 10 and 11) must equal the marginal utility of time ( $\lambda_2$ ) for a maximum to occur (Henderson and Quandt, 1980). In other words, the optimal solution is achieved when all three marginal utilities (leisure, self-

employment, and wage-employment) are equal with the marginal utility of time, that is:

$$\lambda_2 = U'(L) = \lambda_1 w = \lambda_1 qQ$$

Interpreted differently, the ratio,  $\lambda_2/\lambda_1$ , represents the marginal value of time, which at the maximum is shown to be equal to the wage-rate ( $w$ ), which in turn is each equal to the marginal return to labor in own firm and the reservation wage (marginal value of leisure). If the ratios are equal then they imply that the maximizing individual chooses to participate in all activities, allocating equal hours of labor to all in order to maximize utility: leisure, wage-employment, and self-employment. If the individual chooses one activity exclusively over the other (for example, self- over wage-employment, that is,  $W=0$ ), then the equation changes into an inequality ( $\lambda_1 w - \lambda_2 \leq 0$ ) and the optimum is no longer an interior solution. Because equation 10 is now less than or equal to zero, the optimal solution is a corner or boundary solution.

When corner solutions occur, the budget constraint and indifference curve is tangent at the corner, and the first order conditions are less than zero ( $FOC < 0$ ) under the constraints. The Kuhn-Tucker conditions are applicable in the maximization of utility which is subject to inequality constraints (Henderson and Quandt, 1980). The Kuhn-Tucker Conditions ensure that the maximum is reached at the point where the value of the choice variable (hours allocated to wage-employment) is zero because the value cannot be negative. This implies that, when the wage rate ( $w$ ) is less than the

marginal returns to labor in own-firm, the individual will choose to be only self-employed. If on the other hand, the wage rate ( $w$ ) is greater than the marginal returns to labor in own-firm, then the individual will choose to be only wage-employed.

This framework has most frequently been used by authors to analyze labor allocation behavior of farmers. Lee (1965), Polzin and MacDonald (1971), Bollman (1979), and Sumner (1982), for example, all draw from this framework to analyze the farm households' decision to allocate farm resources (time and labor) among farm, off-farm, and non-market (leisure) activities, and to discuss the factors that motivate the allocation process. They all demonstrate that allocating labor among competing activities such as on-farm, off-farm, and leisure is both rational and efficient in terms of resource use.

Lee (1965) using the marginal revenue product of labor examines the allocation of time between farm and non-farm work. He assumes that farms face diminishing marginal returns to labor, and constant returns to labor off the farm. Lee suggests that if the marginal revenue product of labor in farming is below the market wage rate, the farmer will shift labor away from farm work to off-farm work. He further states that part-time farming is a "product of rational decision-making" and asserts that farmers' decisions to work off-farm or pursue part-time farming are both rational and consistent with the goals of income maximization and making efficient use of farm and family resources. Polzin and MacDonald (1971), like Lee, use the

framework to show that an increase in market wages and a decrease in farm income induce more off-farm work since the opportunity costs of farm work and leisure time increase.

Bollman (1979) builds on Lee's work, introducing the concept of the "kinked" demand curve to analyze the labor-supply decisions of farm-operators. Because the operator faces two demand curves for labor (one on the farm and the other off the farm), the total effective demand curve for labor facing the operator is "kinked" due to combining a downward sloping demand curve for on-farm labor and a horizontal demand curve for off-farm labor. The resulting "kinked" demand curve has the "kink" at the point where MRP from on-farm labor is equal to the MRP from off-farm labor. Using this kinked demand curve, Bollman shows that allocation of the farmer's labor resource among farm work, off-farm work, and leisure is consistent with theory, that is, as long as the marginal revenue products (MRP) of all competing activities are equal, the farmer is indifferent to the type of employment (farm or off-farm). His analysis goes a step further, and suggests that one should recognize the implications of commuting costs and travel time to off-farm work especially when these are not negligible, as the offered off-farm wage may not reflect the "true" opportunity cost of the farmer's time. In other words, commuting costs and travel time should figure in the calculation of marginal returns for a more efficient allocation of resources.

Bollman, like Lee, concludes that part-time farming is efficient where off-farm jobs are freely available and where farmers are not constrained by high commuting costs, or the rigidities of the standard work-week (the 8 hour days).

The purpose of the above section was to provide a foundation for explaining the rationality of labor resource allocation to various labor market activities. The decision to apply farm models was motivated by the assumption that these models may be applicable to the study of rural non-farm self-employment as well. Farming is a self-employment activity in the rural areas where the farm-operator's labor is devoted to farm work. In rural self-employment the non-farm firm-operator's labor is devoted to non-farm sector. These studies therefore offer a very close parallel between 'farm and off-farm work decisions' and 'non-farm self-employment and wage-employment work decisions.' Furthermore, there are no 'a priori' reasons to differentiate between the utility obtained from the two types of self-employment—farm and non-farm.

## **2.4 General Model Specification**

When economic decisions are non-marginal, requiring discrete choices like the choice between being employed versus not-employed, the decision is said to be binomial. Binary-choice models assume that individuals have a choice consisting of only two alternatives. The final choice made by individuals depends on the individual's reservation wage, which is determined by the characteristics of the

individual, the household, and unearned income stream. As discussed in the preceding sections of this chapter, individuals make labor participation decisions by comparing their reservation wage ( $r$ ) against the prevailing market wage rate ( $w$ ) net of commuting costs and travel time, and marginal returns to labor in self-employment ( $MRP_{se}$ ). The decision, whether or not to participate in the labor market, is reflected in the following equation, where the decision variable 'D' is dichotomous and takes a value of '1' when the market wage rate ( $w$ ) or marginal returns to labor in self-employment ( $MRP_{se}$ ) exceeds the reservation wage ( $r$ ). D takes on a '0' value when 'r' exceeds 'w' and  $MRP_{se}$  indicating that the individual is better-off not participating in the labor market:

$$\begin{aligned}
 D &= 1 \text{ if } r < w \text{ or } r < MRP_{se} \\
 D &= 0 \text{ if } r \geq w \text{ and } r \geq MRP_{se}
 \end{aligned}$$

Such qualitative choice models have often been used to determine the probability (Pr) that individuals with a given set of attributes will make one choice rather than the alternative. To measure the influence of these attributes (factors that affect 'r,' 'w' and  $MRP_{se}$  on the likelihood of participation in the labor force) the following participation model is specified, where 'Pr(D=1)' is the probability of participating in the labor force, and 'Pr(D=0)' is the probability of not participating in the labor force.

$$\Pr(D=1=\text{Participating}) = F(\text{Human Capital Characteristics, Labor Supply Factors, Labor Market Factors})$$

Where: Human Capital Characteristics:

Age  
Age-Squared  
Education  
Training  
Health  
Sex  
Wage-Job Experience

Labor Supply Factors:

Children under 6  
Children ages 6 - 18  
Marital Status  
Employed Spouse  
Unearned income  
Employed Household members Other than the Spouse

Labor Market Factors:

Rural Location  
Unemployment rate

But participation decisions in a specific employment-type (eg. non-farm self-employment) follows a two-step process, modeled as a two-equation system suggested by Heckman (1979). The participating/not-participating equation, as specified above, estimates the probability of participation in the labor force using variables that influence an individual's probability of either participating or not participating in the labor force.

Those that participate in the labor force either choose to be self-employed or not self-employed. The self-employed/not-self-employed equation, as specified below, estimates those variables that influence the probability of being self-employed as opposed to not-self-employed. The probability, of being or not being self-employed, is reflected in the following equation, where the dependent variable 'D' is dichotomous and takes a value of '1' when the marginal returns to labor in self-employment ( $MRP_{se}$ ) exceed the market wage rate ( $w$ ). D takes on a '0' value when the wage-rate ' $w$ ' exceeds  $MRP_{se}$  indicating that the individual is better-off being not-self-employed.

$$D = 1 \text{ if } MRP_{se} < w$$

$$D = 0 \text{ if } w < MRP_{se}$$

$$\Pr(D=1=\text{Self-Employed}) = F(\text{Human Capital Characteristics, Labor Supply factors, Labor Market Factors})$$

Where: Human Capital Characteristics:

Log of Age  
 Education  
 Training  
 Health  
 Sex  
 Wage-job experience  
 Wage-job experience squared  
 Parent's self-employment background  
 Previous self-employment background

Labor Supply Factors:

Children under 6  
 Children ages 6-18

Marital status  
Employed spouse  
Unearned income  
Employed household members other than the spouse

Labor Market Factors:

Rural location  
Unemployment rate  
Residence

These two probability equations, the probability of participation in the labor force/not-participating in the labor force and self-employed/not-self-employed, will be linked by a selection factor. A more elaborate discussion of this follows in Chapter Three. The analysis of these two regression results are reported in Chapter Five.

## **2.6 Testable Hypotheses**

As mentioned in preceding sections, human capital, household, income and labor market characteristics are hypothesized to significantly affect both the probability to participate or not participate in the labor force, and the likelihood of being self-employed. The specific hypotheses, as listed in the next page, will be tested in this study.

- a) It is hypothesized that men are more likely to participate in the labor force and to be self-employed.
- b) Household characteristics such as the presence of pre-school and school-age children are hypothesized to affect males and females differently. For males, the presence of pre-schoolers are expected to positively influence the

probability of participation in the labor force; for females, the influence is negative. A positive association is hypothesized between the probability of labor force participation and presence of school-age children for both men and women.

- c) Being married, another household characteristic, is hypothesized to positively influence the probability of being in labor force for males; for females a negative association is expected.
- d) Being married is also expected to positively influence the probability of being self-employed for both males and females.
- e) Other household characteristics such as presence of pre-school and school-age children are hypothesized to positively influence the probability of being self-employed for females. For males, the presence of pre-school and school-age children are hypothesized to negatively influence the likelihood of being self-employed.
- f) Household earnings and unearned income are hypothesized to negatively affect participation probabilities, but positively influence the probability of being self-employed.
- g) Local labor market characteristics such as unemployment rate and rural location with fewer job opportunities are hypothesized to be negatively associated with the likelihood of participating, but positively related to being self-employed.

## **Chapter 3**

### **Empirical Model**

This chapter presents the empirical model. The methods of estimation of the two-equation probit model developed in this chapter are discussed first. This is followed by a section which discusses the variables hypothesized to impact, first, the labor force participation decision and second, the employment-type decision of the non-metropolitan population in Virginia. The second equation, the equation of interest in this research, examines those factors that influence, specifically, the probability of being self-employed as opposed to being not-self-employed, once the decision to participate in the labor force has been made.

The two probit equations also contain gender variables since many studies have found male labor responses to be different from female responses (Hersch, 1991; Huffman and Tockle, 1988; Pencavel, 1986; Hill, 1973). Results of such studies show that, for example, wages affect women's work differently than men's because women do more household work and child care and, thus, have more alternative uses of time. These studies also report that despite equivalent human capital characteristics, women's earnings continue to be lower than men's reducing the

probability of participation in the labor market. Given the prevalent differences between the two sexes, this study attempts to identify those factors that motivate males and females to participate in the labor force and to be self-employed. In this study, the self-employment category includes only those individuals involved in non-farm self-employment.

### **3.1 Model Formulation and Estimation**

The primary objective of this study is to identify the factors that influence the decision to be self-employed as opposed to not-self-employed. But prior to selecting the employment-type (self-employment versus not-self-employment), individuals decide whether or not to participate in the labor force. The outcomes of both decisions are dichotomous (taking a value of either 1 or 0). Such qualitative choice equations are often estimated using a probit equation.

Probit equations are utilized in this study because when the predicted values lie within the 0-1 range, the predictions are unbiased (the true regression slope will not be over or under-estimated). The probit equation assumes that the conditional cumulative distribution of the error term is from a standard normal distribution with a zero mean and unit variance. As a result of the above assumption, the probit model with its cumulative probability function, is considered to be the appropriate approach (Pyndyck and Rubinfeld, 1981).

This approach is very similar to the Logit method except that logit models assume a logistic distribution of its error term and differ from the probit method at the tails, which is observable only when using large samples with enough observations at the tails. For the not-so large samples, the tails of these curves approach slowly but never intersect the 0-1 range values (Madala, G.S. 1983).

The probit equations in this study are not estimated by the standard Ordinary Least Squares (OLS), a linear estimation method, because a dichotomous dependent variable violates the homoscedasticity assumption leading to inefficient (no minimum variance) estimates, and to the possibility of predicted values lying outside the admissible range of 0,1.

The probit equations in the analysis are, therefore, estimated by the maximum likelihood estimation (MLE) procedure, a non-linear estimation method, which focuses on maximizing the probability of the observed dependent variable occurring, and exhibits efficiency, unbiasedness, and normality.

Since self-employed and not-self-employed individuals are culled from a sub-sample containing only those individuals who have decided to participate in the labor force, the possibility of sample-selection bias arises. The possibility of sample selection bias arises because entry into the self-employed/not-self-employed equation is restricted to only those individuals participating in the labor market who may have self-selected into the sample because of some additional ability or comparative advantage to be in the labor force or to succeed at employment. Those who choose

not to be in the labor force (individuals with reservation wage exceeding the market wage) are not included in the sub-sample for the self-employed/not-self-employed equation. Because it is difficult to account for all factors relevant to the probability of labor market participation, those individuals participating in the labor force may have different characteristic(s) than those who are not participating. The lack of a variable accounting for this (these) unobservable characteristic(s) of the individuals in the labor force leads to selection bias, which is similar to a missing variable(s).

Not correcting for this selection bias/missing variable could lead to inconsistent estimates of the parameters because it could over-estimate the effects of factors representing those who participate in the labor force, and under-estimate effects for those that are not in the labor force (Haveman, 1987). Estimates obtained from such restricted sub-samples would not be representative of the entire population for which inference is desired. The inclusion of a sample-selection term as a proxy for the unobservable characteristic, therefore, serves to account for the possible non-random nature of the sub-sample (Haveman, 1987).

The simplest procedure to correct for selectivity bias is the calculation of the sample-selection term using the Heckman approach (1979). Heckman uses a two-stage method to obtain the sample-selection term (also referred to as the inverse Mills Ratio -  $\lambda$ ) based on a probit estimated by Maximum Likelihood methods.

The first stage of the Heckman procedure estimates the likelihood of participation in the labor force on the entire sample. Heckman assumes the error

term to have a bivariate normal distribution. And, from the probit equation obtains the estimates of the parameters necessary to construct the inverse Mills ratio ( $\lambda$ ) for each observation. Mathematically,  $\lambda$  is the following (Heckman, 1979, pp.156):

$$\lambda = \phi(Z_i) / 1 - \Phi(-Z_i) = \phi(Z_i) / \Phi(-Z_i)$$

where:  $Z_i = X_{i2}B_2 / (\sigma_{22})^{1/2}$   
 $\phi$  = density function;  
 $\Phi$  = distribution function;  
 $X_i$  =  $i^{\text{th}}$  individual's vector of regressors; and  
 $B_2$  = parameter estimates.

The inverse Mills ratio ( $\lambda$ ) is a function that declines as the probability of an observation being retained in the sample increases ( $\Phi(-Z_i)$ ). When the inverse Mills ratio is small or negligible, the selectivity bias is essentially unimportant, that is, according to Heckman (1976), "the sample selection rule ensures that all potential population observations are sampled" and the parameter estimates have optimal properties (Heckman, 1976, pp. 479). Moreover, when the sample selection term is insignificant, the term behaves like a constant and is correlated with only the intercept (Maddala, 1983).

Heckman's procedure allows information of those excluded from the sample to affect estimates of the parameters underlying the probability of being self-employed or not self-employed. Furthermore, the method gives consistent estimates that can be used as initial values in the iterative solution of the likelihood equations (Maddala, 1983).

For this research, per Heckman, the first equation of the two-equation model estimates the decision whether or not to participate in the labor force. The estimated value of  $\lambda$  from the labor participation equation is then included as a regressor in the second equation, fit over the selected sub-sample of only those individuals participating in the labor market to correct for individual differences in participation probabilities. The second probit equation, with  $\lambda$  included as an explanatory variable, then evaluates the likelihood of an individual being self-employed. The two-equation model is estimated using LIMDEP, an econometric program.

### **Variable Specification**

Choice of variables for empirical analysis is guided by theory and previous studies, which suggest factors that may affect labor supply decisions. For instance, research on non-farm self-employment (Quinn, 1980) shows that self-employed individuals are less constrained by institutional rigidities like vacation time and length of week/day; Rees and Shah (1986) and Evans and Leighton (1989) report the importance of parental background on the decision to become self-employed. An in-depth analysis of the variables affecting labor force participation and employment selection decisions is conducted in the next sections.

These "labor participation" variables are grouped, for both equations, under such general categories as: human capital characteristics, household characteristics, income characteristics, and labor market characteristics. The approach taken in this

section is to first identify variables specific to each equation, and then to define and discuss them in relation to their influence. Gender specific variables are included where applicable, so that we may better understand the ways in which various factors affect the probability that males and females are self-employed.

The variables included in the two probability (Pr) equations are presented below:

Pr(Participating) = F(Age, Age-Squared, Dummy Health, Education, Education (Male), Dummy Training, Years of Wage-Job Experience, Dummy Sex, Dummy Marital Status, Dummy Marital Status (Male), Dummy Children under 6, Dummy Children under 6 (Male), Dummy Children 6 to 18, Dummy Children 6 to 18 (Male), Unearned Income, Dummy Employed Spouse, Dummy Employed Spouse (Male), Dummy Other Employed Household members, Unemployment Rate, Dummy Rural)

Pr(Self-Employed) = F( Log of Age, Dummy Health, Education, Education (Male), Dummy Training, Years of Wage-Job Experience, Years of Wage-Job Experience-Squared, Dummy Previous Self-Employment, Dummy Parents' Self-Employment Background, Dummy Residence, Dummy Sex, Dummy Marital Status, Dummy Marital Status (Male), Dummy Children under 6, Dummy Children under 6 (Male), Dummy Children 6 to 18, Dummy Children 6 to 18 (Male), Unearned Income, Dummy Employed Spouse (Male), Dummy Employed Spouse, Dummy Other Employed Household Members, Unemployment Rate, Dummy Rural, Sample-Selection term)

The two equations are connected by the self-selection term (inverse Mills ratio), a variable derived from the first (Labor-Participation/Not-Labor-Participation)

probit equation. This self-selection factor is then included as a regressor in the second (Self-Employed/Not-Self-Employed) probit equation as a correction factor for possible selection bias (Heckman, 1976).

### **3.2 Labor Force Participation Equation**

Most studies on labor participation utilize the human capital model, which proposes that investments individuals make in themselves increase their productivity. The amount of human capital possessed by an individual influences not only the earning capacity, but also the marginal value of market and non-market activities which define the level of the individual's reservation wage. Those individuals with greater endowments of human capital are expected to earn a higher wage, which in turn increases the individual's opportunity cost of non-market activities. The higher the opportunity costs of non-market activities, the stronger the inducement for the individual to participate in the labor market. The most commonly used human capital variables are age, health, education, skill training, labor market experiences, sex, and marital status.

Other factors influencing labor force participation decisions are household characteristics such as number and age of children and dependents; income characteristics represented by variables such as unearned income, spouse-income, and income of household members other than the spouse; and labor demand characteristics such as the unemployment rate and location.

### 3.2.1 Human Capital

#### Age

Age is an important determinant associated with the probability of labor force participation. Age is often used as a proxy for the accumulation and deterioration of job-skills—a factor affecting job performance and productivity, and therefore the likelihood of employment (Lass, et al., 1989; Reddy and Findeis, 1988). Until a particular age, older individuals are more attractive to employers as their age is perceived to represent a certain level of energy, motivation, maturity, and potential to perform more complex tasks. After that, productivity is expected to begin its descent, usually before retirement (Bowen and Finegan, 1969). Consequently, age is expected to have a positive association with labor participation, especially during the early and middle part of the life-span, ages 25-54 (Deseran et al., 1984). This descent is usually captured in labor participation models in a quadratic form (eg. age-squared) to illustrate the curvi-linear effects of age on employment decisions. The negative effect of advancing age on employment occurs for several reasons: preference for more leisure as individuals age; and decreased ability (poorer health, loss of stamina, difficulty in learning new skills, etc.) to compete effectively in the labor market and command a competitive wage-rate (Barkauser and Quinn, 1990). In this study, both age and age-squared are recorded as continuous variables and measured in years. A positive sign is anticipated (for both men and women) for the age variable; a negative

sign is expected for age-squared implying that after a certain age individuals are less likely to be in the labor force.

## **Health**

Investments in health improve people as productive agents. Individuals without work-inhibiting health problems are more likely to join the labor force since they have less impediments to contributing productively. Hill (1973) and Sumner (1982) indicate that health problems impair one's ability to work leading to low productivity, which discourages employers from hiring employees with health problems, undermines the growth and satisfaction in one's job performance and often leads to early retirement or cessation from labor force participation. Scott et al. (1977) emphasize the importance of the health variable especially in rural areas where the provision of health care is not on par with urban areas. In a study of Southern Rural Labor Markets, they found that poor health was one of the major factors inhibiting labor force participation. Health problems are therefore hypothesized to be negatively associated (for both sexes) with labor force participation.

In this study, the health variable is defined as a dummy variable and takes a value of one if the individual does not have any work-inhibiting illnesses, and a zero otherwise. A positive relationship is postulated between labor force participation and good health.

## Education

The most prevalent measure of human capital is education. The human capital model proposes the basic idea that education is an investment of current time for future pay. If education enhances an individual's productivity, those with more education will have greater access to high-paying occupations and receive higher wage rates within any chosen occupation, which encourages labor force participation (Becker, 1980; Rungeling, 1977). Previous studies point out that higher education serves as an indication to employers of an individual's ability, intelligence, trainability, and motivation—criteria implying high productivity, which in turn increase an individual's employment potential (Mincer, 1974; Hill, 1973). People with less education, however, have greater difficulty competing in the labor market. As a result of their inability to find and hold a job, individuals with lower education are discouraged from participating in the labor force. Therefore, given the general finding that more education leads to higher returns, education is anticipated to be positively correlated with labor force participation for both men and women. The positive relationship, however, is expected to be stronger for males than for females. Although, Huffman and Tockle (1988) found the marginal effect of schooling on wages to be larger for females than males, but, on average, the absolute dollar value increase in wage was still larger for males. Hersch (1991) and Scott (1977) found similar results, which indicate that the average male wage was over 40 percent higher

than female wage. In this study, education enters the model as a continuous variable and is measured in years of formal schooling.

### **Training**

Training programs, at either the work-place or in vocational schools, enhance an individual's skills. Training, like education, is an element of the human capital model, and investments in it are expected to increase productivity and consequently the wage-rate, as a result of the accrued human capital. Mincer (1974) estimated that the rate of return to on-the-job training was approximately 10 percent.

This study defines training as a dummy variable, incorporating both on-the-job-training as well as vocational training. This dummy variable takes the value of one if the individual has had any on-the-job training or vocational training, and a zero otherwise. A positive relationship between this variable and the probability of labor participation is expected for both sexes.

### **Wage-Job Experience**

Human capital theory argues that labor market experience increases one's stock of productivity-augmenting skills. Skills accumulated through wage-job experience directly contribute to job productivity and thereby the wage-rate. There are, however, several studies that have found that longer labor market experience does not necessarily translate automatically into productivity growth. Medoff and Abraham

(1980) point out that during periods of rapid technological change, skill obsolescence negatively impacts productivity with the passage of time. The authors, nevertheless, concede that earnings may be positively associated with experience, because of the prevalence of institutional arrangements such as seniority provisions in employment practices. Regardless of the reasons, the ultimate outcome is that with more wage-job experience, earnings are higher (for both sexes) thereby making the opportunity costs of staying out of the labor market greater. Thus, the probability of participation in the labor force is higher for those individuals with more job experience. Wage-job experience, a continuous variable, is measured in years, and is expected to be positively associated with the probability of being in the labor force.

## **Sex**

The sex variable is included to capture differences between male and female labor force participation. Past studies have shown that sex affects the labor force decisions of individuals by affecting the wage-rate they receive. A comparative study of earnings (and education) by sex demonstrates that women earn less than men with similar characteristics (Hersch, 1991; Holzer, 1990; Scott, 1977). In Southern rural labor markets, Scott et al. (1977) found that the average male wage was higher than the average female wage. Studies also report that those females participating in the labor force are, in general, more likely to be employed in peripheral and secondary jobs, in part-time jobs, and receive lower pay than their male counterpart (Deseran et

al., 1984; Cautley and Slesinger, 1988). Therefore, although both sexes are active in the labor market, males are expected to have a higher likelihood of finding employment when compared to females (Rungeling et al., 1977). Thus, in this study, a positive relation is anticipated between being male and labor participation. Sex is defined as a dummy variable taking a value of 1 if the individual is male, and 0 if female.

### **3.2.2 Household Characteristics**

#### **Marital Status**

The decision to participate in the labor force has also been found to be influenced by the marital status of individuals. Since married individuals are assumed to have greater financial and family responsibilities than single individuals, the married are more likely to participate in the labor force (Scott et al., 1977). However, the literature also points to differences between men and women so marital status is crossed with sex for the analysis.

For married men, marriage traditionally translates into responsibility and so the value of income becomes higher than leisure, thus men have a stronger need to participate in the labor market for the needed income (Bowen and Finegan, 1969).

Single men, on the other hand, have fewer family responsibilities and thus do not have as strong a need to participate in the labor market as married men. However, single men, in order to meet their minimal needs and support themselves, have a reason to actively seek work as well.

For married females, however, the employment decision is slightly different. Studies like Holzer (1990) and Herz (1988) show that on average, married women are more likely to be out of the labor force, since household-responsibilities tend to increase the reservation wage for females. Furthermore, Lundberg (1988), Shackett and Slotje (1986) and Mincer (1962) point out that an increase in the husband's income tends to reduce the labor supply of wives, due to an income effect. However, in cases where the husband's income is considered insufficient or transitory, wives seek work.

Single women, on the contrary, are found to have a higher labor force participation rate than married women due to several reasons: single individuals (both men and women) don't have a spouse to rely on; and single females tend to have fewer alternative uses of time than married women leading to, perhaps, a stronger taste for market work, and thus, to better earnings opportunities over time (Bowen and Finegan, 1969).

For this study, a positive relationship is expected between married males and labor participation; a negative relationship between married females and labor force participation is posited. Married and DMarrysx are two dummy variables representing married females and married males, respectively. The Married variable take a value of one if the individual is married, and DMarrysx takes a value of one if individual is male and married, and a zero otherwise for both variables.

## **Children Under 6 years of age**

Studies of labor supply demonstrate that the presence of young children in a household has different effects on males and females. Presence of young children is expected to influence labor force participation decision in two ways: first, by increasing the amount of work done at home; and second, by increasing the family's demand for income. The overall net effect of children under six on females is that it raises their reservation wage-rate while lowering the opportunity cost of home work since women generally assume responsibility for the home and child-care. As a result, females with pre-school children (under six years old) are less likely to seek employment because pre-school children require more supervision but require fewer expenses such as school books, school clothes etc. (Deseran et al., 1984; Tockle, 1988; Scott, 1977).

The positive effect of pre-school children on men's labor supply decision is due to the increased demand for income as a result of the increased number of dependent household members. Thus, presence of children under six was found to induce labor force participation among men (Deseran et al., 1984).

A negative relationship is generally anticipated between female labor force participation and children under six, despite the increasing availability and continual use of substitutes such as child-day-care centers, domestic help and similar services. A positive association is postulated between children under 6 and male labor force participation.

For this study, the dummy variables, children under 6, and male with children under 6, take a value of one if pre-school children are present; zero otherwise.

### **Children 6 to 18 years of age**

Households with older children are more likely to participate in the labor force because older children require less close supervision, provide assistance for household tasks, and the expenses of rearing children increase as they grow older (Bowen and Finegan, 1969). As already mentioned, the presence of pre-school children is expected to have a negative impact on female labor force participation, while school-going children between 6 and 18, is expected to positively impact the propensity to seek market-work as the demand for income increases. The effect on male participation is also positive as the pressure of providing for the needs of children increases as they grow older. As Scott et al. (1977) shows, household-heads have a higher probability to seek employment as a way to meet the financial responsibilities imposed by the presence and therefore, the needs, of school going children.

Thus, a positive relationship is expected for both male and female labor force participation and children between 6 and 18 years of age. But, the effect is expected to be less strong for females with school-age children than for males, given that school-age children do require some supervision, and add to the amount of work done at home. The variables, children 6 to 18, and male with children between 6 and 18, take a value of one if school-age children are present; zero otherwise.

### **3.2.3 Income Characteristics**

#### **Unearned Income**

Unearned income, that is, income from non-labor sources (due to the income effect), is expected to influence an individual to choose more leisure (given that leisure is a normal good), and less market-work. The work-leisure indifference curve analysis suggests that those individuals with a positive and consistent unearned income stream are less likely to seek work. Increases in unearned income sources are expected to increase the marginal value of leisure and therefore the individual's reservation wage, which then decreases the probability of labor force participation for both men and women. Lass, et al. (1989) and Sumner (1982) both included income from other sources besides earnings to capture the family's financial characteristics. Their results indicated a negative relationship between unearned sources and labor force participation. For this study, this variable is measured in dollars and a negative association is anticipated between unearned income and probability of being in the labor force.

#### **Employed Spouse**

An employed spouse, serving as a proxy for spouse's earnings, is assumed to increase the marginal value of time and therefore the individual's reservation wage, since the potential infusion of additional income lowers the likelihood of labor force participation, especially for females. This income effect is expected if leisure is a normal good.

Studies such as Shackett and Slottje (1986), Lundberg (1988), and Mincer (1962), indicate that for females, the presence of an employed spouse tends to have a negative association with labor force participation because a higher family income provides less of an incentive to participate in the labor force. For males, however, the presence of employed spouse (implying spouse earnings) does not appear to have a significant effect on male labor participation (Lundberg, 1988).

In this study, males with employed-spouse are expected to be positively associated with labor force participation, while a negative relationship is anticipated for females with employed spouses and labor participation. Employed-Spouse is recorded as a dummy variable, because in many cases information on spouse employment was reported but earnings were not. The variables, employed spouse and male with employed spouse, take a value of one if spouse is employed and a zero otherwise. The variable also takes a value of zero if the individual has no spouse.

### **Employed Household Members Other than Spouse**

The variable, employed household members other than the spouse, serves as a proxy for additional earnings, and is assumed to increase the marginal value of leisure for individuals since income contributions from other household members are similar to contributions from unearned income. Since an extra source of income is an asset upon which the household draws to spread the responsibility of maintaining household expenses, it decreases, somewhat, the pressure on income demand, and therefore on the need to seek employment.

This variable is defined as a dummy variable that takes a value of one if another employed household member is present, and a zero otherwise. An inverse association is expected for both males and females between this dummy variable and the probability of labor force participation.

### **3.2.4 Labor Demand Characteristics**

#### **Unemployment rate**

The unemployment rate in the county serves as a proxy for labor demand as it reflects the area's employment opportunities and the conditions that affect offered wage rates. As Lass et al. (1989, pp.153) report, "greater levels of unemployment should result in lower levels of employment participation... due to excess supply in local labor markets." Tokle and Huffman (1988) show that the expected wage rate decreases when the unemployment rate increases. In almost all studies, the effect of the unemployment rate on labor market participation is negative. In particular, Holzer (1990) reports labor force participation falling 1-2 percent for every percentage point increase in the unemployment rate.

The effect of the unemployment rate is similar for females and males—both are expected to show a negative association with labor force participation. And as jobs become harder to find, the discouraged worker effect (the reluctance to look for work when the job market gets tighter) is observed to set in for men as well as women (Bowen and Finegan, 1969, Manser and Brown, 1979).

Unemployment rate is entered in the model as a continuous variable, and is measured as a percentage. An inverse relationship is expected between higher rates of unemployment and labor force participation, regardless of the sex.

### **Regional Labor Market Variables**

Location variables are included in labor force participation models as another measure of the demand side of the labor market. In many studies, these regional variables are included to reflect the regional/local labor market conditions, and capture the degree of urbanization, and therefore the opportunity of employment: the more urban the region, the more positive the effect on participation. Rural areas generally have poorer job opportunities (Gould and Saupe, 1989; Lass et al., 1989; Findeis and Reddy, 1988).

Since geographic location ie. proximity to urban centers has bearing on the job opportunities, a negative association is expected between participation and the rural residence dummy variable. This variable takes a value of one if the individual resided in a non-metropolitan county with a center city of less than 20,000 people (counties with a Beale Code of 6,7,8 or 9); otherwise the variable takes a value of zero (Butler, 1988).

### 3.3 Employment-type Selection Equation

Given the nature of the labor market, those individuals who are employed generally fall into two categories: wage-employees working for a wage/salary, or self-employed individuals working for themselves for a profit. A small percentage work in both categories; in 1983, approximately 3% were both wage- and self-employed (Lichtenstein, 1986). In this study, however, individuals are defined to be either self-employed (if person is only self-employed, or is both self-employed and wage-employed) or not self-employed (if person only holds a paid job).

One of the objectives of this research is to determine the factors that influence the choice of employment-type i.e. the decision to be either self-employed or not-self-employed. Characteristics of self-employed individuals or small business owners have been discussed widely over the years. Studies indicate that factors and traits such as age, health, education, on-the-job/vocational training, sex, marital status, labor market experience, previous self-employment experience, parents' employment background, presence of children, unearned and other sources of income, confidence, the need to control or direct, self-reliant attitude, etc. play an important role in distinguishing the self-employed from the wage-employed. Given the limited research on the topic, many of these variables appear to be based on intuition rather than on the outcome of formal research. An attempt is, therefore, made to identify some of the determinants and ascertain their level of influence on the probability of employment selection. Towards that end, this research uses readily available and

measurable characteristics rather than attitudes and personality traits which are more difficult and costly to determine. The following section discusses those variables hypothesized to be important in explaining the decision to be self-employed. Where applicable, appropriate gender variables have been included.

### **3.3.1 Human Capital**

#### **Age**

Findings from several studies confirm that older individuals have a higher propensity of being self-employed. The SBA (1986) finds that the self-employed are older than the wage-employed; more than 42 percent of the full-time, unincorporated self-employed were 45 years and older, while 29 percent of full time wage-employees were 45 years and over. Among the part-time self-employed, 13 percent were over 65 years, while among the part-time wage-employed 4.7 percent were 65 years and over. Evans and Leighton (1989) found that the rate of self-employment slowly increased with age until about age 40, after which it remained constant until about age 60. On the other hand, Fuchs (1982) and Quinn (1980) found that the probability of self-employment among older white males ages 58 and over increased with age.

One of the reasons for a positive relation between self-employment and age is that, self-employment is seen as an attractive and easier way for older workers to partially retire and still maintain continuity, flexibility (in work hours), and independence in work activity (Quinn, 1980; Fuchs, 1982). Furthermore, since older workers

are more likely to have the financial resources (including a proven credit history which somewhat minimizes risk in the eyes of financial institutions), the know-how, established professional and social contacts and connections (in terms of information networks), and experience of dealing in the "real" world to start a business than younger workers, workers' age is positively associated with self-employment.

Stated differently, for every group of entrants into self-employment, a large percentage exit every year, but the small percentage that remain in self-employment add to the pool of previous entrants who have continued to be self-employed over the years. The rate of growth of entry into self-employment is reported to pick up, and at the same time, the rate of exit is reported to decrease sharply as people near retirement age thereby increasing the probability of self-employment over time. In this study, the log of age is used to capture the life-cycle effects on the probability of being self-employed. The log of age illustrates the initial low probability which increases with age and increases more rapidly as individuals enter self-employment at around retirement age.

In this study, log of age is a continuous variable measuring age in years. A positive association between log of age and the likelihood of being self-employed is expected. No gender difference is anticipated.

## **Health**

Health is also regarded as an important variable in the determination of self-employment since an individual's health may influence the marginal value of time.

Those with work-inhibiting health problems who find it difficult to be hired as an employee, may find self-employment to be an alternative to unemployment. Evans and Leighton (1989) and Fuchs (1982) report that disadvantages like ill-health may force individuals out of the wage-labor market where expectations to be competitive are high (and where they may not produce at the same rate as a healthy person), and into self-employment. Borjas (1986) also found a positive impact of poor-health on self-employment propensities. Since self-employment provides the individuals with health disabilities the flexibility to set the pace and hours which best fit their needs, self-employment is viewed as a source of employment for these individuals.

This study defines good-health, a dummy variable, as not having any work-inhibiting health problems. As a result, we expect the dummy variable to be negatively correlated with self-employment for both sexes, since healthy workers are more likely to be hired and less likely to be pushed out of wage-employment.

## **Education**

Human capital stock in the form of formal schooling affects the productivity of the worker. Education also enhances an individual's managerial, organizational, and technical skills needed to successfully operate a firm. Evans and Leighton's (1989), Rees and Shah's (1986), and Borjas (1986) reveal that the probability of being self-employed is higher for those with higher education, even after controlling for occupations like doctors, engineers, lawyers, who tend to be self-employed. Evans

and Leighton (1989) show that the returns to education in self-employment are higher than in wage-employment (10.3% versus 7.15%). Rees and Shah (1986) suggest that education acts as a filter, such that the higher educated are more likely to be uniform in their abilities. They suggest that the educated tend to be better informed and more efficient in assessing self-employment and market opportunities. Borjas (1986), in his study of self-employment and male immigrants, found that higher levels of education were positively (and significantly) correlated with the probability of being self-employed. Borjas (1986) suggests that higher levels of education increase the individual's organizational or managerial talents necessary for operating an enterprise. The SBA (1986) too reports that the self-employed as a group are better educated than wage-employed, indicating the positive effect of education on self-employment.

In contrast, farm and off-farm studies show an opposite effect of education on farming, a self-employment activity in the agricultural sector. Numerous farm/off-farm studies suggest that those individuals with higher education tend to be in off-farm employment, mostly wage-employment, rather than in farming (Sumner, 1982; Reddy and Findeis, 1988). Part of this can be attributed to the structural changes that have recently taken place in the agricultural sector. These changes have led to a decline in the returns to farm work. The opportunity cost of remaining on the farm is higher for the well-educated so they seek off-farm work.

Self-employment is anticipated to be positively correlated with higher levels of educational attainment for both sexes. But, as reported by the SBA (1986) the

positive relationship is not as strong for women as for men. Education is entered as a continuous variable measuring years of educational attainment.

### **Training**

On-the-job training and vocational training are included in many labor supply studies because such training enhances skills and raises the productivity level, leading to higher wages. On-the-job training is generally job-specific, while vocational training tends to be oriented to production, not management skills thus not providing some of the skills needed for self-employment. Those who participate in these types of skill enhancement programs are expected to have a higher marginal value in the work they are trained for. Gould, et al. (1989) in a farm/off-farm study, found that participating in any on-the-job training increased the participant's marginal value of wage work time. It is suggested that such training decreased the probability of farming (ie. self-employment) as it expanded and strengthened job specific skills necessary for wage employment.

In this study, training, a dummy variable, represents both on-the-job training and vocational training; it does not differentiate between the two types of training. The variable takes a value of one if individuals (both sex) have either one or both type of training; zero otherwise. A negative relation is expected between on-the-job/vocational training and the probability of self-employment.

## Labor Market Experience

In this study, two types of labor market experiences are specified, previous self-employment and wage-job-experience, to differentiate between the variables' effect on self-employment. Various studies indicate that self-employment propensities increase with prior labor market experience (Balkin, 1989; Borjas, 1986). Balkin reports that an extra year of labor market experience has a greater impact on the probability of being self-employed than when one has fewer years of it. Specific experience, such as previous self-employment experience, was found to positively affect the probability of being self-employed (Evans and Leighton, 1989; Fuchs, 1982). The experience gained is expected to sharpen and increase one's knowledge of, not only business operations, but also of social and financial networks, and market information and opportunities. Previous self-employment is assumed to expose one to the realities of the market place and the factors that influence the success or failure of a business entity. Studies conducted by the SBA (1983) show that the probability of being self-employed is greater for those with previous self-employment and related labor market experiences. In farming, Lass et al. (1989) and Sumner (1982) indicate that farm-specific experience raises the shadow value of farm labor which decreases the likelihood of participation in wage-employment, and increases the probability of self-employment (ie. farming).

Self-employment experience accumulated over time is specified as a dummy variable, taking a value of one if respondents have had previous self-employment

experience, and a zero otherwise. The variable is expected to be positively associated, for both sexes, with the probability of being of self-employed.

Prior wage-employment experience, on the other hand, is found to have a much smaller return in self-employment than in wage-employment (Leighton and Evans, 1989). Wage labor experience is found to be influential for wage-employment, as it raises the shadow value of wage-labor; it does not appear to be an important factor in explaining self-employment selection.

Individuals with stable wage-jobs or with lower than average work experience are less likely to enter into self-employment (Evans and Leighton, 1989). This is because the opportunity cost of switching into self-employment is higher for those with stable wage-jobs unless the self-employment opportunity is unusually good to entice them to switch employment. SBA (1988) reports that people with more years of work experience are more likely to be self-employed because they are more likely to have acquired assets and work experience. In addition, having more than the average years of wage-employment experience had a positive impact on the likelihood of being self-employed (Fuchs, 1982). The positive effect of previous wage-employment experience on the probability of self-employment is captured by the wage-job-experience-squared variable. In this research, both wage-job experience and wage-job-experience-squared are measured in years, and are anticipated to be negatively and positively associated with self-employment, respectively. No gender differences are anticipated.

## **Sex**

Sex is included to capture the differences between male and female participation in self-employment. The self-employment rate is much higher among men than for women, although, the rate of increase is higher for women than men (Balkin, 1989; SBA, 1986; Becker, 1984; Fain, 1980). One reason for an increasing number of women entering self-employment could be due to the flexible hours of self-employment. Another could be that many of these businesses operate out of the home (Lichtenstein, 1990). Furthermore, the fact that women have mostly been assigned to low-paying, part-time, peripheral jobs could also be a factor. As mentioned, wage-employed individuals in low paying jobs are more likely to be self-employed than the highly compensated individuals, since self-employment provides a means of living for the unemployed and low wage workers (Balkin,1989). Thus, it would not be surprising to find women attracted to self-employment.

This study specifies the sex variable as a dummy variable taking a value of one for males and a zero to represent females. Even though, many studies indicate an increasing rate of participation in self-employment for women, the probability of being self-employed is still higher for males. Hence, self-employment is expected to have a stronger positive association with males than with females.

## **Parents' Self-Employment Background**

A parent's occupation indicates the kind of environment an individual has been exposed to. Exposure to self-employment activities can increase the probability of

self-employment in an individual, assuming s/he learned the "tricks of the trade" from the parents. Evans and Leighton (1989) found that individuals whose parents, especially fathers, were managers or self-employed in the non-farm sector were more likely to be self-employed.

The variable 'parent's self-employment background,' a dummy variable, accounts for the parents' self-employment (both farm and non-farm) activities. Thus, we expect the variable to have a positive effect on the probability of becoming self-employed.

### **Residence**

Bradshaw and Blakely (1983) report that a high proportion of newcomers to rural areas started their own businesses. They found that approximately 42 percent (of newcomers) started their own enterprises within a few years of residence. Self-employment was the major source of income for 31 percent of these individuals, while it served as a secondary income for another 5.3 percent. Based on the above finding, lifetime residents—those who grew up where they currently live—are hypothesized to be negatively associated with self-employment as they are less likely to be self-employed than those who "move around."

### 3.3.2 Household Characteristics

#### **Marital Status**

An individual's marital status appears to be an important factor in the process of employment decision-making. Married individuals are found to be over-represented among the self-employed (SBA, 1986). It is hypothesized that married persons will be more prepared to take risks, and may find the support of a family to lessen the demands of self-employment (Rees and Shah, 1986). Borjas (1986) also reports that married persons have a greater propensity to become self-employed than single persons. He found that especially married men had a higher self-employment rate than single men, "due perhaps to the fact that family-owned businesses have an advantage over other firms in solving the shirking problem" (Borjas, 1986, pp.494).

Findings for women are similar to men's. Self-employment seems to provide married women the opportunity to work in the house enabling them to maintain house and business responsibilities at the same time. But, married men are more likely than married women to be self-employed, even though the rate of increase is higher for women than men (SBA, 1986). Thus, for this study, the dummy variable representing marital status takes a value of one if the individual is married and a zero if s/he is not-married (i.e. single, widowed, or divorced). We anticipate a strong positive relation between the marital status dummy variable and the probability of self-employment for male; for females, the positive association is not expected to be as strong.

### **Children Under 6 years of Age**

Most researchers have found the presence of dependents to influence the probability of self-employment significantly, especially farming (Lass et al., 1989; Gould et al. 1989; Reddy and Findeis, 1988). Male parents who, under the pressure to provide a stable income stream, are more likely to participate in off-farm employment than remain in farming ie. self-employment (Lass et al., 1989). For female parents, the findings are reversed: women with pre-school children are more likely to be self-employed in the farm sector than wage-employed off-farm (Tokle and Huffman, 1988). These studies indicate that while men appear to be "reacting to the financial burden of children" by seeking wage-employment (versus self-employment: farm or non-farm), women find their value in home production raised, and seek, if needs be, to be self-employed at home, as younger children (pre-schoolers) demand more time and personal care (Lass et al., 1989; Deseran et al., 1984).

Consequently, due to the constraint imposed by young children, this study expects children-under-6-years, a dummy variable representing pre-school children, to be positively associated with the probability of being self-employed for females as the presence of young children allows them to combine both activities; for males with children under 6 years, the relation is expected to be negative.

### **Children between 6 and 18 years of Age**

The presence of school-age children demands less parental time and more financial resources due to the expenses associated with school activities (Findeis and

Reddy, 1988; Deseran et al., 1984). Male parents tend to work in areas with a more stable source of income for example in wage-employment, with female parents following suit, in order to meet the rising financial needs of school-age children (Deseran et al., 1984). Lass et al. (1989), however, found that school-age children significantly reduced off-farm (wage-employment) work for the spouse, while it increased hours worked (wage-employment) by the operator. Findeis and Reddy (1988) also found the marginal effect of school-age children on the probability of wage-work for operators to be positive since older children can provide labor resources to substitute for farm operator labor. The effect of older children on the likelihood of wage employment for spouses was found to be negative, but statistically insignificant at the five percent alpha level.

Based on the farm/off-farm studies already mentioned, and recognizing the need for some care required for older children, combined with the support that older children ages 6 to 18 can provide for home-based business, we anticipate a positive association between the dummy variable representing the presence of school-going children of 6 to 18 years of age, and the probability of self-employment for women. For men, a negative relationship is expected based on the argument that men need a more stable income source to provide for the family.

### **3.3.3 Income Characteristics**

#### **Unearned Income**

The consistently positive correlation between self-employment and unearned

income (dividends, interest, transfer payments, rent, etc.) results from lowering the risk of self-employment and providing the capital needed for a business. Evans and Jovanovic (1989) report that the wealthy are more inclined to be self-employed because they possess the essential capital required to fund business-startups. Evans and Leighton (1989), report that the probability of switching into self-employment increases with net worth, measured by assets and by the difference between family earnings and unearned income. Lass et al. (1989) and Gould and Saupe (1989) included income from other sources besides earnings, to capture the farm family financial characteristics. Their results indicate that such sources reduced the probability of working in the off-farm market, and gave the farm-operators more flexibility in doing what they pleased. As a result, sources of non-work income are hypothesized to have a positive effect on the decision to be self-employed.

Unearned income, which is measured in thousand dollars, represents all non-work sources of income. A positive relationship is expected between unearned-income and the probability to be self-employed.

### **Employed Spouse**

The earnings of a spouse are hypothesized to have effects similar to unearned income on the probability of being self-employed. Since spouse-earnings provide an additional source of income/capital, it allows the other spouse to venture into riskier self-employment activities. As Balkin (1989) points out, the presence of an employed

spouse provides a steady stream of income and also acts as "insurance" against the risk of fluctuating self-employment income.

Employed-Spouse is recorded as a dummy variable because in many cases information on spouse employment was reported but information on earnings were not. Employed spouse, therefore, represents a source of additional income, and the affect on self-employment is similar to that of unearned income. Like unearned income, this variable is anticipated to increase the probability of being self-employed for both males and females. The increase, however, is expected to be stronger for women with an employed spouse. As Lichtenstein (1990) points out, the advantage of working from the home enables women to maintain both business and household activities. The dummy variable takes a value of one to indicate the presence of employed spouse, and a zero otherwise.

### **Employed Household Members Other than the Spouse**

The presence of income sources, other than the spouse's earnings and unearned income, is expected to have effects similar to unearned income and spouse's employment income, on the probability of being self-employed. Additional sources of income are assumed to spread the responsibility of providing for the family, thereby freeing the individual to pursue other activities like self-employment. In this study, we define a dummy variable if additional household members other than the spouse are employed. The dummy variable takes a value of one to indicate the presence of

such income and a zero otherwise. We hypothesize that this dummy variable, like the unearned income variable, will be positively associated with the probability of being self-employed. No gender difference is anticipated.

### **3.3.4 Labor Demand Characteristics**

#### **Unemployment rate**

Labor demand factors are important in the determination of household labor supply. The unemployment rate, for example, approximates an area's labor demand conditions that affect offered wage rates (Gould and Saupe, 1989). The unemployment rate of an area indicates the level of employment opportunities which influence labor allocation decisions. Lichtenstein (1990) reports that unemployed people are twice as likely to start businesses as are wage-employees. Along the same line, Evans and Leighton (1989) report that in addition to unemployed individuals, lower-paid wage workers and men who change jobs frequently are more likely to be self-employed, all else equal. In areas where individuals continuously face low wages and unemployment, more people enter self-employment activities as business entry is relatively easy (Lichtenstein, 1990). It is hypothesized that the sign of the unemployment variable, measured as a percentage, will be positive. A rise in the unemployment rate is expected to increase the probability of being self-employed for both men and women.

## **Regional Labor Market Variables**

Location variables are included to measure the demand side of the labor market. In many studies these variables have been included to capture the vitality of the local labor markets (Lass et al., 1989). It is commonly suggested that the more urban a region, the larger the number of jobs available. Rural areas have limited wage-job employment opportunities than urban areas (Gould and Saupe, 1989; Lass et al., 1989). Self-employment should then be more prevalent in rural than urban areas given the argument that more people try out self-employment when faced with limited job opportunities. When farming as well as non-farm self-employment are taken into account, self-employment has been found to be nearly twice as prevalent in rural areas as in urban areas (Block et al., 1983; Bradshaw and Blakely, 1983). Even when farming is excluded, self-employment is still found to be an important part of rural economies (Watkins and Allen, 1987). In this study, we expect a positive relationship between self-employment and the rural variable, which is a dummy variable taking a value of one if respondents live in a non-metropolitan county with less than 20,000 people or rural area.

## **CHAPTER 4**

### **Data and Descriptive Analysis**

This chapter presents a discussion of the sampling procedure and the survey. The chapter also includes a descriptive analysis of the groups used for the empirical model developed in chapter 3.

#### **4.1 Survey Development and Sampling Procedure**

This study uses cross-sectional non-farm-household data for 1989, collected from non-metropolitan counties<sup>2</sup> in Virginia between June 19 and July 5, 1990. Data were collected by telephone using the random digit dialing procedure. The intent of this survey was to obtain general information on rural employment and incomes, including self-employment and small businesses, in the non-metropolitan counties of Virginia. All data were collected from a household-head. The sample size was determined by the availability of resources; financial resources were available for only 600 household completed interviews.

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<sup>2</sup> Montgomery County and the City of Radford were excluded because of the presence of two state universities.

The telephone numbers for the survey were obtained by first selecting all non-metropolitan exchange codes (the three digit prefixes of all telephone numbers) for Virginia counties and cities; Montgomery County and Radford City were excluded due to their high population density resulting from the existence of 2 large universities within their borders. Once the exchange codes for non-metropolitan areas were determined, the last four digits were randomly dialed. Nine-hundred and fifty-six (956) households were contacted. A screening question was first used to eliminate those individuals in farming, and those who lived in metropolitan counties (because exchange codes can cross county boundaries).

According to the 1990 Census, only 5.4 percent of the non-metropolitan "occupied housing units" did not own telephones. Thus the sample may be slightly biased towards families with higher incomes. The interview took an average of 12 minutes. The survey was pretested first to ensure clarity and congruity of the questions.

## **4.2 Survey Results**

Of the 956 households that were randomly contacted, 356 households (37.2 percent) either farmed, lived in metro areas, or refused to participate in the study. The survey yielded 600 completed interviews, a response rate of 62.8 percent (see Table 4.1).

**Table 4.1: Response Rate for Sample**

<b>Sample</b>	<b>Number of Households</b>
Total Contacted	956
Total Non-Responses	356
Total Responses	600
<b>Response Rate (%)</b>	<b>62.8</b>

The 600 households contained 994 household heads. The descriptive analyses excludes those individuals with incomplete or missing data, resulting in an effective sample of 851 individuals for the analysis of those participating and not-participating in the labor force, and a sub-sample of 588 individuals consisting of only those participating in the labor force for the self-employed/not-self-employed analysis. The Statistical Analysis Systems (SAS), a computer software package for statistical analysis, was used for the subsequent descriptive analysis and comparisons.

A descriptive analysis of the households and individuals in the sample is presented in the following sections. First, the entire sample is discussed to provide a general overview of the data at both the household and individual levels. This sample is then divided into two groups: Participating versus Not-Participating in the labor force for comparison. The group with participating individuals is then further subdivided into two groups consisting of individuals who are: Self-Employed versus Not-Self-Employed.

### 4.3 Description of Rural Households

The survey includes 600 households containing 994 adult heads of households: 387 married couples, 16 single individuals living with another adult in the same household and sharing income, and 204 single; divorced; or widowed individuals.

Approximately 33 percent of the households, mostly married couples, had school-age children (children ages 6 to 18) and 15 percent had pre-school children (children under 6). The average number of children per household in non-metropolitan Virginia, during 1989, was less than one child (0.68) per household.

Over 44 percent of the households had dual income earners. In addition, fourteen percent of the sample had a household member, other than the spouse, that was employed and also contributing to the household income. This trend of supplementing household income from multiple sources has been on the rise—it increased by 468% from 1979 to 1983, nationally (Lichtenstein, 1990). It is therefore interesting but not surprising to note similar patterns taking shape in non-metropolitan Virginia as well.

The average household income, despite multiple earners and multiple sources of income, remained relatively low (when compared to metropolitan areas), corroborating reports that employment in the rural South are heavily concentrated in relatively low-paying jobs (Hoke, 1990). Approximately 57.8 percent of all households had a total annual income of \$30,000 or less. Relatively few (15.2%) households had a total annual income of over \$50,000, while 27 percent earned

between \$30,000 to \$50,000 per year (Table 4.2). Approximately 53 percent of the households with individuals participating in the labor force, had a total income of \$30,000 or less.

**Table 4.2: General Characteristics of Households in Rural Virginia**

Sample Size = 600

Characteristics	Percentage
<b>Presence of Children:</b>	
Children under 6	15.0
Children 6 to 18	32.7
<b>Marital Status:</b>	
Single	4.7
Married	81.1
Divorced	7.8
Widowed	6.5
<b>Total Household Income:</b>	
< = \$20,000	35.7
> \$20,000 - < = \$30,000	22.1
> \$30,000 - < = \$50,000	27.1
> \$50,000 - < = \$70,000	11.2
> \$70,000	4.0
<b>Non-Work Income Sources:</b>	
Unearned Income	30.4
Welfare Income	0.7

Wage-employment was the predominant employment source for non-metropolitan Virginians—73 percent of the households had some income from wage-employment. Another 17.3 percent of the households earned part of their income from self-employment. A little over 30 percent of the households in rural Virginia had some unearned income—an average unearned income of approximately \$4,371 per year in 1989. Less than one percent (0.7) reported welfare income.

A large percentage of the households that were not participating in the labor force (29.3% of the total households) were dependent on unearned income sources such as transfer payments, dividends, rent, etc. The average unearned income in households with no earner in 1989 was approximately \$10,462. Households that had no working household-heads, were mostly comprised of retirees; only around 2 percent were unemployed (actively seeking work).

The majority of the individuals (67%) that were not participating in the labor force were female, while 33 percent were male. Of the nearly 20 percent of the sample that were classified as elderly (65 years or older in 1989), most did not participate in the labor force.

Sixty-nine (69) percent of the surveyed households had at least one individual who had grown up in the county where they were currently living, while 31 percent had migrated from elsewhere.

Of the 994 household-heads in the sample, 143 individuals had to be discarded due to missing or incomplete data, leading to an effective sample of 851 household-

heads. Of the 851 household-heads, 45.7 percent (388) were male and 54.3 percent (463) were female. When analyzed at the individual level, the surveyed household-heads in rural Virginia averaged 48.5 years old and 86 percent did not have any work-inhibiting health problems. More than 52 percent of the household-heads had a high school degree, while 28.3 percent had college degrees, and 5.8 percent had graduate degrees; 13.4 percent had only a grade school education or less (Table 4.3). Thirty-seven percent of the household-heads had some on-the-job or vocational training.

Sixty-nine percent of the household-heads were in the labor force during 1989. A significant share (80% of 588) of those in the labor force were wage-employed, and approximately 18 percent (105 of 588 individuals) were self-employed. Almost 2 percent of those in the labor force were unemployed. Approximately 5 percent of the wage-employed and 26 percent of the self-employed were holding second jobs (moonlighting) as well during 1989. Approximately 29 percent (31 of 105) of the self-employed in this study were found to be wage-employed as well.

Since the primary objective of this research is to identify those characteristics that influence the probability of being self-employed, the next sections provides a more detailed discussion of individuals. First, individuals in the labor force are compared with those not in the labor force. Then individuals who are self-employed are compared with those who are not self-employed, but are in the labor force.

Because males and females are expected to differ in their labor force participation, a gender disaggregated discussion also follows where relevant.

**Table 4.3: General Characteristics of Household-Heads in Rural Virginia**

Sample Size = 851

Characteristics	Percentage
<b>Education:</b>	
Grade School or less	13.4
High School	52.5
College	28.3
Graduate School	5.8
<b>On-the-Job/Vocational Training:</b>	
Have Training	36.7
Do not have Training	63.3
<b>Health Status:</b>	
Have some Health Problems	13.9
Have No Health Problems	86.1
<b>Sex:</b>	
Female	54.4
Male	45.6

#### **4.4 Characteristics of Individuals Participating/Not-Participating in the Labor Force**

The individuals in the sample were divided into two groups according to whether or not they were participating in the labor force. When comparing these two groups based on demographic and household characteristics, the study found that the individuals in the participating group (588 of 851) were significantly different from the not-participating group (263 of 851). The variables on which there were significant differences include age, health, education, training, wage-job experience, sex, marital status, children under 6, children 6 to 18, unearned income, employed spouse, employed household member other than the spouse, and the county unemployment rate. This finding implies that these variables are influential in determining who participates or does not participate in the labor force (Table 4.4).

Not surprisingly, participating individuals were much younger (42.5 years) than the average not-participating individual (61.5 years), and had more formal education than those individuals that were not in the labor force (12.9 years vs 10.6 years). The vast majority of the participating individuals (92%) had no work inhibiting health problems, while 27 percent of those out of the labor force reported such problems. Furthermore, those in the labor force were more likely to have had some on-the-job and/or vocational training (43.5%) than those not in the labor market (21.3%). Not-participating individuals had slightly more years of wage-job experience (21.1 years) than the participating individuals (20.71 years), most likely

due to the presence of retirees with full work history, but, this difference was statistically insignificant (Table 4.4).

**Table 4.4: Average Characteristics of Participating/ Not-Participating Individuals**

Sample Size = 851

Variables	Participating	Not-Participating	T-Statistic	P-Value
[Mean]				
Age	42.5	61.5	18.57	0.000
Education	12.9	10.6	(10.24)	0.000
Children	0.8	0.3	8.36	0.000
Wage-job Experience	20.7	21.1	0.34	0.733
Unearned Income	1405.9	10462.3	11.81	0.000
Unemployment Rate	5.8	6.4	4.04	0.000
<b>DUMMY VARIABLES</b> [Percent] X <sup>2</sup> -Statistic				
On-the-Job/Vocational Training	43.5	21.3	(38.72)	0.000
Good Health	92.0	73.0	54.94	0.000
Married	85.7	70.7	26.63	0.000
Male	51.2	33.1	24.03	0.000
Children under 6	18.2	8.0	14.83	0.000
Children 6 to 18	41.3	13.3	64.86	0.000
Employed spouse	70.6	28.5	131.62	0.000
Employed Household Member Other than spouse	16.2	7.9	10.31	0.001

The largest percentage (34.6% of 588) of those in the labor force and employed hold blue-collar (jobs requiring manual labor) occupations such as operators, fabricators, mechanics, construction, movers, laborers, craft and repair. The prevalence of a high level of blue collar work perhaps reflects the low skill level in non-metropolitan Virginia. A higher percentage of males were in blue collar occupations than females (50.2% versus 18.9%) (Table 4.5).

Over one-fourth (26.9%) of the individuals (both males and females) that were in the labor force and employed, were working in white collar jobs (jobs requiring non-manual labor) such as administration, engineering, science, health, entertainment, teaching and similar occupations. Another 26.2 percent were employed in technical, clerical, sales, and related white collar occupations. A disaggregation by gender shows that a larger percentage of women (67.7%) were employed in white collar jobs; only 38.7 percent of the males in the labor force were working in white collar occupations (Table 4.5).

Approximately 10.5 percent of the surveyed individuals were in service occupations. A higher percentage of females (12.7% of females) than males (8.2% of males) were employed in this sector.

**Table 4.5: Occupational Distribution of the Employed Individuals by Sex**

Sample Size = 588

Occupation	Total	Male	Female
[In Percent]			
Precision, Craft	20.0	26.2	2.9
Operator, Laborer	14.6	24.0	16.0
Administration	26.9	22.6	31.3
Technical, Sales, etc.	26.2	16.1	36.4
Services	10.5	8.2	12.7
Agriculture related*	1.8	2.9	0.7
<b>X<sup>2</sup> (for Male &amp; Female) = 87.4 P-Value = 0.0000</b>			

\* excluded

Participating males and females were found to be significantly different in only wage-job experience and presence of an employed spouse. Men had over 5 years more wage-job experience than women; and more women had an employed spouse than men (74% versus 67%). A comparison between males and females based on other demographic and household characteristics shows that any other differences are not significantly different from zero (Table 4.6). Such similarities reiterate the changing nature of the labor market where more and more women, for various reasons, are joining the labor force.

**Table 4.6: Average Characteristics of Participating Individuals by Sex**

Sample Size = 588

Variables	Participating Male	Participating Female	T-Statistic	P-Value
[Mean]				
Age	42.66	42.31	- 0.357	0.721
Education	12.73	13.00	1.133	0.257
Wage-Job Experience	23.30	18.0	- 6.086	0.0001
Unearned Income	1081.73	1745.82	1.176	0.240
Unemployment Rate	5.75	5.86	0.653	0.514
<b>DUMMY VARIABLES</b> [Percent] <span style="float: right;">X<sup>2</sup>-Statistic</span>				
On-the-Job/Vocational Training	46.51	40.42	2.22	0.136
Good Health	91.36	92.68	0.35	0.555
Married	88.70	82.58	4.50	0.034
Children under 6	19.93	16.38	1.25	0.264
Children 6 to 18	40.86	41.81	0.05	0.815
Employed Spouse	67.44	73.87	2.92	0.087
Employed Household Member Other than spouse	16.28	16.03	0.01	0.934

The not-participating individuals (33% of 851) were mainly retirees, and 67 percent were female, while 33 percent were male. Among the not-participating individuals there were differences by gender. Not-participating males (65.7 years) were much older than not-participating females (59.4 years), and they (males) had significantly more years of wage-job experience than the not-participating females (32.86 years versus 15.28 years). Both these variables were highly significant. The not-participating males and females were found to be significantly different based on

variables such as training, health, marriage, presence of employed spouse, and unearned income (Table 4.7). The average education among non-participating males was roughly 10.27 years compared to 10.75 years for the not-participating females, but this difference was not significant. Other demographic and household variables that were found to be statistically insignificant were presence of pre-school and school-age children, and other employed household member besides the spouse (Table 4.7).

**Table 4.7: Average Characteristics of Not-Participating Individuals by Sex**  
Sample Size = 263

Variables	Not-Participating Male	Not-Participating Female	T-Statistic	P-Value
[Mean]				
Age	65.70	59.39	- 3.720	0.000
Education	10.27	10.75	1.108	0.270
Wage-Job Experience	32.86	15.28	- 8.951	0.000
Unearned Income	15,698.28	8,827.84	- 3.960	0.000
Unemployment Rate	6.49	6.37	- 0.447	0.655
<b>DUMMY VARIABLES</b> [Percent] X <sup>2</sup> -Statistic				
On-the-Job/Vocational Training	31.03	16.48	7.362	0.007
Good Health	62.07	78.41	7.887	0.005
Married	86.21	63.07	15.054	0.000
Children under 6	4.60	9.66	2.030	0.154
Children 6 to 18	10.34	14.77	0.989	0.320
Employed Spouse	20.69	32.39	3.907	0.048
Employed Household Member Other than spouse	5.75	9.09	0.886	0.347

#### **4.5 Characteristics of Self-Employed/Not-Self-Employed Individuals**

In this section, the sub-sample under discussion consists of only those individuals that were participating in the labor force. These 588 individuals were further divided into two groups based on whether they were working for themselves (self-employed) or were not self-employed (eg. wage-employed or unemployed). Those individuals that were both self- and wage-employed are defined as being self-employed in this study.

There were significant differences between the two groups in age, unearned income, employed spouse, employed household members other than the spouse, previous self-employment, and parents' self-employment background. These findings suggest that these variables might play an important role in determining who is self-employed and who is not. There were, however, no significant differences between these two groups in education, wage-job experience, on-the-job/vocational training, health, marriage, presence of children (pre-school and school-age), and county unemployment rate (Table 4.8).

The average self-employed individual was 45.3 years old compared to 41.9 years for not-self-employed individuals. This corresponds with SBA's finding, that the average age of self-employed individuals was 45 years in 1986 (Table 4.8). The self-employed individuals in this study were more likely to have been previously self-employed and had additional sources of income such as unearned income, income from a spouse and/or income from other household members than did the not-self-employed individuals. This finding is consistent with other studies (Rees and Shah, 1986; Evans and Leighton, 1989; Fuchs, 1982; Quinn, 1980) which all state the positive effect additional income sources have on spreading the responsibility of providing for the family's basic needs. The existence of more than one source of income diversifies risks for the family.

Self-employment has often been thought of as providing an avenue for employment for those unable or unwilling to work in wage-employment. This study

found a higher percentage of individuals with work-inhibiting health problems among the self-employed than the not-self-employed. But this difference was statistically insignificant.

The importance of one or both parents' self-employment experience on an individual's decision to be self-employed is supported by this study as well. Moreover, it also implies that one's environment has a noticeable impact on employment-type selection and such labor market participation decisions.

**Table 4.8: Average Characteristics of Self-Employed/ Not-Self-Employed Individuals**

Sample size = 588

Variables	Self-Employed	Not-Self-Employed	T-Statistic	P-Value
[Mean]				
Age	45.3	41.9	(2.53)	0.013
Education	13.2	12.8	(1.11)	0.267
Wage-job Experience	21.0	20.6	(0.23)	0.818
Unearned Income	4346.2	766.7	(2.61)	0.010
Unemployment Rate	5.6	5.8	1.03	0.303
<b>DUMMY VARIABLES: [In Percent] X<sup>2</sup>-Statistic</b>				
On-the-Job/Vocational Training	43.8	43.5	0.004	0.951
Good-Health	88.6	92.7	2.051	0.152
Married	81.9	86.5	1.515	0.218
Children under 6	16.2	18.6	0.346	0.556
Children 6 to 18	37.1	42.2	0.923	0.337
Employed Spouse	62.9	72.3	3.67	0.055
Employed Household Member Other than spouse	22.9	14.7	4.24	0.040
Parents' Self-Employment Background	51.4	41.2	3.68	0.055
Previous Self-Employment	23.8	8.5	20.32	0.000

Approximately 46.3 percent of self-employed individuals were in white-collar (jobs requiring non-manual labor) occupations such as administration, clerical, sales, technical, etc. Another 31.7 percent were in blue collar jobs (jobs requiring manual labor) like precision production, crafts, repair, laborers and operators, while 17 percent were in the service sector. Only 4.9 percent of these individuals had agricultural related occupations. Results presented in table 4.9 reveal that self-employment in rural Virginia is more prevalent in the service sector, precision and crafts, agriculture, and sales related occupations, while not-self-employed individuals appear to be more inclined to participate in white collar jobs (51.24%) (Table 4.9).

**Table 4.9: Occupational Distribution of Self-Employed/ Not-Self-Employed Individuals by Sex**

Sample Size = 588

Occupation	Self-Employed (%)	Not-Self-Employed (%)
Administration	14.63	29.03
Technical, Sales	31.71	25.21
Services	17.01	9.32
Precision, Craft	18.29	13.98
Operator, Laborer	13.41	21.19
Farming, Hunting*	4.88	1.27
$X^2 = 18.54$		$P\text{-Value} = 0.002$

\* excluded

A gender analysis of the self-employed individuals shows that self-employed men differ significantly from self-employed women in wage-job experience, previous self-employment experience, and marital status (married). Self-employed men had more labor market experience than women: men had almost 8 more years of wage-job experience than women, and more men were previously self-employed than women. More self-employed men than women were married (Table 4.10).

**Table 4.10: Average Characteristics of Self-Employed Individuals by Sex**

Sample size = 105

Variables	Self-Employed Male	Self-Employed Female	T-Statistic	P-Value
[Mean]				
Age	44.9	45.8	0.335	0.738
Education	13.0	13.3	0.496	0.621
Wage-job Experience	24.3	16.7	(3.13)	0.002
Unearned Income	4601.1	4155.0	0.160	0.873
Unemployment Rate	5.8	5.4	(1.07)	0.287
<b>DUMMY VARIABLES:</b> [In Percent] X <sup>2</sup> -Statistic				
On-the-Job/Vocational Training	38.3	51.1	1.706	0.192
Good-Health	90.0	86.7	0.282	0.595
Married	90.0	71.1	6.190	0.013
Children under 6	20.0	11.1	1.497	0.221
Children 6 to 18	56.4	43.6	0.014	0.907
Employed Spouse	63.3	62.2	0.014	0.907
Employed Household Member other than spouse	21.7	24.4	0.113	0.737
Parents' Self-Employment Background	50.0	53.3	0.114	0.735
Previous Self-Employment	30.0	15.6	2.957	0.005

When the occupational distribution of those in self-employment in non-metropolitan Virginia are analyzed based on gender, the analysis shows that a higher percentage of the self-employed females than males worked in the service sector (26.8% versus 7.3%) and in white collar jobs (53.7% vs 39.1%). Males tended to be self-employed in blue collar and agricultural related occupations (Table 4.11).

**Table 4.11: Occupational Distribution of Self-Employed Individuals by Sex**

Sample Size = 105

Occupation	Self-Employed		
	Total (%)	Male (%)	Female (%)
Administration	14.6	17.1	12.2
Technical, Sales	31.7	22.0	41.5
Services	17.1	7.3	26.8
Precision, Craft	18.3	29.3	7.3
Operator, Laborer	13.4	17.1	9.8
Farming, Hunting*	4.9	7.3	2.4
<b>X<sup>2</sup> (For Male &amp; Female) = 14.58    P-Value = 0.012</b>			

\* excluded

The distribution of not-self-employed individuals shows that females were significantly different from males in terms of wage-job experience, unearned income, training, and employed spouse (Table 4.12). The not-self-employed males and females were found to have similar levels of education, age, health, etc. (Table 4.12).

Analysis of the occupations in which individuals in not-self-employment participate shows that a larger proportion of females were in white collar jobs, while a higher percentage of males were participating in blue collar occupations in 1989 (Table 4.13). Table 4.13 shows that less than half percent of not-self-employed women were involved in agricultural related jobs in 1989, compared to 2.1 percent for males.

**Table 4.12: Average Characteristics of Not-Self-Employed Individuals by Sex**

Sample size = 483

Variables	Not-Self-Employed Male	Not-Self-Employed Female	T-Statistic	P-Value
[Mean]				
Age	42.1	41.7	(0.4114)	0.681
Education	12.7	12.9	1.0965	0.273
Wage-Job Experience	23.1	18.2	(5.2189)	0.000
Unearned Income	316.6	1214.9	2.823	0.005
Unemployment Rate	5.7	5.9	1.165	0.2445
<b>DUMMY VARIABLES: [In Percent] X<sup>2</sup>-Statistic</b>				
On-the-Job/Vocational Training	48.5	38.4	5.030	0.025
Good-Health	91.7	93.8	0.793	0.373
Married	88.4	84.7	1.397	0.237
Children under 6	19.9	17.4	0.523	0.470
Children 6 to 18	41.9	42.6	0.021	0.884
Employed Spouse	68.5	76.0	3.45	0.063
Employed Household Member other than spouse	14.9	14.5	0.022	0.883
Parents' Self-Employment Background	43.1	39.3	0.757	0.384
Previous Self-Employment	10.0	7.0	1.338	0.247

**Table 4.13: Occupational Distribution of Not-Self-Employed Individuals by Sex**

Sample Size = 483

Occupation	Not-Self-Employed		
	Total (%)	Male (%)	Female (%)
Administration	29.0	23.5	34.6
Technical, Sales	25.2	15.1	35.5
Services	9.3	8.4	10.3
Precision, Craft	14.0	25.6	2.1
Operator, Laborer	21.2	25.2	17.1
Farming, Hunting*	1.3	2.1	0.4
X <sup>2</sup> (for Males & Females) = 77.64		P-Value = 0.000	

\* excluded

#### 4.6 Summary

This chapter grouped the individuals in the sample into two categories: participating or not participating in the labor force, and self-employed or not-self-employed. A significant portion (69% of 851) of the rural household-heads that were interviewed were in the labor force; and of those in the labor force, 98 percent were gainfully employed, while approximately 2 percent were actively seeking employment. Although a larger percentage of males (51%) were in the labor force, the females were not too far behind, with 49 percent in the labor force. Such close numbers indicate the changing nature of the labor market where more and more women are joining the labor force.

A disaggregation of the employment-type shows 18 percent in the labor force were self-employed, while a much larger portion (80%) were wage-employed; and 2 percent were unemployed.

The self-employed and not-self-employed individuals were significantly different in age, unearned income, presence of employed spouse and employed household member other than the spouse, previous self-employment experience, and parents' self-employment experience. Among both the self-employed and not-self-employed, females and males were similar in terms of a many demographic and household characteristics. Among the self-employed, males and females were significantly different in terms of labor market experience (both wage- and previous self-employment experience), and marital status. The significance of these variables indicate that these factors are important in determining who becomes or does not become self-employed in rural Virginia. This will be tested and discussed in greater detail in the next chapter.

## **CHAPTER 5**

### **Model Estimation and Analysis**

The primary objective of this research is to identify the factors that influence the likelihood of an individual being self-employed. Towards that end, a two-equation probit model was specified and developed in chapter 3. Based on the results from the two-equation model, a single equation probit was also estimated. This chapter analyzes the results of these two models.

For statistical testing a ten percent alpha level of significance is specified as the tolerance level for a type I error. A ten percent level denotes the rejection region by specifying that there is a less-than-ten percent probability of incorrectly rejecting the null hypothesis that the effect of the variable is zero.

This study applies the usual set of criteria such as the standard errors of the coefficients, the estimated t values with their significance levels, McFadden's  $R^2$ , and Chi-square ( $X^2$ ), and prediction success rate to measure the overall strength and goodness of fit of the estimated probit equations.

Another aspect of evaluating the empirical results, and thereby the strength of a model, is to examine its predictive power i.e. its overall prediction success rate.

The prediction success rate indicates that the higher the number of right predictions, the better the fit and therefore, the greater the explanatory power of the variables.

The empirical model is estimated using a two-equation system as proposed by Heckman (1976). As mentioned in chapter three, this model consists of two-equations: participating/not-participating, and self-employed/ not-self-employed. The first of the two-equations estimates the probability of participating or not participating in the labor force, while the second equation evaluates the probability of being self-employed as opposed to not-self-employed. Since both equations are specified using a zero-one dummy dependent variable, the models are estimated as probit equations tied by a sample selection factor,  $\lambda$ , as suggested by previous theoretical and empirical studies (Heckman, 1979).

Table 5.1 presents the independent variables used in the model, their means, and standard deviation. The Pearson Correlation Analysis procedure was also used to test for correlation. None of the variables were found to be correlated above the 0.54 level.

**Table 5.1: Descriptive Statistics of Variables used in the Participating/Not-Participating in the Labor-Force probit equation**

Sample Size = 851

Independent Variable	Specification	Mean	Standard Deviation
<b>Human Capital &amp; Personal Characteristics</b>			
Age	Years	48.36	15.49
Age-Squared	Years	2578.10	1587.70
Good Health	Yes=1	0.86	0.34
Education	Years	12.16	3.07
Male with Education	Years	8.86	4.76
Training	Yes=1	0.37	0.48
Wage-Job Experience	Years	20.83	13.03
Male	Yes=1	0.45	0.50
<b>Household Characteristics:</b>			
Married	Yes=1	0.81	0.39
Male and Married	Yes=1	0.61	0.44
Children under 6	Yes=1	0.15	0.36
Male with Children under 6	Yes=1	0.11	0.31
Children 6 to 18	Yes=1	0.33	0.47
Male with Children 6 to 18	Yes=1	0.24	0.42
<b>Income Characteristics</b>			
Unearned Income	\$1,000	4.40	10.03
Employed Spouse	Yes=1	0.57	0.49
Male with Employed Spouse	Yes=1	0.41	0.47
Employed Household members Other than the spouse	Yes=1	0.14	0.34
<b>Labor Demand Characteristics</b>			
Unemployment Rate	Percentage	5.99	2.00
Rural	Yes=1	0.83	0.37

## 5.1 Labor Force Participation Equation

The probit results for the participating/not-participating in the labor force equation are presented in Table 5.2. Coefficients with positive values indicate that increases in the associated variables increase the probability of participation, while negative values indicate that increases in the associated variables would decrease the probability of participation in the labor market. The probit coefficients cannot be directly interpreted as marginal changes. Instead, the marginal change in probability corresponding to a unit change in the regressors is measured by taking the partial derivatives of the independent variables at their respective means. This is presented in the 'marginal probability' column. The numbers in the 't-ratio' column are the t-statistics, with each of their significance levels, for the maximum likelihood coefficients. Individually, 11 of 20 regressors are significant at the ten percent alpha level.

McFadden's  $R^2$  measures the proportion of the total variation in the dependent variable that can be attributed to the relationship between the dependent and independent variables. In other words, it measures how well the regression line fits the data. Collectively, the independent variables account for approximately 49 percent (McFadden's pseudo  $R^2$ ) of the variance—"an extremely good fit," for models estimated by the maximum likelihood method for binomial probability models (Hensher and Johnson, 1981).

Table 5.3 provides the prediction success rate of the participating/not-participating equation. Overall, this model successfully predicted 88 percent of the outcomes, a relatively high level of predictive ability. The correct prediction for the labor-force participating individuals (with value of 1) was much better at 94 percent than for the not-participating individuals (with value of 0) at 72 percent.

**TABLE 5.2: Regression Results for Participating/Not Participating in Labor Force Equation**  
**Dependent Variable: Participating in Labor Force = 1**

Sample Size = 851

Independent Variable	Expected Sign	MLE Coefficient	t-ratio	Marginal Probability
Intercept		- 0.90610	- 0.950	- 0.28354
<b>Human Capital:</b>				
Age	+	+ 0.05507	+ 1.685 <sup>***</sup>	+ 0.01723
Age-Squared	-	- 0.00125	- 3.789 <sup>***</sup>	- 0.00039
Good Health	+	+ 0.43423	+ 2.472 <sup>***</sup>	+ 0.13587
Education	+	+ 0.08922	+ 2.830 <sup>***</sup>	+ 0.02791
Male and Education	+	+ 0.00903	+ 0.199	+ 0.00283
Training	+	+ 0.28992	+ 2.192 <sup>***</sup>	+ 0.09072
Wage-Job Experience	+	+ 0.04468	+ 6.887 <sup>***</sup>	+ 0.01398
Male	+	- 0.07202	- 0.117	- 0.02254
<b>Household:</b>				
Married	-	+ 0.14751	+ 0.563	+ 0.04609
Male and Married	+	- 0.31087	- 0.745	- 0.09727
Children < 6	-	- 0.62092	- 2.639 <sup>***</sup>	- 0.19429
Male with Children < 6	+	+ 0.62645	+ 1.611 <sup>*</sup>	+ 0.19601
Children 6 to 18	+	- 0.01910	- 0.108	- 0.00598
Male with Children 6 to 18	+	- 0.02201	- 0.075	- 0.00689

Continued on the next page...

**TABLE 5.2: Continued...**

Independent Variable	Expected Sign	MLE Coefficient	t-ratio	Marginal Probability
<b>Income:</b>				
Unearned Income	-	- 0.03	- 4.049**	- 0.01
Employed Spouse	-	- 0.19518	- 0.800	- 0.06107
Male with Employed Spouse	+	+ 0.80708	+ 2.529**	+ 0.25253
Employed Household members other than the spouse	-	+ 0.19981	+ 1.069	+ 0.62520
<b>Labor Demand:</b>				
Unemployment Rate	-	- 0.07044	- 2.188**	- 0.02204
Rural	-	+ 0.14650	+ 0.829	+ 0.04584

X<sup>2</sup>Statistic (20) = 517.27 ; Log-Likelihood = -267.57

McFadden's Pseudo-R<sup>2</sup> = 0.491 ; Number of observations = 851

\* = Statistically significant at the 10 percent level (>1.28)

\*\* = Statistically significant at the 5 percent level (>1.64)

**Table 5.3: Prediction Success Table  
For The Participating/Not-Participating in Labor Force Equation**

Sample Size = 851

Actual	Total	Predicted		Prediction Success Rate
		Participating	Not-Participating	
Total	851	629	222	88 %
Participating	588	556	32	94 %
Not-Participating	263	73	190	72 %

### 5.1.1 Human Capital Variables

The coefficients of almost all the human capital variables support the hypothesized relationships between the variables and the probability of participating in the labor force, except for the "male" variable.

In accord with previous findings, age and age-squared variables follow the life-cycle pattern, implying that the probability of participation in the labor force increases with age until a certain turning point, after which the curvilinear effect of age begins to be evident. This curvilinear effect is captured by the age-squared variable with its hypothesized negative sign, which indicates that the probability of labor force participation decreases with age once past the turning point. Both variables are significant at the five percent alpha level.

Education positively and significantly affects the probability of participation in the labor market. In this study, education significantly affects women's participation and at the mean, increases the likelihood of participation in the labor market by approximately 3 percent for every extra year of education. For men, the variable had the right sign but the coefficient was not significantly different from zero, indicating that it was not any different from women. In general, the positive influence of the education variable on the likelihood of participation confirms the importance of higher education on the marginal value of labor in the labor market.

Having on-the-job training and/or vocational training is also positively associated with the probability of participation in the labor force. The positive sign

on education and training support human capital theory which predicts that investing in oneself increases the chances of employment by increasing ones' access to more and better jobs than are available to unskilled workers. This study indicates that the impact of investing in human capital is positive, and that the marginal effect of on-the-job and/or vocational training increases the probability of participation in the labor market by almost ten percent.

Wage-job experience, another human capital variable, also plays a significant role in the probability of being in the labor force. At the sample mean (approximately 21 years), the marginal effect of a year of wage-job-experience increases the likelihood of labor force participation by 1.4 percent.

As expected, good health was found to be a significant factor in determining labor-force participation. When evaluated at the mean, individuals with good health are almost 14 percent more likely to participate in the labor force than those with poor health.

In contrast to other studies (Hersch, 1991; Holzer, 1990), there were no differences, after accounting for other variables, in the probability of participating in the labor market based on sex, as indicated by the insignificant coefficient for the variable.

### **5.1.2 Household Variables**

Household characteristics include the individual's marital status, presence of pre-schoolers (children under 6 years) and school-age children (between 6 and 18

years). Among the household characteristics, presence of pre-schoolers are the only variables that were statistically significant and had the expected sign. The variable negatively affected the probability of women participating in the labor force. The inverse association between women with children under 6 and the probability of participation confirms the constraint preschoolers place on females as children under 6 demand a lot of time and effort which is generally provided by the mother. The presence of children under six decreased the participation probability for women approximately 19 percent.

For men, however, the relationship, as anticipated, was significant and positive, but the effect was less strong in determining their likelihood of participation in the labor force. This study shows that the marginal effect of the presence of additional children under 6 was (0.2 percent), a small but significant influence. Since an increase in dependents increases the need for income, and women spend most of their time caring for their dependent children, men with children contribute to this responsibility by seeking employment to meet the added financial responsibility.

The other household variables, being married and presence of children between 6 and 18 years old, are neither significant nor have the expected signs, for both females and males.

For females, a negative relationship was anticipated between labor force participation and being married because household-responsibilities tend to increase the reservation wage for females, keeping them from participating in the labor market.

On the other hand, the presence of children 6 to 18 years of age, was expected to positively influence the probability of labor force participation for women. A positive relationship is expected simply because school-age children have more school related expenses and need less intense care. And, females, like males, seek work to finance the added needs and expenses of school-going children.

The expectation of positive signs for both these variables for males is based on the hypotheses that since married individuals have greater financial and family responsibilities than single individuals, they seek employment to meet family and personal responsibilities. Similarly, since the expenses related to the needs of school-age children are greater as they grow older, presence of children between 6 and 18 is expected to "force" the individual to seek employment to finance his/her children's expenses. The variable, however, was not significant nor was the difference between males and females significant.

### **5.1.3 Income Variables**

Variables representing the household's financial characteristics include unearned income, and whether the spouse and other household members are employed. Among all these variables, the unearned income variable and employed spouse variables had the expected sign. The unearned income and men with employed spouse variables were statistically significant, while the others were not.

The negative association between unearned income and participation probability indicates that for every \$1,000 increase in unearned income, the

probability of labor force participation decreases by one percent. This inverse relation is expected because unearned income increases the marginal utility of leisure and thereby the individual's reservation wage. A reservation wage higher than the market wage rate depresses the probability of labor market participation.

The influence of an employed spouse, a dummy variable, on the labor participation probability for men was significantly positive. This study found that in rural Virginia, the likelihood of participation increased by a little over 19 percent for men with employed spouse.

Females with employed-spouse was found to have the posited negative sign, indicating that the presence of an employed spouse decreases the likelihood of participation for women. But, as already mentioned, this variable was found to be insignificant at the ten percent alpha level.

Presence of employed household members other than the spouse contributing to the household income pool was found to be insignificant in this study as well. The existence of multiple income earners contributing to the same household income pool, was expected to decrease the probability of employment, because any infusion of additional income source increases the affordability of more leisure, which in turn is expected to lower the likelihood of labor force participation. But the variable was not significantly different from zero in this study.

#### **5.1.4 Labor Demand Variables**

The unemployment rate and rural location variables are used to measure the

area's labor market and wage-rates. The unemployment rate measures the labor demand as it reflects an area's job opportunities. And, rural location is a dummy variable with a value of one for counties with an urban center of no more than 20,000 people. The variable is a proxy for job opportunities in rural areas.

Both variables are hypothesized to be negatively associated with the probability of participation in the labor force. The unemployment rate shows the expected sign and is also significant, indicating that the probability of an individual being in the labor force decreases significantly with the increase in an areas's unemployment rate. This study found that in the rural Virginia, a one percent increase in the unemployment rate decreases labor participation by a little over 2 percent. The rural dummy variable was not significantly different from zero.

#### **5.1.5 Summary:**

The results from the participating/not-participating equation show that an individual's age, education, job-related and/or vocational training, wage-job experience, and good health are strong determinants of the probability of participation in the labor force. This study found education to positively effect labor force participation in rural Virginia. There was no significant difference in the impact of education on male and female participation.

The labor participation equation also reveals that the presence of dependent children (under age 6) has opposite effects on women and men. The presence of

additional preschool children was found to decrease the probability of participation, for women, by approximately 19 percent. For men, the variable had a positive affect on the probability of participation, but the marginal effect of additional pre-school children was much smaller and statistically less strong than for women.

Financial characteristics are included in the equation to capture the effects of exogenous non-labor income on the consumption of leisure. The results show that presence of non-labor income decreases labor force participation. Unearned income decreased the probability of participation by 1 percent for every \$1,000 increase.

The presence of employed spouse is found to have a much higher effect on men than on women with employed spouse. The results indicate that the presence of an employed spouse increases the labor force participation of men. The marginal effect of this variable on women show the hypothesized negative sign, but it was found to be insignificant at the ten percent alpha level.

The unemployment rate, representing local labor market conditions, has a strong effect on the probability of participation in the labor force. The variable shows that residing in an area with a relatively high unemployment rate is likely to decrease an individual's probability of being in the labor force, by 2 percent. The rural location variable, another labor market variable, was neither significant nor correctly signed.

## **5.2 Employment-type Selection Equation**

Table 5.4 presents the independent variables used in the self-employed/not-

self-employed probit equation, their means, and standard deviation. The self-employment/not-self-employment probit equation results are presented in table 5.5. The model determines a labor force participant's probability of being self-employed versus not-self-employed.

Eight of the 24 variables are significantly different from zero. Many other variables have the hypothesized signs, but are not significantly different from zero. Using the goodness-of-fit measure, the McFadden pseudo- $R^2$  statistic of 0.13 reveals a weak fit. The chi-square value for the overall model, however, is significant with a value of 70.96 (with 24 degrees of freedom). According to Gujarati (1988), McFadden's pseudo  $R^2$  of 0.13 may seem to be a low figure, but in view of the large sample size ( $N=588$ ), this Mcfadden's pseudo  $R^2$  is still significant.

The overall prediction success rate of 84 percent for the probit model indicates a reasonably good model. However, this is misleading because the model is naive, in that the model is "zero fit." A model exhibiting "zero fit" displays its naivety by its inclination to better predict one category over the other (either 0 or 1). In this study, the model correctly predicts approximately 98 percent of the not-self-employed observations but correctly predicts only 19 percent of the self-employed (Table 5.6).

The low goodness-of-fit statistic (McFadden's pseudo  $R^2$ ) and low prediction success rate could have resulted from, among others factors, a growing similarity between self-employed and wage-employed persons, in terms of personal characteristics and professional requirements.

**Table 5.4: Descriptive Statistics of Variables used in the Self-Employed/Not-Self-Employed probit equation**

Sample Size = 588

Independent Variable	Specification	Mean	Standard Deviation
<b>Human Capital:</b>			
Log(Age)	Years	3.71	0.28
Good Health	Yes= 1	0.92	0.27
Education	Years	12.86	2.81
Male with Education	Years	9.69	4.76
Training	Yes= 1	0.44	0.50
Wage-Job Experience	Years	20.71	10.93
Wage-Job Experience-Squared	Years	548.15	546.26
Male	Yes= 1	0.51	0.50
Previous Self-Employment	Yes= 1	0.11	0.32
Parents' Self-Employment Background	Yes= 1	0.43	0.50
Residence	Native= 1	0.67	0.47
<b>Household:</b>			
Married	Yes= 1	0.86	0.35
Male and Married	Yes= 1	0.66	0.42
Children under 6	Yes= 1	0.18	0.39
Male with Children under 6	Yes= 1	0.14	0.34
Children 6 to 18	Yes= 1	0.41	0.49
Male with Children 6 to 18	Yes= 1	0.31	0.45
<b>Income:</b>			
Unearned Income	\$ 1,000	1.41	6.83
Employed Spouse	Yes= 1	0.70	0.46
Male with Employed Spouse	Yes= 1	0.52	0.47
Other Employed Household members	Yes= 1	0.16	0.37
<b>Labor Demand:</b>			
Unemployment Rate	Percentage	5.80	1.95
Rural	Yes= 1	0.82	0.38

**TABLE 5.5: Regression Results for the Self-Employed/  
Not-Self-Employed Equation**  
Dependent Variable: Self-Employed = 1

Sample Size = 588

Independent Variable	Expected Sign	MLE Coefficient	t-ratio	Marginal Probability
Intercept		- 2.954	- 1.790 <sup>***</sup>	- 0.70589
<b>Human Capital:</b>				
Log(Age)	+	+ 0.59632	+ 1.175	+ 0.14249
Good Health	-	- 0.21004	- 0.858	- 0.05019
Education	+	+ 0.06706	+ 1.641 <sup>*</sup>	+ 0.01602
Male and Education	+	- 0.02143	- 0.451	- 0.00512
Training	-	+ 0.01991	+ 0.143	+ 0.00476
Wage-Job Experience	-	- 0.08109	- 3.099 <sup>***</sup>	- 0.01938
Wage-Job Experience Squared	+	+ 0.00122	+ 2.672 <sup>***</sup>	+ 0.00029
Male	+	+ 0.12853	+ 0.175	+ 0.03071
Previous Self-Employment	+	+ 0.60375	+ 3.251 <sup>***</sup>	+ 0.14427
Parents' Self-Employment Background	+	+ 0.18529	+ 1.381 <sup>***</sup>	+ 0.04428
Residence	-	- 0.09185	- 0.619	- 0.02195
<b>Household:</b>				
Married	+	- 0.46229	- 1.144	- 0.11047
Male and Married	+	+ 0.90018	+ 1.709 <sup>***</sup>	+ 0.21511
Children < 6	+	- 0.13366	- 0.433	- 0.03194
Male and Children < 6	-	+ 0.20959	+ 0.564	+ 0.05008
Children 6-18	+	+ 0.10505	+ 0.508	+ 0.02510
Male and Children 6-18	-	- 0.12287	- 0.446	- 0.02936

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**TABLE 5.5: Continued...**

Independent Variable	Expected Sign	MLE Coefficient	t-ratio	Marginal Probability
<b>Income:</b>				
Unearned Income	+	+ 0.02	+ 1.534*	+ 0.01
Employed Spouse	+	+ 0.07002	+ 0.196	+ 0.01673
Male and Employed Spouse	+	- 0.35588	- 0.841	- 0.08504
Employed Household members Other than the spouse	+	+ 0.36102	+ 2.029**	- 0.02195
<b>Labor Demand:</b>				
Unemployment Rate	+	- 0.04179	- 1.155	- 0.00999
Rural	+	+ 0.20656	+ 1.139	+ 0.04936
<b>SELF-SELECTION TERM (<math>\lambda</math>)</b>		+ 0.30306	+ 0.720	+ 0.07242

X<sup>2</sup>Statistic (24) = 70.964 ; Log-Likelihood = -240.42;  
 McFadden's Pseudo-R<sup>2</sup> = 0.13 ; Number of Observations = 588

\* = Statistically significant at the 10 percent level (>1.28)  
 \*\* = Statistically significant at the 5 percent level (>1.64)

**Table 5.6: Prediction Success Table  
 For the Self-Employed/Not-Self-Employed Equation**

Actual	Total	Predicted		Prediction Success Rate
		Self-Employed	Not-Self-Employed	
Total	588	27	561	84%
Self-Employed	105	20	85	19%
Not-Self-Employed	483	7	476	98%

### 5.2.1 Human Capital Variables

Literature on the effect of age on self-employment provides evidence that as individuals get older, they have a higher propensity to be self-employed. In this study, the log form of age is used to allow for the increasing effects of age on self-employment. Although of the correct sign, the study did not find the probability of being self-employed increasing with age in rural Virginia.

Consistent with other studies, this study found education to have a stronger affect on the likelihood of being self-employed for females than males. The education variable which is positive and significant for women, indicates that for every additional year of education at the mean, the likelihood of being self-employed increases by almost 2 percent. For men, the education variable shows an overall positive effect on self-employment, but the variable is not significant.

Human capital built through investments in experience is assumed to affect the probability of self employment. Experience gained through previous self-employment, and parent's self-employment background were found to significantly increase an individual's probability of being self-employed in rural Virginia as well. When evaluated at the mean, this study shows that individuals with previous self-employment are over 14 percent more likely to be self-employed than those without such experience. The marginal effects of parent's self-employment background were also found to raise (by 4%) an individual's chances of being self-employed. Persons who have already experienced being self-employed, know the "ropes" of starting an

enterprise. And, individuals with parents' who have first-hand knowledge of self-employment are more likely to be self-employed because of the possible exposure to the "right" environment providing invaluable knowledge of the "in's and out's" of the market place. Both variables were found to be strong determinants of the probability being self-employed.

As suggested by several studies, the wage-job experience and wage-job-experience-squared variables in this research show the hypothesized relation with self-employment. The negative direction of the wage-job experience indicates that the probability of being self-employed decreases at a decreasing rate until the 33rd year, after which it increases. This also makes economic sense, since those that have more wage-employment tend to stay in wage-employment savoring the stability and security of a steady income stream without having to bear the risk of managing an entire business operation.

This study has included the wage-job-experience-squared variable in the model to consider the impact of early retirement, and to account for those people who move into self-employment from wage-employment after retirement. This curvilinear effect of previous wage-job experience on the probability of self-employment is positive. Both variables are significant at the five percent alpha level.

Other human capital variables such as good health, on-the-job/vocational training, sex, and residence had no significant influence on the likelihood of being self-employed, although three out of four of these variables had the correct sign.

### **5.2.2 Household Variables**

Household variables such as presence of dependents and marital status have been shown to influence the likelihood of being self-employed. In this analysis, married males were found to have a higher likelihood of being self-employed than married females. The marginal effect of married men on the probability of being self-employed is positive. Contrary to other studies, the variable representing married females did not have any significant impact on the probability of being self-employed.

Other household variables such as presence of pre-school and school-age children did not significantly influence the likelihood of participating in self-employment for either males or females.

### **5.2.3 Income Variables**

Unearned income and employed household member other than the spouse were the only income variables that were statistically significant. Variables representing household assets include unearned income, and whether the spouse and other household members are employed.

The existence of multiple income earners and income sources is expected to increase the likelihood of participation in self-employment. Such income sources act like an "insurance," encouraging individuals to try riskier activities. This is reflected by the positive sign of the unearned variable, and the significant influence it has on explaining the probability of being self-employed.

The presence of other household members contributing to the income pool had a significant influence on self-employment probability as well. In accordance with previous studies, the variable's significant positive sign suggests that additional income sources do serve as a safety buffer, encouraging self-employment. Contrary to expectations, the likelihood of self-employment was not significantly affected by the presence of employed spouse, for both men and women.

#### **5.2.4 Labor Demand Variables**

The variables included to account for an area's labor market conditions—unemployment rate and rural location—do not significantly influence the probability of being self-employed in non-metropolitan Virginia.

#### **5.2.5 Self-Selection Term**

The selectivity bias term,  $\lambda$ , included as a regressor to correct for self-selection bias among those in the labor force, was insignificant. The insignificance of this variable indicates that the sub-sample of individuals participating in the labor force may be free of self-selection bias.

#### **5.2.6 Summary**

The results from the self-employed/not-self-employed equation show that human capital variables such as education and labor market experience, in the form of

both previous self-employment, wage-job experience, and parent's self-employment background, are determinants of the probability of being self-employed. This study found that in rural Virginia, education positively affects the probability of being self-employed for both men and women, but the difference between the two was insignificant.

Household characteristics such as being married, presence of pre-school and school-age children were hypothesized to influence the probability of being self-employed. In this study, all but one variable was shown to have little influence on determining the probability of being self-employed, for both men and women. In this study, marriage was found to increase the probability of being self-employed for men. On the other hand, marriage did not increase the likelihood of being self-employed for women.

Financial characteristics included variables such as unearned income, and whether the spouse and other household members are employed. Unearned income and employed household member other than the spouse were the only income variables that were statistically significant.

Labor demand variables representing local labor conditions were all insignificant and therefore not any different from zero.

The self-employed/not-self-employed equation correctly predicts only 19 percent of the self-employed. This low prediction success rate (shown in Table 5.6) indicates a poor fit, which could have resulted due to a growing similarity between

self-employed and wage-employed characteristics, especially if unemployed wage-employed individuals move in and out of self-employment. A poor fit could also be due to a lack of appropriate variables, other than demographic and socio-economic variables. Furthermore, results from similar research have not yielded anything more definite. As Rees and Shah (1986), conclude, there is more to the determinants of self-employment than age and education—the only variables they found to be significant—and suggest the need to for further research "in this under-researched area."

### **5.3 Single Equation Self-Employed/Not-Self-Employment Model**

The self-selection term functions as an omitted variable to test whether there is some unobserved difference between the participating and not-participating individuals, which is not reflected by the variables in the model. When the self-selection term is not significant, it implies that any difference between participating and not-participating individuals are adequately captured by the model. The insignificance of the self-selection term suggests that the self-employed/not-self-employed equation can be directly estimated from the whole sample (Heckman, 1979).

Because of the absence of self-selection bias, a single equation, self-employed/not-self-employed model was run on the entire sample. Tables 5.7 and 5.8 present the results. The estimates from this single equation probit reveal that seven

out of 23 variables are significantly different from zero, although many of the insignificant variables do have the hypothesized signs. The five variables that are statistically significant in both the single equation model and in the self-employed/not-self-employed equation of the two-equation model are education, previous self-employment, parent's self-employment background, employed household members other than the spouse, and married males. Log of age and the unemployment rate were found to be significant only in the single equation model. Wage-job experience, wage-job-experience-squared, and unearned income, which were significant in the self-employed/not-self-employed equation of the two-equation model, were insignificant in the single equation model.

Using the goodness-of-fit measure, the McFadden pseudo- $R^2$  statistic of 0.08 reveals a poor fit. Furthermore, the prediction success rate shows a highly naive model, in that the model is 99 percent zero fit. The model correctly predicts 99 percent of the not-self-employed category, but only one self-employed person was correctly predicted (Table 5.8).

**TABLE 5.7: Regression Results for the Single Equation  
Self-Employed/Not-Self-Employed Model  
Dependent Variable: Self-Employed=1**

Sample Size = 851

Independent Variable	Expected Sign	MLE Coefficient	t-ratio	Marginal Probability
Intercept		- 0.16424	- 0.132	- 0.02966
<b>Human Capital:</b>				
Log(Age)	+	- 0.44963	- 1.565*	- 0.08120
Good Health	-	- 0.10278	- 0.543	- 0.01856
Education	+	+ 0.07749	+ 2.383***	+ 0.01399
Male and Education	+	- 0.02714	- 0.664	- 0.00490
Training	-	+ 0.09761	+ 0.798	+ 0.01763
Wage-Job Experience	-	- 0.01410	- 0.888	- 0.00255
Wage-Job Experience Squared	+	+ 0.00023	+ 0.776	+ 0.00004
Male	+	+ 0.16239	+ 0.267	+ 0.02933
Previous Self-Employment	+	+ 0.46301	+ 2.889***	+ 0.08377
Parents' Self-Employment Background	+	+ 0.16304	+ 1.354*	+ 0.02944
Residence	-	- 0.15651	- 1.196	- 0.02826
<b>Household:</b>				
Married	+	- 0.31413	- 1.041	- 0.05673
Male and Married	+	+ 0.69430	+ 1.646***	+ 0.12539
Children < 6	+	- 0.28798	- 1.051	- 0.05201
Male and Children < 6	-	+ 0.35603	+ 1.051	+ 0.06430
Children 6 - 18	+	+ 0.07274	+ 0.387	+ 0.01314
Male and Children 6 - 18	-	- 0.12286	- 0.486	- 0.02219

Continued on the next page...

**TABLE 5.7: Continued...**

Independent Variable	Expected Sign	MLE Coefficient	t-ratio	Marginal Probability
<b>Income:</b>				
Unearned Income	+	+ 0.003	+ 0.498	+ 0.001
Employed Spouse	+	+ 0.07924	+ 0.279	+ 0.01431
Male and Employed Spouse	+	- 0.22574	-0.683	- 0.04077
Employed Household members Other than the spouse	+	+ 0.45460	+ 2.917**	+ 0.08210
<b>Labor Demand:</b>				
Unemployment Rate	+	- 0.04248	- 1.359*	- 0.00767
Rural	+	+ 0.14888	+ 0.911	+ 0.02689

X<sup>2</sup>Statistic (23) = 52.753 ; Log-Likelihood = -291.57 ;  
 McFadden's Pseudo-R<sup>2</sup> = 0.08 ; Number of Observations = 851

\* = Statistically significant at the 10 percent level (> 1.28)

\*\* = Statistically significant at the 5 percent level (> 1.64)

**Table 5.8: Prediction Success Table  
 For the Single Equation Self-Employed/Not-Self-Employed Model**

Actual	Total	Predicted		Prediction Success Rate
		Self-Employed	Not-Self-Employed	
Total	851	2	851	88 %
Self-Employed	105	1	104	1 %
Not-Self-Employed	746	1	745	99 %

## 5.4 Summary

In an attempt to identify those characteristics important in explaining the probability of self-employment, a two-equation probit model was used, as suggested by Heckman (1979). The decision to be self-employed is assumed to be a two-step process, with employment-type selection decisions made after the labor force participation decision. In keeping with the structure of this chapter, the probability of labor force participation is explained first.

From the analysis of the participating/not-participating probit equation, it is evident that human capital characteristics play an influential part in determining who is likely to be in the labor force. The finding that individuals with higher levels of education, job-related and vocational training, and wage-job experience are more likely to be in the labor force is not unexpected. In agreement with previous studies, the results show that education positively affects the likelihood of participation for both males and females, and that the marginal effect of one extra year of education at the mean is similar for both men and women, at the ten percent alpha level. In addition, having good health was shown to be strong determinant of the likelihood of participating in the labor force.

This study also shows that the presence of pre-schoolers (children under 6), and an employed spouse all decrease the probability of being in the labor force for women. For men, the variables show a positive association, consistent with other studies. The results indicate that for men, the marginal effects of the presence of

preschool children and employed spouse significantly increased the likelihood of seeking employment.

The results from the self-employed/not-self-employed probit equation reveal that the probability of being self-employed does not increase with age in rural Virginia. Previous self-employment and wage-employment experience were significant in explaining the probability of self-employment in this analysis. The probit equation reports that having more than 33 years of wage-job experience actually increases a person's probability of being self-employed. This is evident in older, closer to retirement age individuals, who are increasingly turning to self-employment from wage-employment. Those with fewer than 33 years of wage-job experience are more likely to be wage-employed than self-employed, perhaps because of increasing seniority, the advantages of remaining in wage-employment are perceived to be greater.

In addition, consistent with other studies, women with more education had a higher probability of being self-employed than men. This study found that for every extra year of education at the mean (high school), the likelihood of being self-employed increased significantly for women. However, the marginal effect of education on the probability of being self-employed was the same for males and females. Other human capital variables such as on-the-job/vocational training and health were not significant in this analysis.

A significant note is the finding that additional sources of income such as unearned income and employed household members other than the spouse, have a positive affect on the probability of being self-employed. The presence of employed household members other than the spouse contributing to the income pool significantly increased the likelihood of being self-employed by 2.2 percent.

The predictions for the self-employed and not-self-employed equation were weak and naive. Given the inadequacy of the self-employed/not-self-employed equation in the 2-equation model, it was not surprising that the predictions for the single equation model was also poor.

## **CHAPTER 6**

### **Policy Implications and Conclusions**

The primary objective of this research has been to identify those factors that influence the probability of being self-employed as opposed to not-self-employed in rural Virginia. The contribution of this study is that it provides information on rural self-employed individuals. To the author's knowledge, no similar study exists. Thus, the information provided here, even with its limitations, is a unique contribution to the literature. A two-equation probit model was formulated and the results were presented in chapter five. This chapter presents the policy implications, conclusions and recommendations.

#### **6.1 Summary of Research**

A two-equation probit model was estimated using a sample of rural Virginians. Following Heckman's (1979) method, the two-equation model was estimated in two steps. Both probit equations were estimated by the maximum likelihood method. In the first step, a dichotomous probit equation was estimated for the entire sample to determine the probability of participating in the labor force as opposed to not participating in the labor force. The fit of this equation was good.

A second probit equation, which determined the probability of being self-employed versus not-self-employed, used a sub-sample of only those who were found to be employed in the first equation. This second dichotomous probit was estimated using a sample selection term estimated from the first equation as a regressor. The selection term, which is included as a correction factor for possible selection bias (due to the use of a restricted sample), was found to be insignificant and to have no effect on the probability of being self-employed. The fit for this equation was poor.

Because the sample selection term was statistically insignificant, a single equation self-employed/not-self-employed probit model was run on the entire sample. The estimates from this single equation probit model varied from the two-equation self-employed/not-self-employed probit. Five variables were significant in both models and three variables, which were significant in the two-equation model, were not significant in the single equation model. The poor fit of the single equation model is not surprising given that the two-equation model was also a poor fit.

Since many studies found that male responses to be different from female responses to both labor force participation and self-employment, gender specific variables were included in all equations, where applicable, and as guided by theory and previous empirical studies.

## **6.2 Summary of Results**

### **6.2.1 Labor Force Participation Equation**

The results from the estimation of the participating/not-participating equation support the hypothesis that those who participate in the labor force are different from those that are not in labor force based on almost all the human capital variables used in the equation. Human capital characteristics such as age, education, training, wage-job experience, and good health are significantly and positively related to the probability of participating in the labor force. Education, however, had a greater impact on women's participation than on men's. The curvilinear effect of age also was evident in rural Virginia. The importance of these variables reiterates the suggestion that investments made in oneself, whether through formal education, on-the-job/vocational training, skills obtained through wage-job experience, or health improvements, all increase one's productivity and enhance one's welfare, eventually. Those that start with higher education are likely to have access to higher paying jobs, and receive higher wages thereby encouraging labor force participation (Becker, 1980). Training and wage-job experience also contribute to higher wage-rate.

The results in this study do not support the hypothesis that men are more likely to participate in the labor market. The male variable was found to have the wrong sign and not any different from zero.

Consistent with other studies, this analysis shows that presence of pre-school children places a constraint on the labor force participation of women, and increases

the participation of men. Other household characteristics such as being married, and presence of school-age children were found to be insignificant.

Additional sources of income such as unearned income, and employed spouse (for males) were also important determinants of participation in the labor market. Unearned income shows it posited inverse association with the likelihood of participation. And, males with employed spouse show a positive relationship with the probability of being in the labor force.

Results from this study confirm the hypothesized negative relation between the likelihood of labor force participation and the local area unemployment rate.

### **6.2.2 Employment-type Selection Equation**

Results from this study confirm other findings that human capital characteristics such as education, previous self-employment experience, above average wage-job experience, and more than one income source, positively influence the probability of being self-employed. Consistent with other studies, education had a positive effect on the probability of being self-employed, and there were no difference between males and females. Education, an investment in oneself, enhances an individual's skills necessary for his/her trade. Education affects the efficiency of the production process because, as Rees and Shah (1986) report, the more educated tend to be better informed and better able to seek out information important for their business venture.

Self-employment maybe seen by many older individuals as an attractive and easier way to partially retire and maintain continuity, flexibility, and independence while at work. As the results further reveal, having more than the 33 years of wage-job experience increases a person's probability of being self-employed. This is evident in older, closer to retirement aged individuals, who turn to self-employment from wage-employment. The probability of being self-employed decreased with wage-experience up to 33 years, indicating that until this point the advantages of remaining in wage-employment are greater than self-employment.

The positive association between the probability of self-employment and additional sources of income such as unearned income and employed household member other than the spouse demonstrates the importance of liquidity for self-employment. Access to a stream of additional income mitigates the risk factor, and affords the individual the opportunity to attempt uncertain endeavors. Studies, such as the one conducted by Evans and Leighton (1989), also found that the probability of self-employment increased with increases in the net worth. Therefore, the significance and positive direction of both unearned income and employment earnings of other household member variable were anticipated. Both variables were significant at the 10 percent alpha level.

This study also found marriage to have a stronger impact on males than on females. For men, marriage increased the probability of being self-employed.

Overall, two key findings emerge from the analysis with respect to identifying the determinants of being self-employed. These two findings are: that human capital investments in the form of education and particularly, experience, play an influential role in determining the probability of being self-employed; and that access to and availability of financial resources are important elements in determining an individual's likelihood of being self-employed.

### **6.2.3 Single Equation Self-Employed/Not-Self-Employed Model**

The estimates from the single equation probit model reveal that only seven out of 23 variables are significantly different from zero, although many of the insignificant variables do have the hypothesized signs. The seven variables that are important in this model are  $\log(\text{age})$ , education, previous self-employment, parents' self-employment background, married males, employment earnings of household members other than the spouse, and unemployment rate.

The only "new" information in the single equation model is that the log of age and unemployment rate, which were insignificant in the two-equation model become significant, indicating that the probability of being self-employment increases with age in rural Virginia. The inverse relationship between the unemployment rate and self-employment indicates that as the local area unemployment rate increases, the probability of self-employment decreases, contrary to expectations.

Wage-job experience, wage-job-experience-squared, and unearned income, which were significant in the two-equation model, were insignificant in this equation.

It is unclear as to why these variables turn out to be insignificant, especially in the absence of a self-selection bias.

Overall, the results from both the two-equation and single equation models support the findings of other studies. This is especially true for the participating/not-participating equation. However, the results, for both the two-equation self-employed/not-self-employed probit and the single equation models are weak. But, results from similar research have not yielded anything more definite. As Rees and Shah (1986), conclude, there is more to the determinants of self-employment than age and education—the only variables they found to be significant—and suggest the need to for further research "in this under-researched area."

### **6.3 Limitations**

This research analyzed the characteristics that determine the likelihood of self-employment in non-metropolitan Virginia. The sample consisted of individuals other than farmers. Given that this study is specific to non-metropolitan Virginia, care should be exercised in extrapolating the results to other regions because it is unclear whether the results from this study would be applicable to dissimilar environments.

Even though farming is another type of self-employment, it is also not clear if the results could be applied or even be appropriate to Virginia farmers.

Because cross-sectional data were used in this analysis, one should be cautious in extending the results from this study as it is not known if people respond differently over time.

## 6.4 Policy Implications

If rural economic revitalization is a goal, then emphasis must be placed on understanding rural citizens and their choice of economic activities. Attention must also focus on alternative sources of employment, such as self-employment, since this is an important source of employment and income in rural areas.

This research is the only known study looking at self-employment in rural areas. Results from this study, essentially, illustrate the importance of two types of variables in determining the probability of being self-employed: human capital and financial resources. Human capital variables specifically indicate the importance of education and experience, which translates to knowledge and market information gained through practice and exposure to the right kind of environment.

This study, therefore, suggests that rural policy could be directed at expanding opportunities to increase formal education, since education has a strong influence in determining the likelihood of being self-employed. As mentioned earlier, the rapid pace of technological changes/innovations is making self-employment a viable option for many (Blau, 1987). Therefore, supporting education that is accessible to rural Virginians and that allows them to use of these innovations may increase the success of the self-employed.

The results of this research also point to exploring ways to substitute for experience, given that variables such as wage-job-experience-squared, previous self-employment experience, and parent's self-employment background, were found to

significantly influence the probability of being self-employed. Research is needed to determine if training and access to electronic or physical up-to-date information, and other mediums of information, such as seminars and workshops substitute for experience.

A suggestion is that training and information should specifically address, not only the basics of operating an enterprise, but also the importance and 'how-to' of marketing and management. The availability of information can enhance existing small business centers and chamber of commerce with information on business ideas, regional/national/international business opportunities, general market information, etc. which in turn can be made accessible to the self-employed person.

The results from this study also suggest that availability of income is an important factor in determining the probability of being self-employed. This finding is not unexpected given that the availability of additional sources of income could be lowering risk and "freeing" individuals to attempt riskier opportunities.

Other research shows that the self-employed often obtain start-up and working capital from sources other than formal lending institutions (Hoke, 1990). If further research finds that lack of capital is a constraint, then policies to improve access to capital might be considered.

Targeting rural programs based on the variables found significant in this study, which are easily identified demographic variables, does not seem feasible given the poor prediction rate of the models. The inability of the models to successfully predict

self-employed individuals could suggest that they do not differ significantly from the wage-employed. It could also mean that the self-employed and the potentially self-employed are not readily identifiable based on easily available demographic characteristics. This information-gap also suggests the need to explore other measurable characteristics such as the need to direct, risk-taking, self-worth, self-reliant attitude, etc. to accurately explain self-employment.

More recently, self-employment has also been promoted as a strategy to pull the unemployed out of unemployment. This approach is based on studies (eg. Lichtenstein, 1990) which propose self-employment as the avenue of employment for the unemployed. This study, however, found that the unemployment rate had no impact on the probability of being self-employed, suggesting that even if unemployed individuals enter self-employment, they may not remain as self-employed long. It is unclear why they do not continue to be self-employed, but some reasons could be that the business was unsuccessful, or they returned to wage-employment. This suggests that more research is needed to understand whether the self-employment of unemployed individuals is really economically feasible.

## **6.5 Future Research**

The poor prediction power of the self-employed/not-self-employed suggest the need to rethink the model. Many of the socio-economic variables used in the models were not significant. Reasons such as the possible growing similarities between the

self-employed and wage-employed in personal characteristic and professional requirements, can be offered to explain the weak finding. But, what this also suggests, is the need to consider characteristics from disciplines such as psychology and business management to account for possible attitudes and behaviors, such as risk-taking, independence, the need to be one's own boss, self-worth, etc., not easily captured by demographic and other economic variables.

This research focuses on the non-farm self-employed in rural Virginia. Additional research is needed to explore the similarities and differences between rural and urban self-employment. In addition, a comparison of the farm and non-farm self-employed, which is currently lacking, would contribute significantly to the literature. Finally, research on self-employment in other rural areas is important to determine if the findings of this research are generalizable.

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## Vita

Bageshwari Sherchand, a native of Kathmandu, Nepal, obtained her O levels from St. Mary's High School in Kathmandu, Nepal. After completing her Intermediate in Science, with a major in physical sciences, she joined a local non-governmental-organization where, for several years, she actively participated in grassroots development activities. A major part of the development activities focused primarily on employment and income generation, women in development, and nutrition/health programs. Because of her interest in economic development, she enrolled at Virginia Polytechnic Institute and State University in Blacksburg, Virginia. She received a B.S. in Agricultural Economics in 1988. She subsequently entered the Masters program and completed the degree in the Department of Agricultural Economics at Virginia Tech. Ms. Sherchand is currently working in the field of international economic development.

